stromasys
legacy server emulation

Charon-AXP V4.10
for Windows
User's Guide

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Introduction

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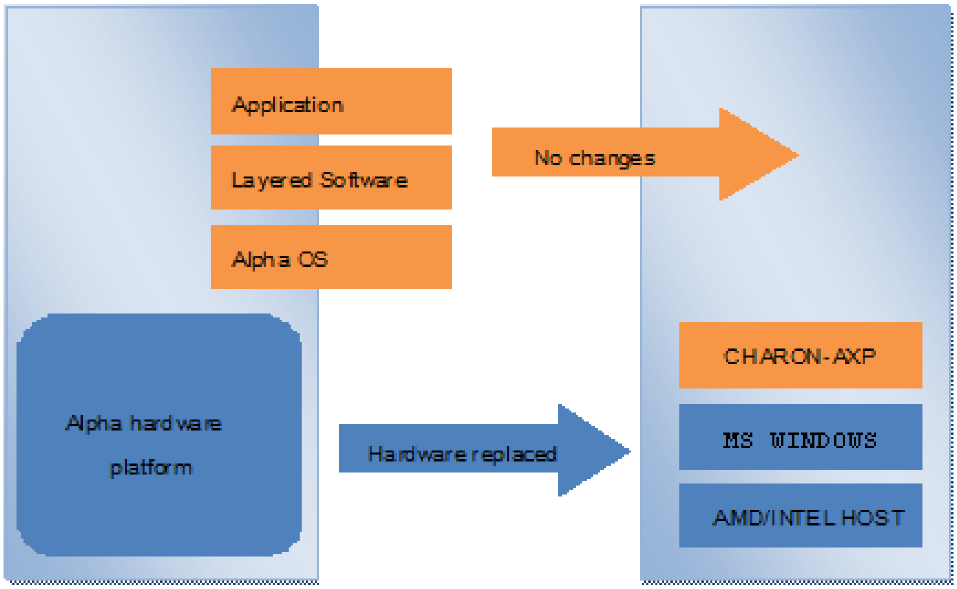
General Description

HP Alpha Hardware Virtualization allows users of HP Alpha (Previously known as DIGITAL Alpha) computers to move application software and user data to a modern Intel or AMD based x64 compatible platform without having to make changes to software and data. HP Alpha Hardware Virtualization is a software solution that replaces HP Alpha hardware.



This approach is best understood when the HP Alpha Hardware Virtualization Software is viewed as a special interface between the old HP Alpha software and a new hardware platform. Basically, the CHARON software presents a HP Alpha hardware interface to the original HP Alpha software, so that the existing software cannot detect a difference. This means no changes have to be made to the existing software. User programs and data can be copied to a new modern industry standard server (64-bit Intel or AMD) and continue to run for many more years.

The HP Alpha virtualization software is designed to replace single and multi-CPU HP Alpha computer systems, including:

- AlphaServer 400
- AlphaServer 800
- AlphaServer 1000
- AlphaServer 1000A
- AlphaServer 1200
- AlphaServer 2000
- AlphaServer 2100
- AlphaServer 4000
- AlphaServer 4100
- AlphaServer DS10
- AlphaServer DS10L
- AlphaServer DS15
- AlphaServer DS20
- AlphaServer DS25
- AlphaServer ES40

- AlphaServer ES45
- AlphaServer GS80
- AlphaServer GS160
- AlphaServer GS320

The principles of HP Alpha Hardware Virtualization

Virtualized hardware

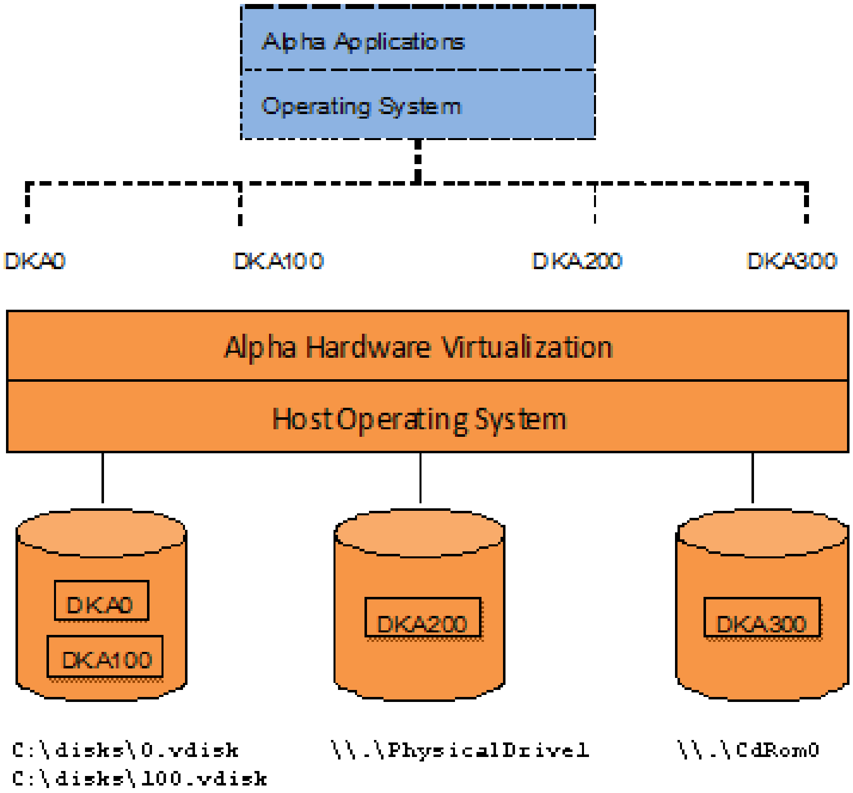
CHARON-AXP virtualizes various HP Alpha architectures and meets or exceeds the performance level of these HP Alpha systems when run on the recommended hardware platform.

The following table shows which hardware boards CHARON virtualizes:

Subsystem	**Covered HP Alpha hardware**
Serial Lines Controllers	On-board serial line port COM2, Family of PCI controllers: PBXDA-BA, PBXDA-BB, PBXDA-AC, PBXDA-AC
IDE/ATAPI CD-ROM Controller	Virtual Acer Labs 1543C
PCI Fibre Channel Controller	KGPSA-CA
PCI SCSI Controller	KZPBA
PCI FDDI Controller	DEFPA
PCI Network Controllers	DE435, DE450, DE500AA, DE500BA, DE602, DE602AA

Host platform

The Virtualization Software presents standard HP Alpha devices to the HP Alpha operating system, allowing the OS to function as though it were still running on a HP Alpha computer. For example, virtual disk container files in a directory or physical devices of the host Windows platform are presented by the Virtualization Software to the HP Alpha OS as emulated SCSI disks attached to a PCI SCSI adapter.



With the use of current storage technology, disks do not have to be physically attached to the Host platform, they can also reside on a SAN or iSCSI storage structure. A similar translation process is also valid for other emulated hardware devices.

About this guide

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Obtaining Documentation

The latest released version of this manual and other related documentation are available on the Stromasys support website at Product Documentation and Knowledge Base.

Obtaining Technical Assistance or General Product Information

Obtaining Technical Assistance

Several support channels are available to cover the Charon virtualization products.

If you have a support contract with Stromasys, please visit http://www.stromasys.com/support/ for up-to-date support telephone numbers and business hours. Alternatively, the support center is available via email at support@stromasys.com.

If you purchased a Charon product through a Value-Added Reseller (VAR), please contact them directly.

Obtaining General Product Information

If you require information in addition to what is available on the Stromasys Product Documentation and Knowledge Base and on the Stromasys web site y ou can contact the Stromasys team using https://www.stromasys.com/contact/, or by sending an email to info@stromasys.com.

For further information on purchases and the product best suited to your requirements, you can also contact your regional sales team by phone:

Region	Phone	Address
Australasia-Pacific	+852 3520 1030	Room 1113, 11/F, Leighton Centre 77 Leighton Road, Causeway Bay, Hong Kong, China
Americas	+1 919 239 8450	2840 Plaza Place, Ste 450 Raleigh, NC 27612 U.S.A.
Europe, Middle-East and Africa	+41 22 794 1070	Avenue Louis-Casai 84 5th Floor 1216 Cointrin Switzerland

Conventions

Notation	Description
$	The dollar sign in interactive examples indicates an operating system prompt for VMS. The dollar sign can also indicate non superuser prompt for UNIX / Linux.
#	The number sign represents the superuser prompt for UNIX / Linux.
>	The right angle bracket in interactive examples indicates an operating system prompt for Windows command (cmd.exe).
`User input`	Bold monospace type in interactive examples indicates typed user input.
<**`path`**>	Bold monospace type enclosed by angle brackets indicates command parameters and parameter values.
`Output`	Monospace type in interactive examples, indicates command response output.
[ ]	In syntax definitions, brackets indicate items that are optional.
...	In syntax definitions, a horizontal ellipsis indicates that the preceding item can be repeated one or more times.
`dsk0`	Italic monospace type, in interactive examples, indicates typed context dependent user input.

Definitions

Term	Description
Host	The system on which the emulator runs, also called the Charon server
Guest	The operating system running on a Charon instance, for example, Tru64 UNIX, OpenVMS, Solaris, MPE or HP-UX

Related documents

- Charon-AXP V4.10 for Windows - User's Guide
- Charon-AXP V4.10 Build 202-03 for Windows 64 bit - Release Notes
- Charon-AXP V4.10 Build 202-05 for Windows 64 bit - Patch Notes
- Charon-AXP V4.10 Build 202-06 for Windows 64 bit - Patch Notes

CHARON-AXP for Windows installation

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Introduction

The CHARON-AXP product is distributed in the form of a zip file that contains the CHARON-AXP installation executable ("InstallShell.exe"). The InstallShell procedure offers the option to select which modules to install (optionally). It is recommended to install all modules (the default) by not selecting "Display components" checkbox.

⚠ Before installing CHARON-AXP, please perform all hardware and software host system checks to ensure the host platform meets minimum CHARON-AXP installation requirements

Optionally, create a specific CHARON username with administrative privileges

CHARON-AXP installation steps:

- Extract the CHARON-AXP installation procedure files from its archive
- Install CHARON-AXP by running the "InstallShell.exe" installer and follow the instructions
- Install CHARON-AXP license (hardware dongle or software license)
- Configure CHARON-AXP host system, for example, network adapter, disable some Windows features (see Host system preparation further), etc.

Hardware Requirements

Number of CPU cores

Each CHARON-AXP emulated CPU requires a corresponding physical core. The total number of host CPUs must exceed the number of emulated CPUs since some of the host CPUs must be dedicated to serving CHARON I/O operations and fulfil host operating system needs. If several CHARON instances run in parallel, the required number of CPU cores is cumulative.

The following table shows the minimum and recommended number of CPUs required for each models for one instance (note that each model instance is able to run on 2 CPU cores hosts, but this configuration does not support emulation of all the virtual CPUs):

CHARON-AXP models	Minimum number of host CPU cores	Recommended number of host CPU cores
HP AlphaServer 400 - HP AlphaServer 4100	2	2
HP AlphaServer DS10/DS10L/DS15	2	2
HP AlphaServer DS20/DS25	4	4
HP AlphaServer ES40/ES45	6	8
HP AlphaServer GS80	10	16
HP AlphaServer GS160	18	32
HP AlphaServer GS320	34	48

When starting, the CHARON-AXP software checks the available number of host CPU cores. This check is based on the maximum number of AXP CPUs that can be emulated if this number is not restricted by the "n_of_cpus" parameter. If the available number of host CPU cores is below this number, CHARON-AXP will issue a warning message even if the requirements for the configured number of AXP CPUs are fulfilled. The CHARON-AXP software will work despite this warning if the requirements for the configured number of AXP CPUs are fulfilled.

⚠ **Hyperthreading must be switched off completely**. Disable hyperthreading in the BIOS settings of the physical host or, for a VMware virtual machine, edit the virtual machine properties, select the Resources tab then select Advanced CPU. Set the Hyperthreaded Core Sharing mode to *None*.

CPU type and speed

Since CHARON-AXP utilizes LAHF instructions in the HP Alpha CPU emulation, please avoid using early (pre-2005) AMD64 and Intel 64 CPUs for the CHARON host system since they lack this capability. AMD Athlon 64, Opteron and Turion 64 revision D processors from March 2005 and Intel Pentium 4 G1 stepping from December 2005 are LAHF instruction capable.

Concerning CPU speed, the general recommendation is that higher CPU frequency is better since it allows better emulated HP Alpha performance. The minimum recommendation is at least 3 GHz.

Operative memory

The minimum host memory size depends on the amount of HP Alpha memory to be emulated and the number of CHARON-AXP instances to be run on one host.
The minimum host memory is calculated according to the following formula:

The minimum host memory = (2Gb + the amount of HP Alpha memory emulated) per CHARON-AXP instance.

Disk storage

The total amount of disk space required for CHARON-AXP can be calculated as a sum of all the disk/tape image sizes plus 500 MB for the CHARON software plus space required for the normal host OS. Temporary disk storage is often needed when setting up a new server, for saveset storage, software installation kits, etc.

Ethernet adapters

CHARON-AXP networking requires dedicated host Ethernet adapters; their number must be equal to the emulated adapters to be configured in CHARON-AXP. One adapter (optionally) can be left to the host for TCP/IP networking etc.

Software Requirements

- Microsoft Windows Server 2016 Standard and Datacenter Editions, 64 bit version
- Microsoft Windows Server 2012 R2 Standard and Datacenter Editions, 64 bit version (please notice that only R2 revision is supported)
- Microsoft Windows Server 2008 R2 (SP1) Standard and Enterprise Editions, 64 bit version (please notice that only R2 revision is supported)
- Microsoft Windows 7 Professional and Ultimate (SP1) Editions, 64 bit version
- Windows 8.1 Professional Edition, 64 bit version
- Windows 10 Professional and Enterprise Editions, 64 bit version
- VMware ESXi 5.5 and 6.x up to 6.7 (requires a supported Windows operating system on top of a ESXi virtual machine)
- Microsoft Hyper-V (requires a supported Windows operating system on top of a Hyper-V virtual machine)

Host system preparation

⚠ All antivirus, screen saver, automatic (scheduled) backup and any other CPU consuming software as well as software that is able to temporarily lock CHARON files (such as automatic indexing) must be turned off, uninstalled and disabled. Alternatively it is also possible to exclude all CHARON executables and material folders from scanning for viruses, but please note that scanning slows down CHARON host anyway - it may be critical for some installations requiring maximum performance.

The power scheme must be set to "High Performance" with all the "Sleep" and "Standby" modes turned off.

The automatic installation of Microsoft updates must be disabled. MS updates to the CHARON host must be done only in specific service maintenance periods established by the system administrator. Before applying new updates one must shutdown the operating system running on CHARON and stop all the running CHARON instances and services.

⚠ Secure boot is not supported by CHARON at the moment since in this case host OS will not accept signature of distributed NDIS drivers needed for CHARON networking. Disable secure boot or use CHARON without networking (select "Ignore" when installation procedure reports that NDIS driver is not signed).

If a network-wide license (red dongle or software license) is going to be used, do the following:

- *On server side (where the network license will reside)*: open port 1947 for both TCP and UDP
- *On the client side*, if broadcast search for remote licenses is to be used, UDP traffic from port 1947 of the license server to ports 30000-65535 of the client must be permitted.
- *Both on server and client sides*: set default gateway

Please consult with Windows online documentation for details.

> If stricter firewall rules are required, it is possible to open the ports 30000-65535 and 1947 only for the "Sentinel HASP License Manager" (hasplms.exe) service (installed by CHARON-AXP).

If any magneto-optical (MO) drive installed on host system is going to be used with CHARON (mapped as "\\.\PhysicalDrive<N>" to CHARON emulated disk controllers) the host "MediaChangeNotification" (MSN) service must be switched off manually for these drives according to the following procedure:

1. Type "regedit" in the search field under "Start" menu or press Windows+R and enter "regedit"; press Enter to run the program.
2. Find the "AlwaysDisableMCN" parameter in the following path:

```
HKEY_LOCAL_MACHINE
 + SYSTEM
    + CurrentControlSet
       + Enum
          + SCSI
             + Disk&Ven_DEC&Prod_RWZ53_____(C)DEC  <- This one depends on Vendor and Model of your MO drive
                + 5&fd233cf&0&000500 <- This one depends on hardware connection (SCSI ID of MO drive, location of SCSI HBA on the host's mainboard, etc ...)
                   + Device Parameters
                      + MediaChangeNotification
                         + AlwaysDisableMCN = DWORD:00000000
```

3. Change the "AlwaysDisableMCN" parameter to "1", for example: "AlwaysDisableMCN = DWORD:00000001".
4. Reboot the host system.

Before installation

1. Login as the local system administrator ("Administrator") on the host system.
2. Create a special user for running CHARON-AXP (optional). This user must have all the administrative privileges. Please consult with Windows online documentation for details.

   > The CHARON installation procedure will create a special group called CHARON-GRP and the current user will be automatically included to this group. Do not remove this group and do not remove any CHARON user from it, otherwise a problem with virtual memory allocation may appear on CHARON startup.
   >
   > The created user may belong to some domain, but please note that in this case you have to add this user to the CHARON-GRP manually as described in this article, and then reboot the CHARON host.

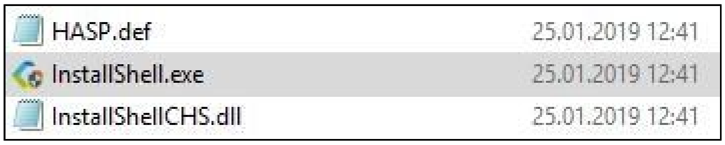
3. Stay logged in as local system administrator ("Administrator") or log off and login as the CHARON-AXP user having administrative privileges (if this option has been chosen).
4. Create a special directory for the CHARON-AXP distribution kit and copy the provided files there.

Upgrade cases

From version	Action
4.7 and below	First uninstall all CHARON products.
4.8 and above	The version 4.10 can be installed directly. ⚠ Please note it is mandatory to update all existing CHARON Virtual Machines to make them run the latest version using the Virtual Machines Manager, VM Configuration tab - otherwise they will remain at the previous installed version.

Distribution preparation

- Extract the content of the distribution archive to the current directory or copy the content of the provided distribution directory to the current directory.
- Run the "InstallShell.exe" file:

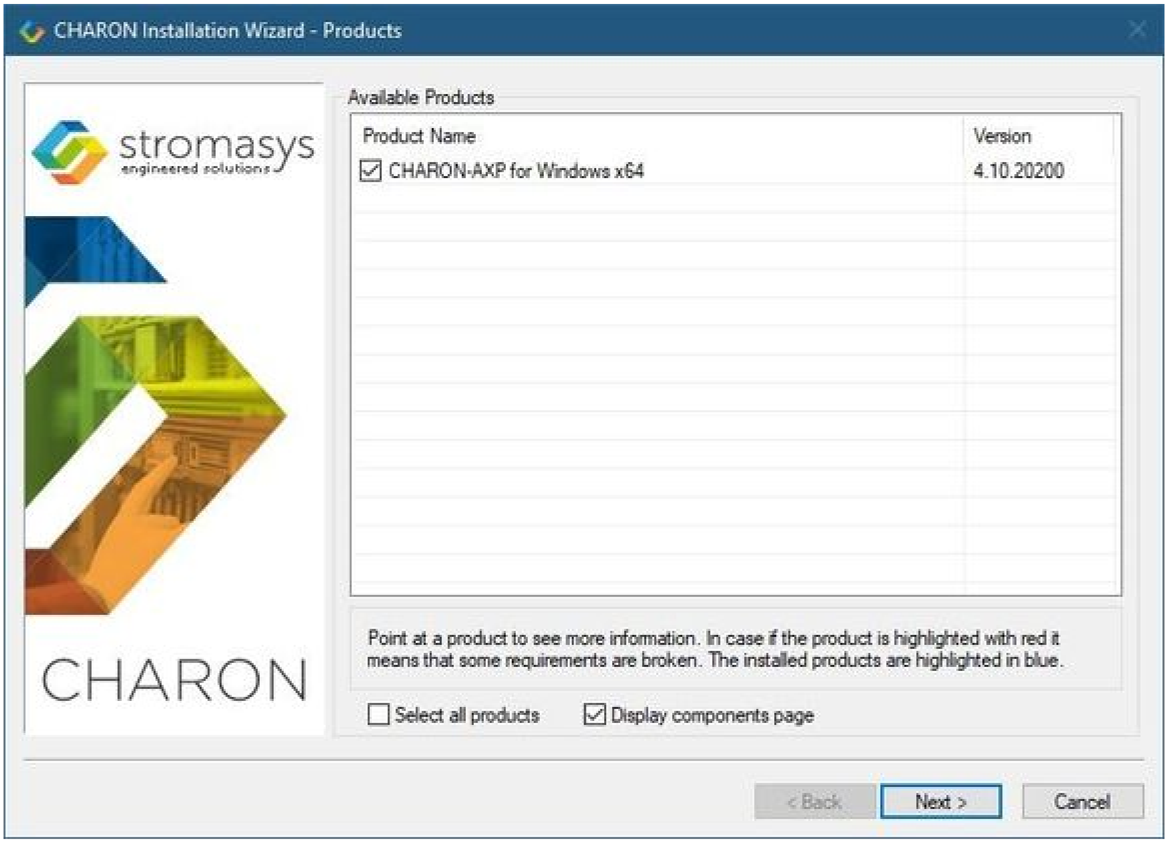


HASP.def	25.01.2019 12:41
InstallShell.exe	25.01.2019 12:41
InstallShellCHS.dll	25.01.2019 12:41

Installation

The following description assumes that this is the first installation of CHARON-AXP on the target host. Installation of additional CHARON products follows the same procedure.

The first dialog lists the CHARON-AXP product:



CHARON Installation Wizard - Products

Available Products

Product Name	Version
☑ CHARON-AXP for Windows x64	4.10.20200

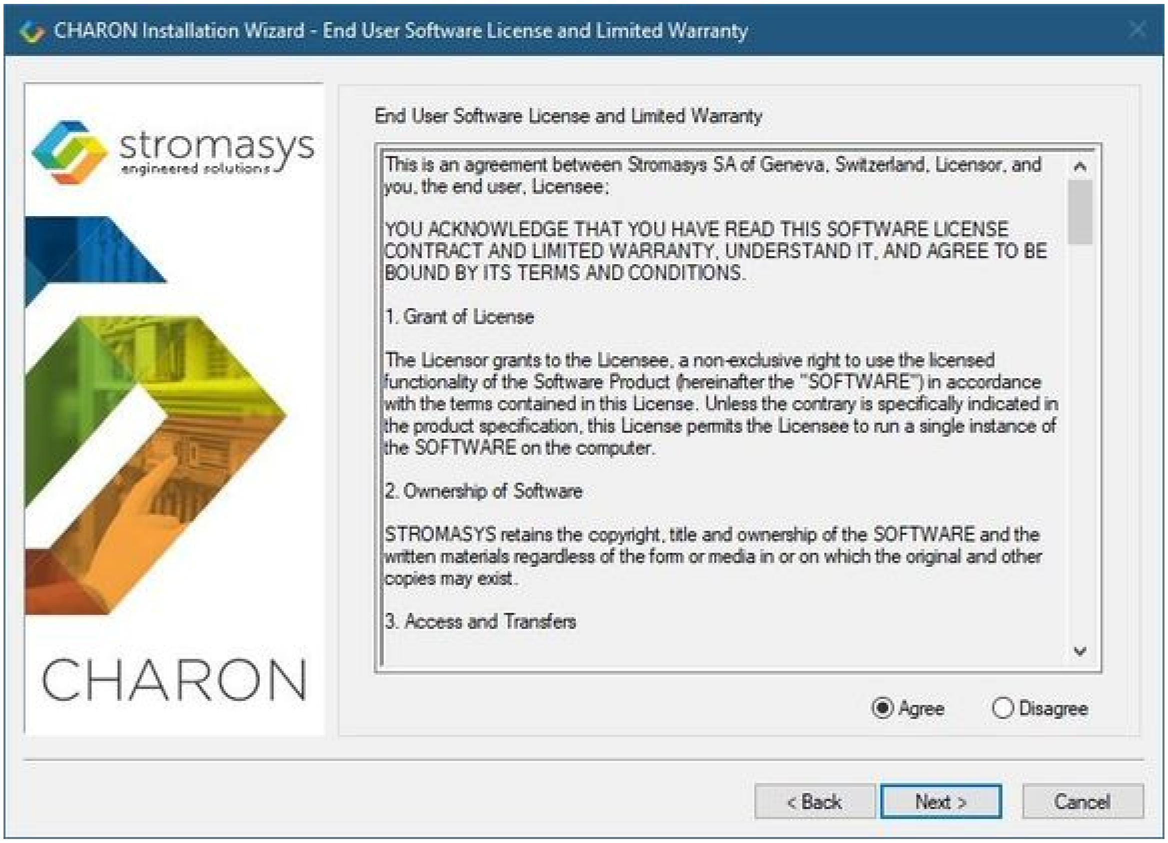
Point at a product to see more information. In case if the product is highlighted with red it means that some requirements are broken. The installed products are highlighted in blue.

☐ Select all products ☑ Display components page

Select the CHARON-AXP product, or all products, by checking the corresponding box. Select the "Display components page" to include the products components page if you need it. Typically it is not required.

⚠ The CHARON products may be highlighted with a red color. This indicates that the CHARON host configuration does not meet CHARON minimal requirements. To see what requirements are not met, point the mouse cursor on that product and a pop-up box with details will appear.

Press the "Next" button.


CHARON Installation Wizard - End User Software License and Limited Warranty
stromasys
engineered solutions
CHARON

End User Software License and Limited Warranty

This is an agreement between Stromasys SA of Geneva, Switzerland, Licensor, and you, the end user, Licensee;

YOU ACKNOWLEDGE THAT YOU HAVE READ THIS SOFTWARE LICENSE CONTRACT AND LIMITED WARRANTY, UNDERSTAND IT, AND AGREE TO BE BOUND BY ITS TERMS AND CONDITIONS.

1. Grant of License

The Licensor grants to the Licensee, a non-exclusive right to use the licensed functionality of the Software Product (hereinafter the "SOFTWARE") in accordance with the terms contained in this License. Unless the contrary is specifically indicated in the product specification, this License permits the Licensee to run a single instance of the SOFTWARE on the computer.

2. Ownership of Software

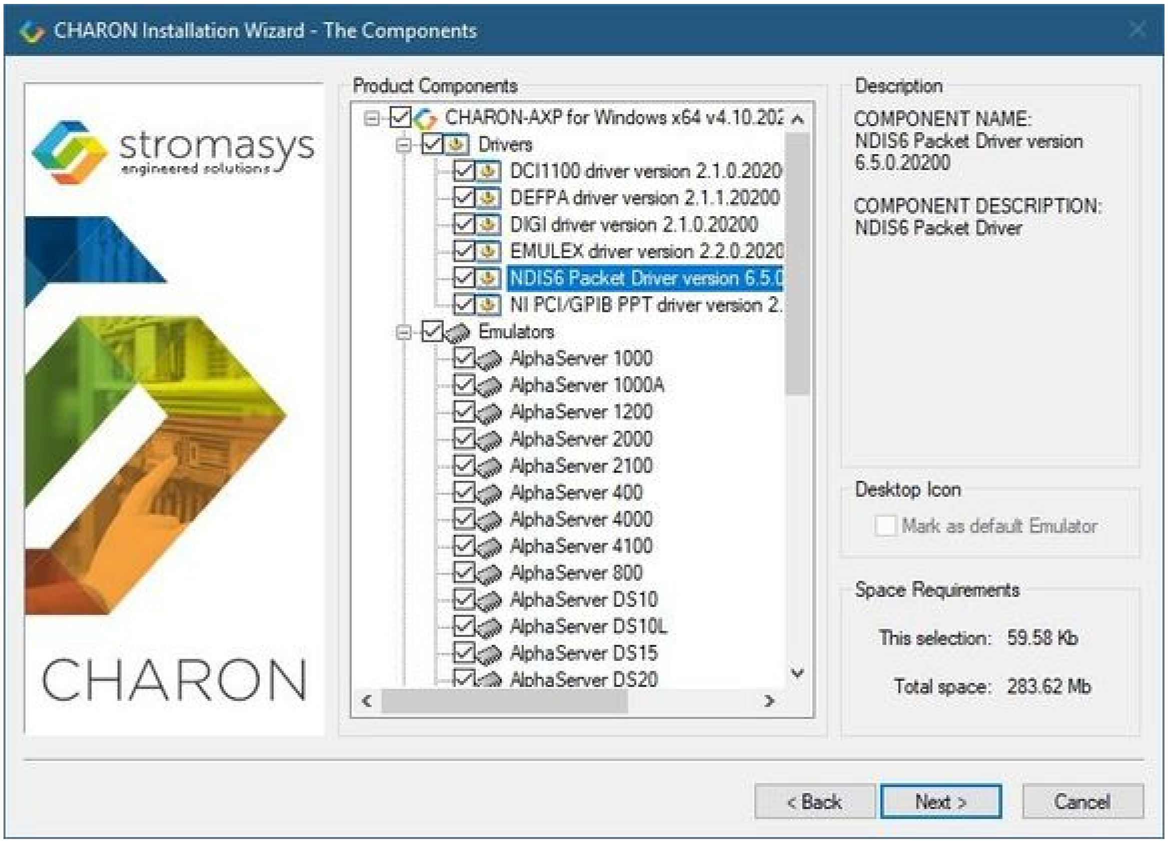
STROMASYS retains the copyright, title and ownership of the SOFTWARE and the written materials regardless of the form or media in or on which the original and other copies may exist.

3. Access and Transfers

● Agree ○ Disagree

Read the license, check "Agree" and press the "Next" button.

If the "Display components page" option was selected, the setup procedure will display a dialog for the CHARON-AXP product components:



CHARON Installation Wizard - The Components

Product Components

- ☑ CHARON-AXP for Windows x64 v4.10.202
  - ☑ Drivers
    - ☑ DCI1100 driver version 2.1.0.2020
    - ☑ DEFPA driver version 2.1.1.20200
    - ☑ DIGI driver version 2.1.0.20200
    - ☑ EMULEX driver version 2.2.0.2020
    - ☑ NDIS6 Packet Driver version 6.5.0
    - ☑ NI PCI/GPIB PPT driver version 2.
  - ☑ Emulators
    - ☑ AlphaServer 1000
    - ☑ AlphaServer 1000A
    - ☑ AlphaServer 1200
    - ☑ AlphaServer 2000
    - ☑ AlphaServer 2100
    - ☑ AlphaServer 400
    - ☑ AlphaServer 4000
    - ☑ AlphaServer 4100
    - ☑ AlphaServer 800
    - ☑ AlphaServer DS10
    - ☑ AlphaServer DS10L
    - ☑ AlphaServer DS15
    - ☑ AlphaServer DS20

Description

COMPONENT NAME:
NDIS6 Packet Driver version 6.5.0.20200

COMPONENT DESCRIPTION:
NDIS6 Packet Driver

Desktop Icon

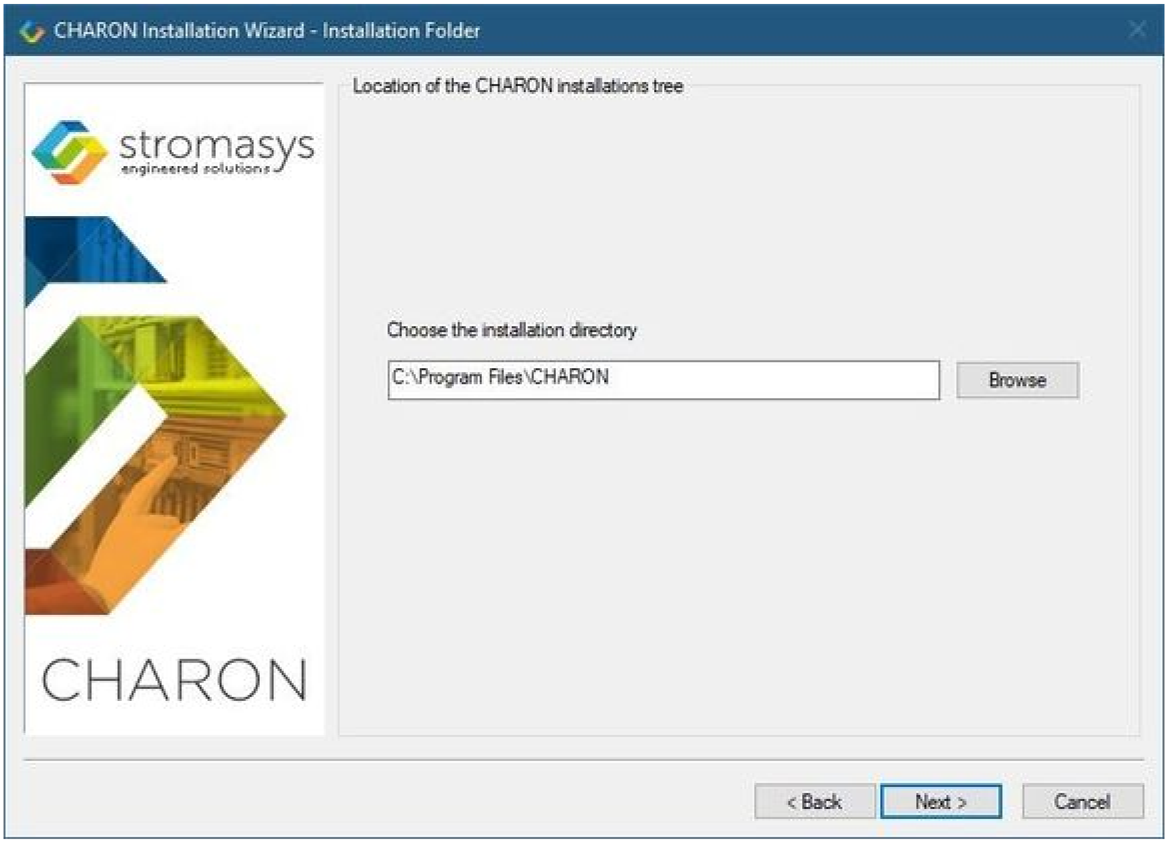
☐ Mark as default Emulator

Space Requirements

This selection: 59.58 Kb

Total space: 283.62 Mb

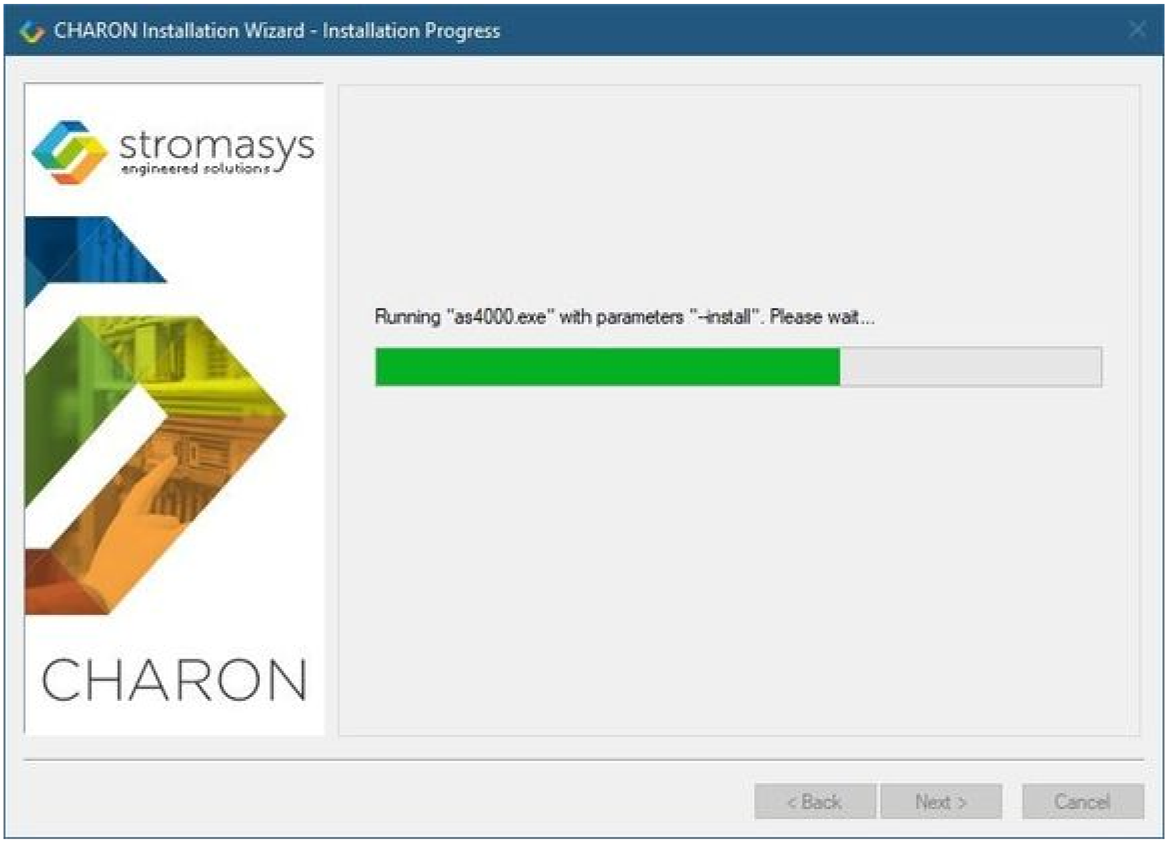
⚠ It is strongly recommended to leave the selection as it is unless you clearly understand what the impact is if you uncheck some modules.


CHARON Installation Wizard - Installation Folder
stromasys
engineered solutions
CHARON
Location of the CHARON installations tree
Choose the installation directory
Browse
< Back
Next >
Cancel

C:\Program Files\CHARON

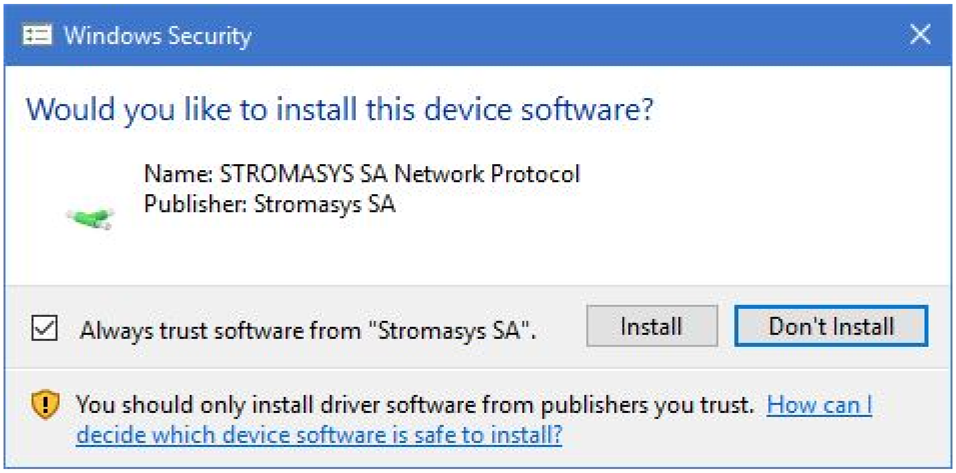
Select a directory to be used for the CHARON installation or use the default. The path can either be entered manually or selected using the "Browse" button.

Once done, press the "Next" button to start the installation of the selected components.



Running "as4000.exe" with parameters "--install". Please wait...

During the CHARON installation procedure, you will have to confirm the installation of the CHARON-specific network driver. Press the "Install" button:



Windows Security

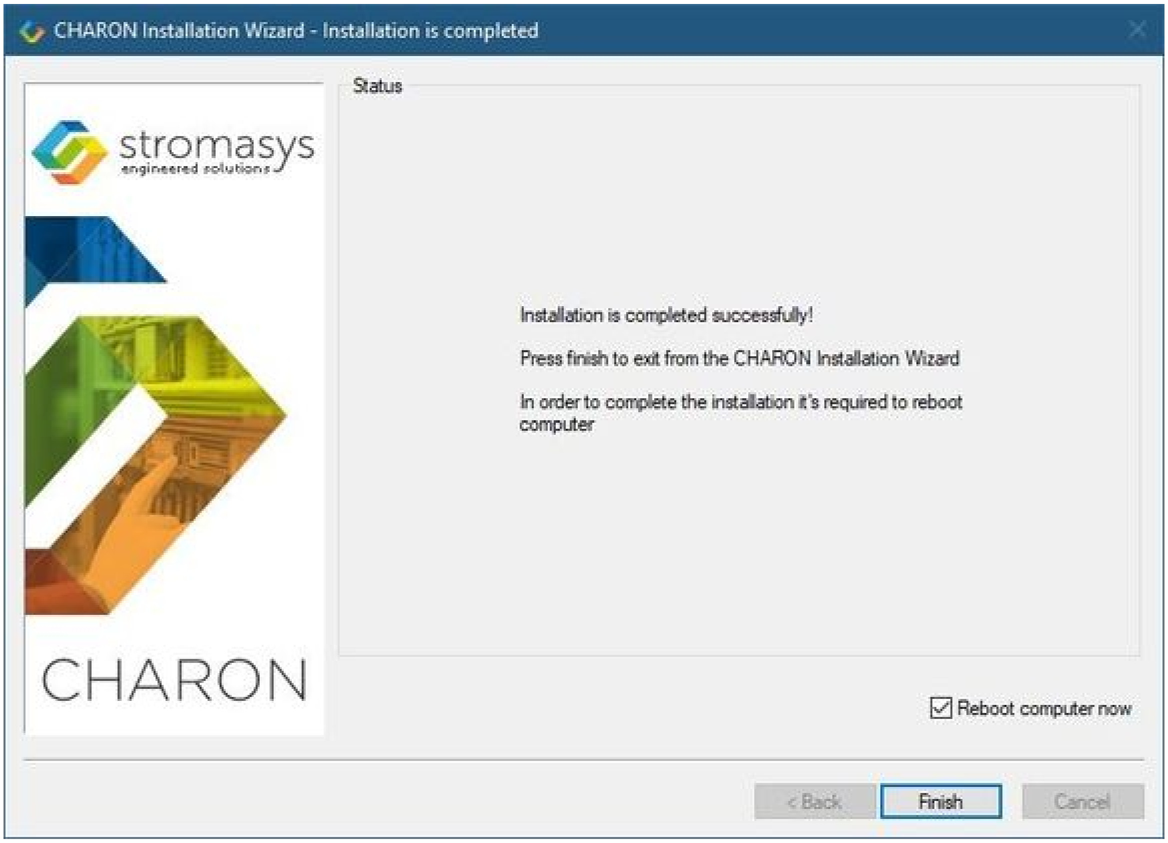
Would you like to install this device software?

Name: STROMASYS SA Network Protocol
Publisher: Stromasys SA

☑ Always trust software from "Stromasys SA".

You should only install driver software from publishers you trust. How can I decide which device software is safe to install?

Once the installation is done, the following dialog will be displayed:



CHARON Installation Wizard - Installation is completed

Status

Installation is completed successfully!

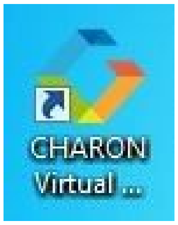
Press finish to exit from the CHARON Installation Wizard

In order to complete the installation it's required to reboot computer

☑ Reboot computer now

⚠ It is strongly recommended to reboot the CHARON host system immediately: leave the "Reboot computer now" box checked and press the "Finish" button.

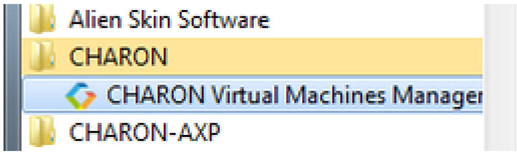
Once the host system is up again, you will notice a new shortcut, "CHARON Virtual Machines Manager", created on the desktop during the installation procedure:



The CHARON Virtual Machines Manager is an essential utility for CHARON management. CHARON installation always keeps most up-to-date version of CHARON Virtual Machines Manager provided by all the installed kits.

⚠ In case of upgrade from V4.8 or V4.9, update all existing CHARON Virtual Machines to make them run the latest version - otherwise they will remain at the previous version. See the following chapters for details.

The CHARON installation procedure creates the following simple structure under the "Start" menu:



CHARON-AXP home directory

By default CHARON-AXP is installed in the "C:\Program Files\CHARON" directory. It has the following sub-directories:

Directory	Description
Build_XXX\x64	Contains product executables and libraries
Drivers	Contains the CHARON drivers
InstallShell	Contains the CHARON installation procedure executables
Logs	Contains the CHARON installation log
Redistributables	Contains the redistributables needed for CHARON running (already installed, except the license alert script)
Virtual Machines Manager	Contains the most up-to-date version of CHARON Virtual Machines Manager
Virtual Machine Templates	Contains templates for creating CHARON Virtual Machines
Virtual Machines	Contains the CHARON Virtual Machines
Virtual Disk Images	Contains the CHARON virtual disk images, for example "idle_vms_pkg_v3.0"

The "Virtual Machine Templates" directory contains template configuration files to build CHARON virtual machines using the CHARON Virtual Machines Manager. We will focus our attention on this subject in the next chapter.

License installation

Regular HASP USB dongle

If the CHARON license is stored on a regular USB dongle, just connect it to a host USB port.

> ⚠ If the CHARON host is accessed remotely, please note that the contents of a regular HASP license cannot be displayed using RDP. ILO or iDRAC, some other console-capable program must be used.

Network HASP USB dongle

If the CHARON license is a network license (red USB dongle), it is possible either to connect it to the host USB port (to use it locally and provide it to other hosts on the local network at the same time) or to install it on a local network "license server" for remote access from this particular host.

If a remote license server is to be used:

- Copy the file "`hasp_install\haspdinst.zip`" from the CHARON distribution to any directory on the server, for example "`C:\Temp`".
- Extract the contents of this archive to the same directory.
- Login as "*Administrator*" on the server and open "`cmd.exe`" from the "Start" menu.
- Switch to that directory.
- Install the extracted file:
  Example:

```
...> cd c:\temp
c:\temp> haspdinst.exe -fr -kp -nomsg
c:\temp> haspdinst.exe -install -cm
```

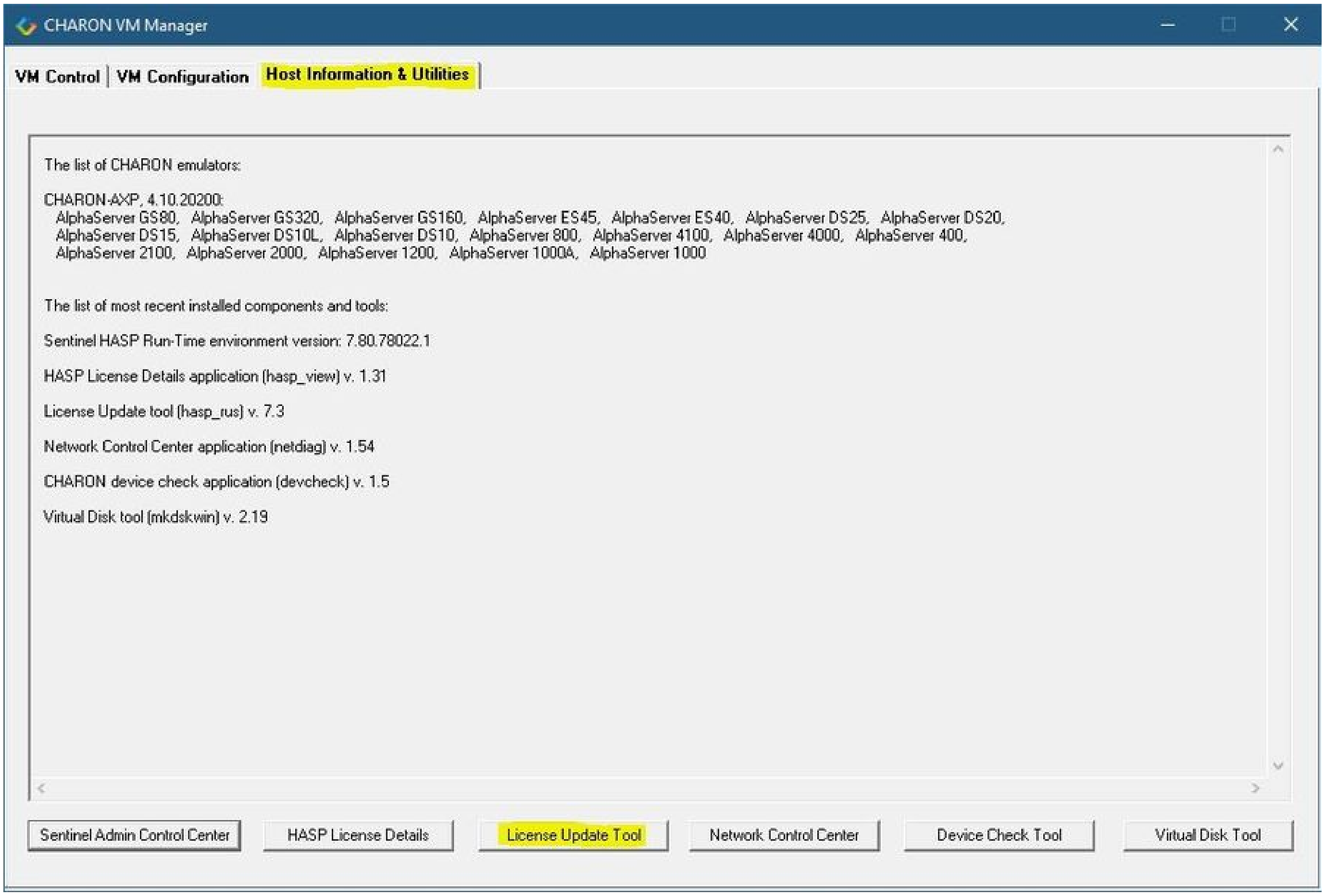
- Copy the file "`hasp_install\hasplib.zip`" from the CHARON distribution to any directory on the server, for example "`C:\Temp`".
- Extract the contents of this archive to the same directory.
- Copy the file "`haspvlib_68704.dll`" to "`C:\Program Files (x86)\Common Files\Aladdin Shared\HASP`" (in case of x64 host) or "`C:\Program Files\Common Files\Aladdin Shared\HASP`" (in case of x86 host)
- Connect the network HASP dongle to the server USB port.

Network HASP (red dongles) licenses have no restrictions with respect to remote access.

Software license

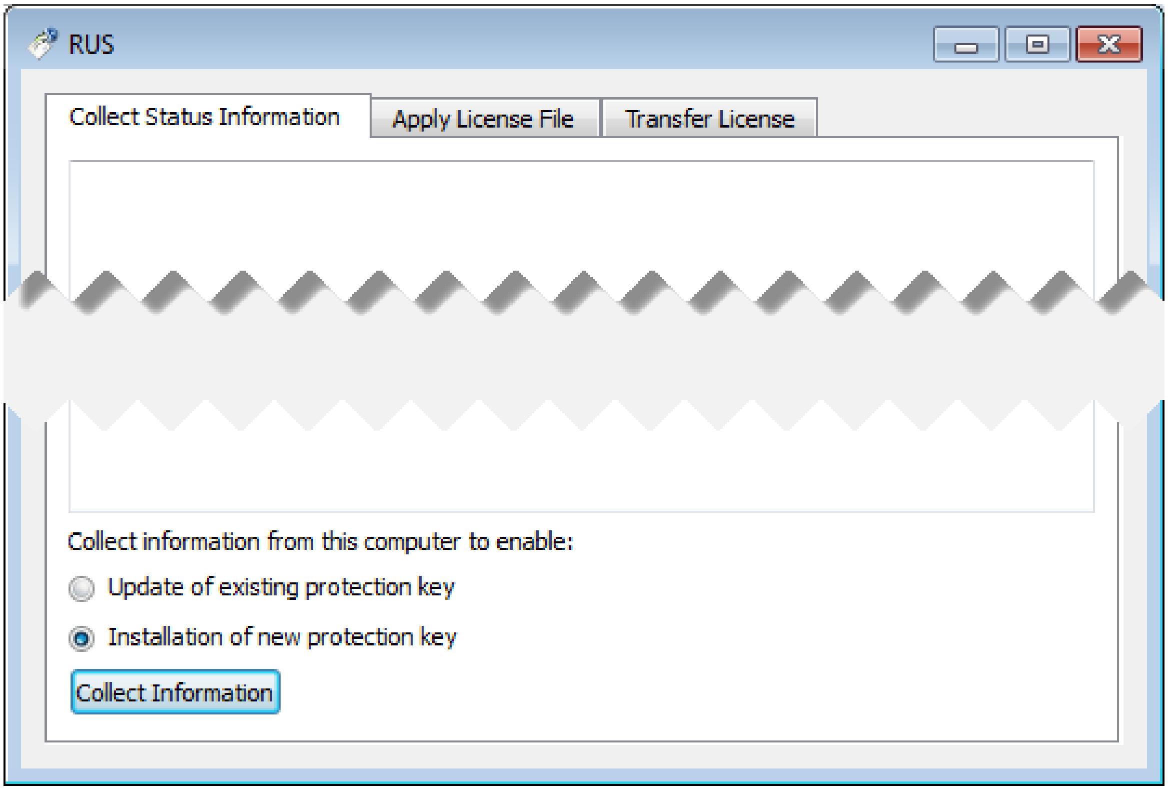
If the CHARON license is a software license (SL), it is installed on the host using the following procedure:

1. Double click the "CHARON Virtual Machines Manager" icon on the desktop or select this utility in the tray menu; select the "Host Information and Utilities" section and press the "License Update Tool" button:



```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
   AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
   AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
   AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

The following default dialog window will appear:



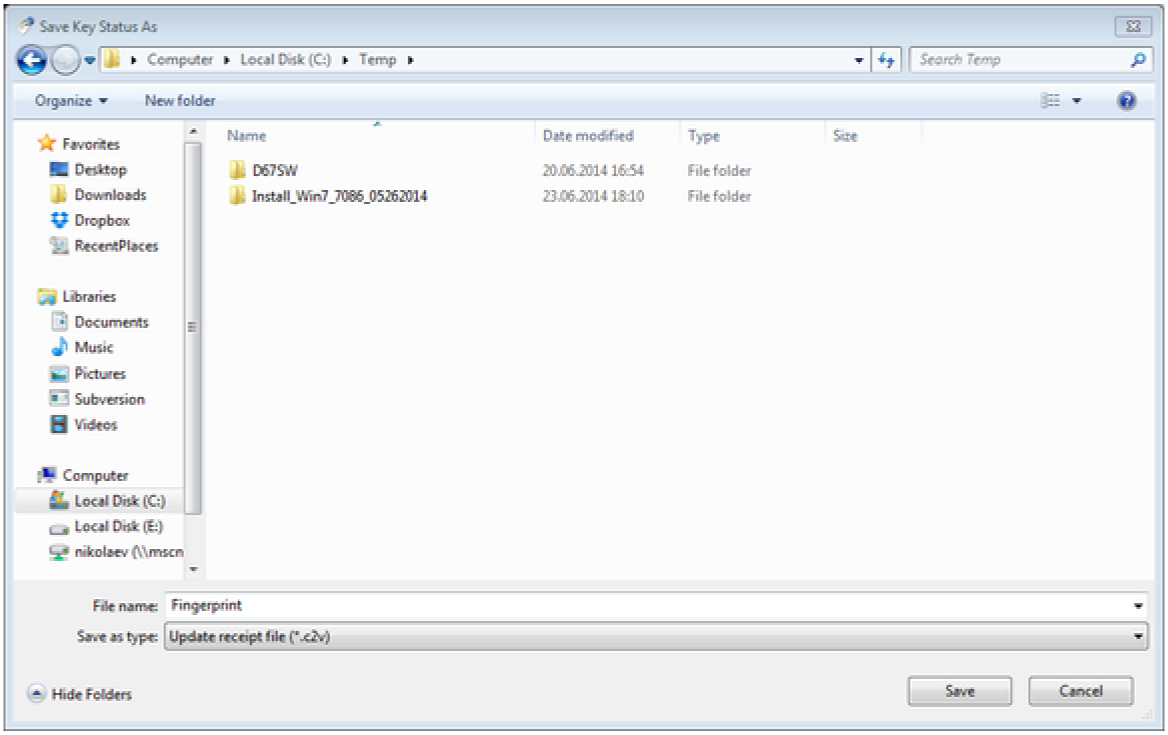
Collect information from this computer to enable:

○ Update of existing protection key

● Installation of new protection key

If you're installing a "Provisional" (demo) license, jump to step 5

2. Ensure no license dongle is connected, select the "Installation of new protection key" radio-box and press the "Collect Information" button. The following window will appear:



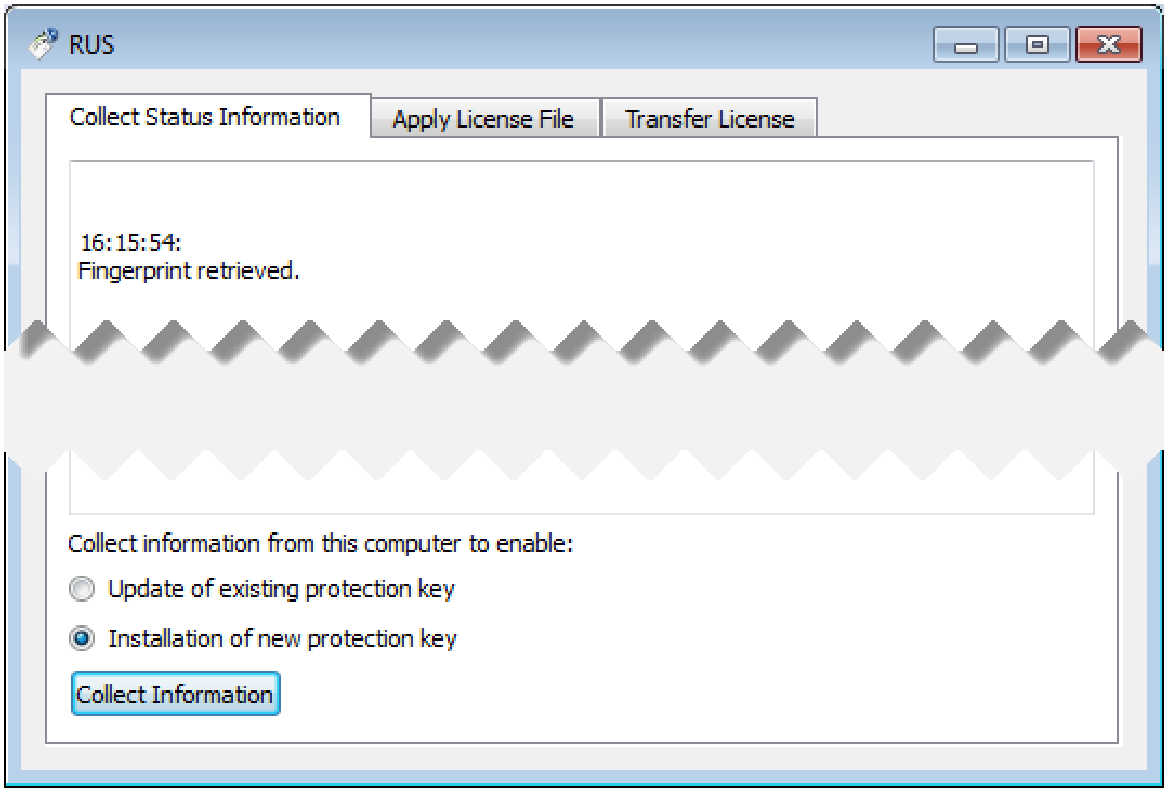
Name	Date modified	Type	Size
D67SW	20.06.2014 16:54	File folder	
Install_Win7_7086_05262014	23.06.2014 18:10	File folder	

File name: Fingerprint

Save as type: Update receipt file (*.c2v)

Specify the directory and name of the system "fingerprint" file to be created the press the "Save" button.

3. The "License Update Service" will save the fingerprint file under the given name and will report the status:


RUS
Collect Status Information
Apply License File
Transfer License
Collect information from this computer to enable:
Collect Information

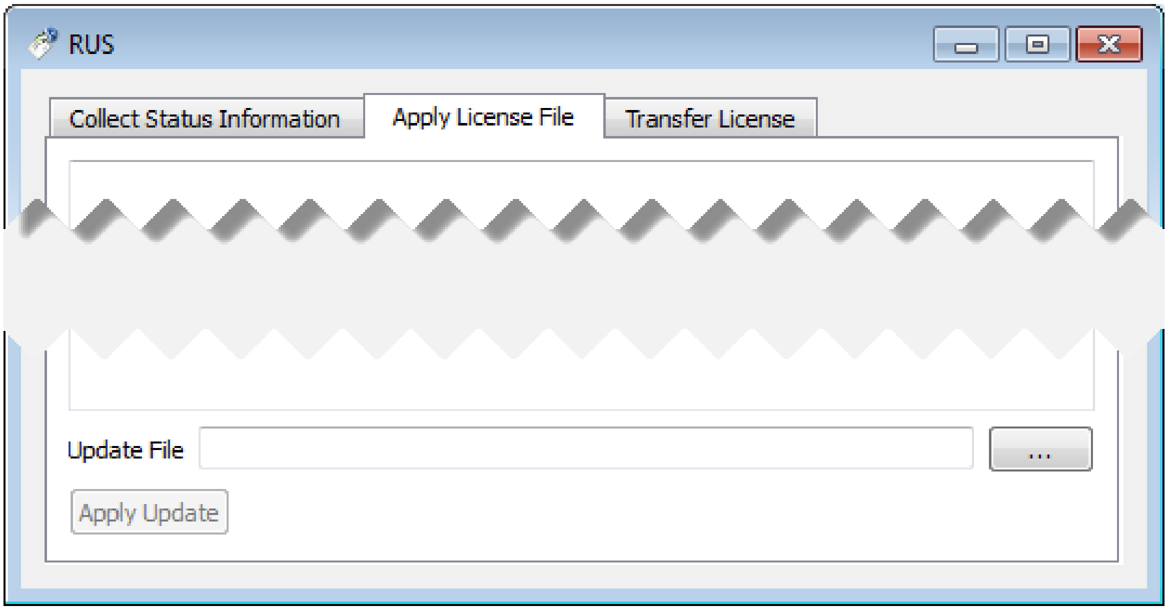
```
16:15:54:
Fingerprint retrieved.
```

○ Update of existing protection key

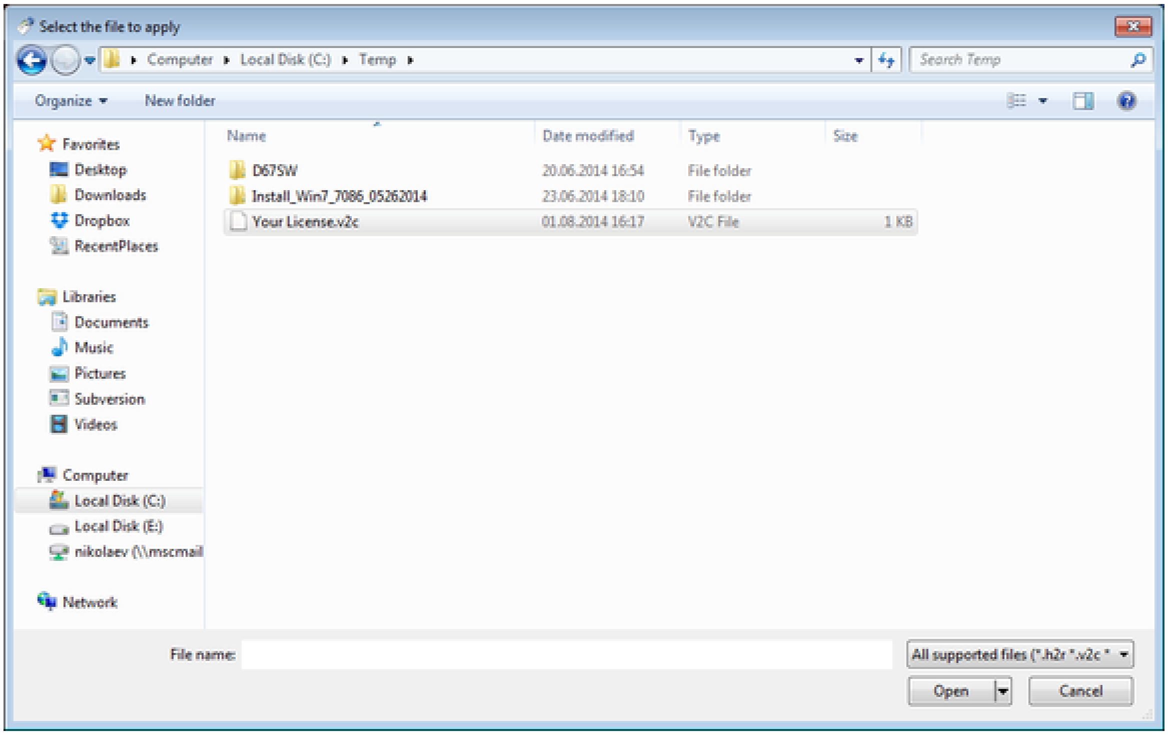
● Installation of new protection key

4. Send the resulting file to STROMASYS. In return STROMASYS will provide you with a ".v2c" file, for example "Your License.v2c".

5. Copy the received v2c file to the CHARON host in a folder of your choice and select the "Apply License File" tab:



6. Press the "..." button and browse for the received v2c file.
Example:



Name	Date modified	Type	Size
D67SW	20.06.2014 16:54	File folder	
Install_Win7_7086_05262014	23.06.2014 18:10	File folder	
Your License.v2c	01.08.2014 16:17	V2C File	1 KB

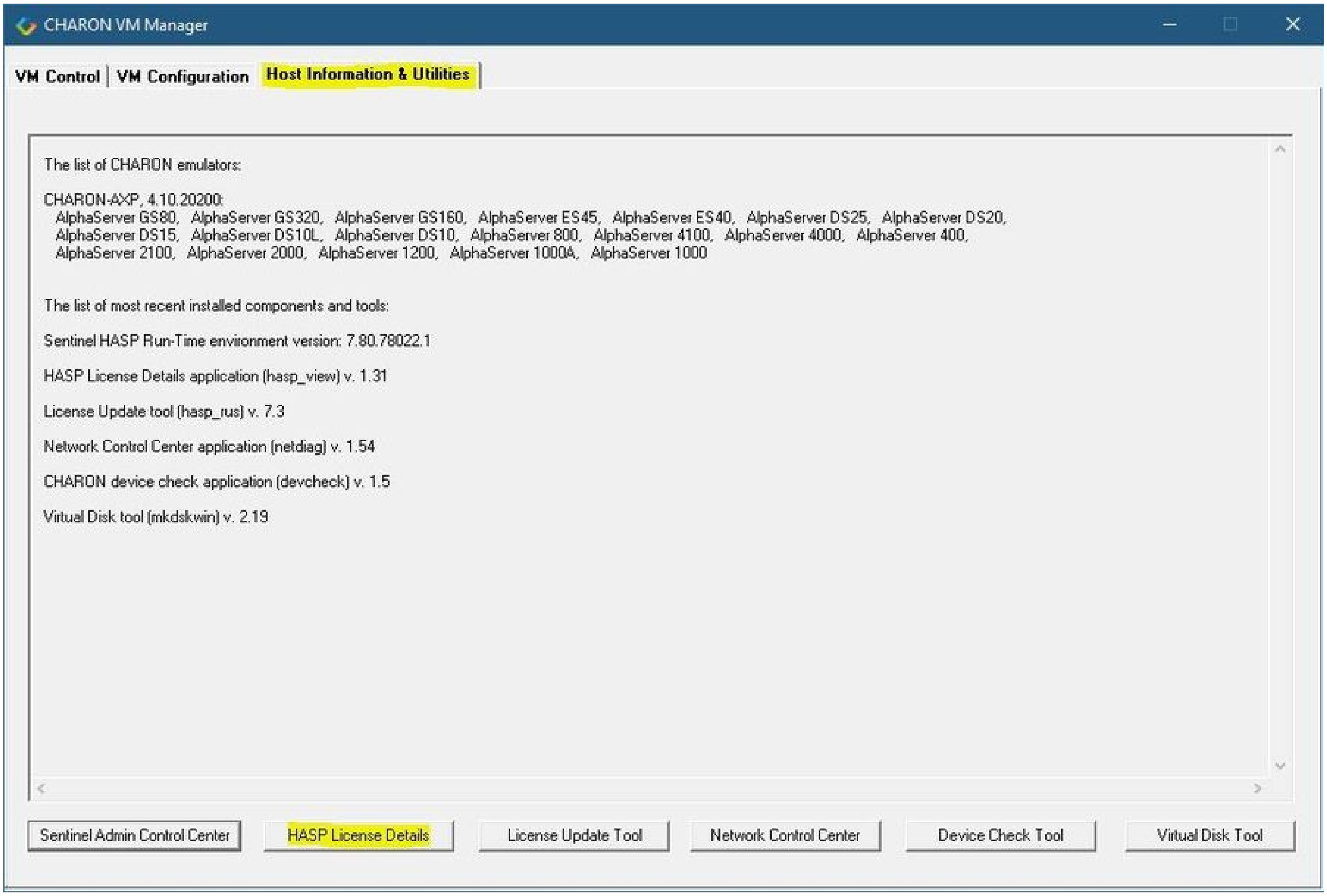
Press the "Open" button to apply the license.

7. From the "CHARON Virtual Machines Manager" utility (see above) select the "Host Information and Utilities" section and press the "Sentinel Admin Control Center" button or (optionally) invoke the system default web browser and enter the URL http://localhost:1947 to display the "**Sentinel Admin Control Center**" (**ACC**) web interface. This interface allows you to view and manage the CHARON licenses.
8. Ensure that the software license is now visible in the "**Sentinel Keys**" section of the **ACC**.

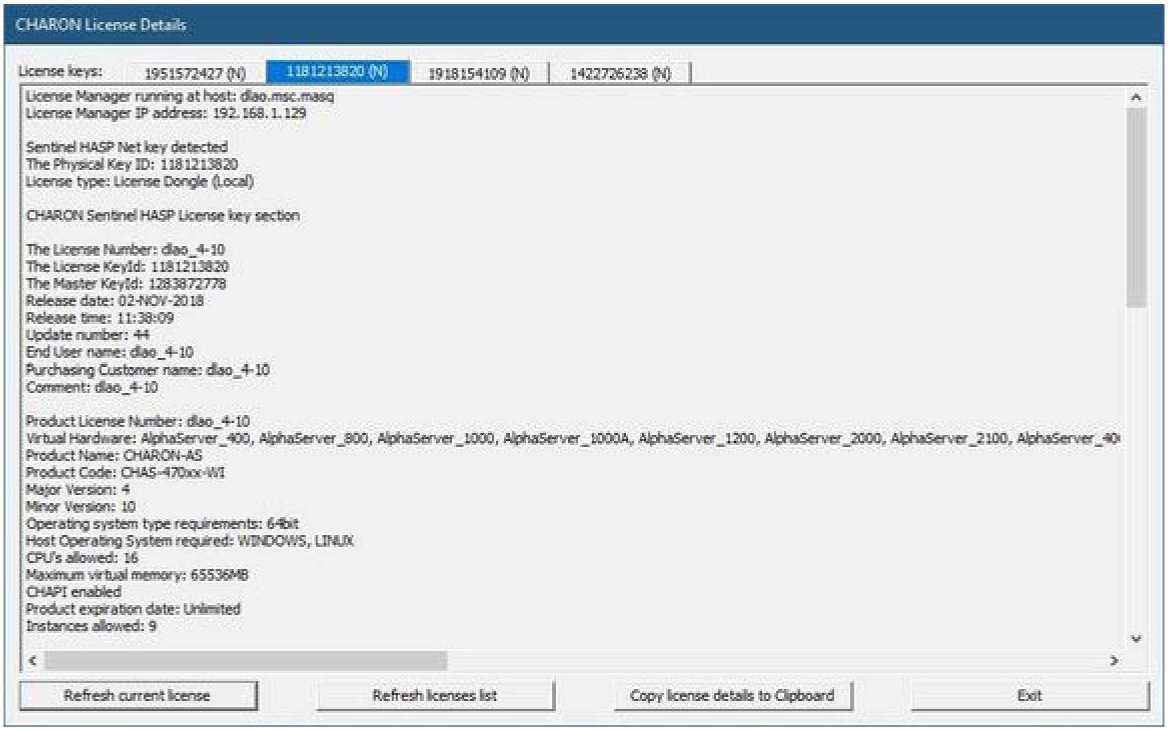
Software licenses are always network licenses. Hence, they have no restrictions with respect to being displayed or accessed via a remote connection.

License validity verification

Check the CHARON license validity by invoking the "Charon License Details" utility to make sure that the CHARON license is visible and is correct. Double click the "CHARON Virtual Machines Manager" icon on the desktop or select this utility in the tray menu; select the "Host Information and Utilities" section and press the "HASP License Details" button:



```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```



```
License Manager running at host: dlao.msc.masq
License Manager IP address: 192.168.1.129

Sentinel HASP Net key detected
The Physical Key ID: 1181213820
License type: License Dongle (Local)

CHARON Sentinel HASP License key section

The License Number: dlao_4-10
The License KeyId: 1181213820
The Master KeyId: 1283872778
Release date: 02-NOV-2018
Release time: 11:38:09
Update number: 44
End User name: dlao_4-10
Purchasing Customer name: dlao_4-10
Comment: dlao_4-10

Product License Number: dlao_4-10
Virtual Hardware: AlphaServer_400, AlphaServer_800, AlphaServer_1000, AlphaServer_1000A, AlphaServer_1200, AlphaServer_2000, AlphaServer_2100, AlphaServer_40
Product Name: CHARON-AS
Product Code: CHAS-470xx-WI
Major Version: 4
Minor Version: 10
Operating system type requirements: 64bit
Host Operating System required: WINDOWS, LINUX
CPU's allowed: 16
Maximum virtual memory: 65536MB
CHAPI enabled
Product expiration date: Unlimited
Instances allowed: 9
```

- Verify the the license content is displayed correctly and no error message is shown
- Verify the content of the license looks correct. Check for example the license number, the major and minor versions, the minimum and maximum build numbers, the CHARON-AXP products and allowed hardware (CHARON-AXP models). More details on the license content can be found in the CHARON-AXP Licensing chapter of this Guide.

Troubleshooting

If the CHARON license content cannot be displayed by the "CHARON License Details" utility or is incorrect, check that the license is available and correctly used:

1. From the "CHARON Virtual Machines Manager" utility (see above) select the "Host Information and Utilities" section and press the "Sentinel Admin Control Center" button or (optionally) invoke the system default web browser and enter the URL http://localhost:1947 to display the "**Sentinel Admin Control Center**" (**ACC**) web interface.
2. Click on the "**Sentinel Keys**" link to open up the "**Sentinel Keys Section**" page
3. Make sure that one and only one CHARON HASP or SL license is present.

Problem	Action
No license is displayed	Make sure that all the recommendations above about remote access to the host are fulfilled (if remote access takes place) and the HASP USB key is not broken and its LED indicator is lit (meaning that it is used by the host).
Only one License key / SL is seen and its content is incorrect	Contact STROMASYS to request a new license update.
Several License keys / SLs are displayed	Remove all of them except the one provided by STROMASYS for the installed version of CHARON.

Removing licenses can be done by physical disconnection of the corresponding USB HASP keys from the CHARON host and physical disconnection of the network HASP keys from all hosts on a local network (or by disabling remote access to network licenses from the CHARON host - see detailed explanation below).

Software licenses can also be uninstalled using the method, described in the "Removing CHARON-AXP Software Licenses" chapter of this Guide

For license servers accessible only via non-broadcast search it is also possible to disable access to network licenses if only a local license is to be used: Click on the "**Configuration**" link to open the "**Configuration for Sentinel Manager**" page.

Uncheck the "**Allow Access to Remote Licenses**" checkbox from the "**Access to Remote License Managers**" tab then press the "**Submit**" button to apply changes.

Starting with Charon-AXP/VAX 4.9 for Linux and Charon-AXP/VAX version 4.8 for Windows the Charon emulator products do not follow the settings in the Sentinel ACC with respect to querying remote license servers and network visibility. They perform a **broadcast search** for network licenses even if this has been disabled in the Sentinel ACC. If this behavior has to be prevented for specific reasons, the network access of the system has to be temporarily restricted or disabled, for example by blocking the relevant traffic in a firewall. Another possibility would be to block access to the network license at the license server side.

Note that such methods can negatively impact other functions of the system or, in the case of blocking access to a network license on the server, even the functions on other license clients.

It is possible to have several licenses available to CHARON-AXP at the same time. In this case you have to specify in the CHARON-AXP configuration file the license key ids to be used.

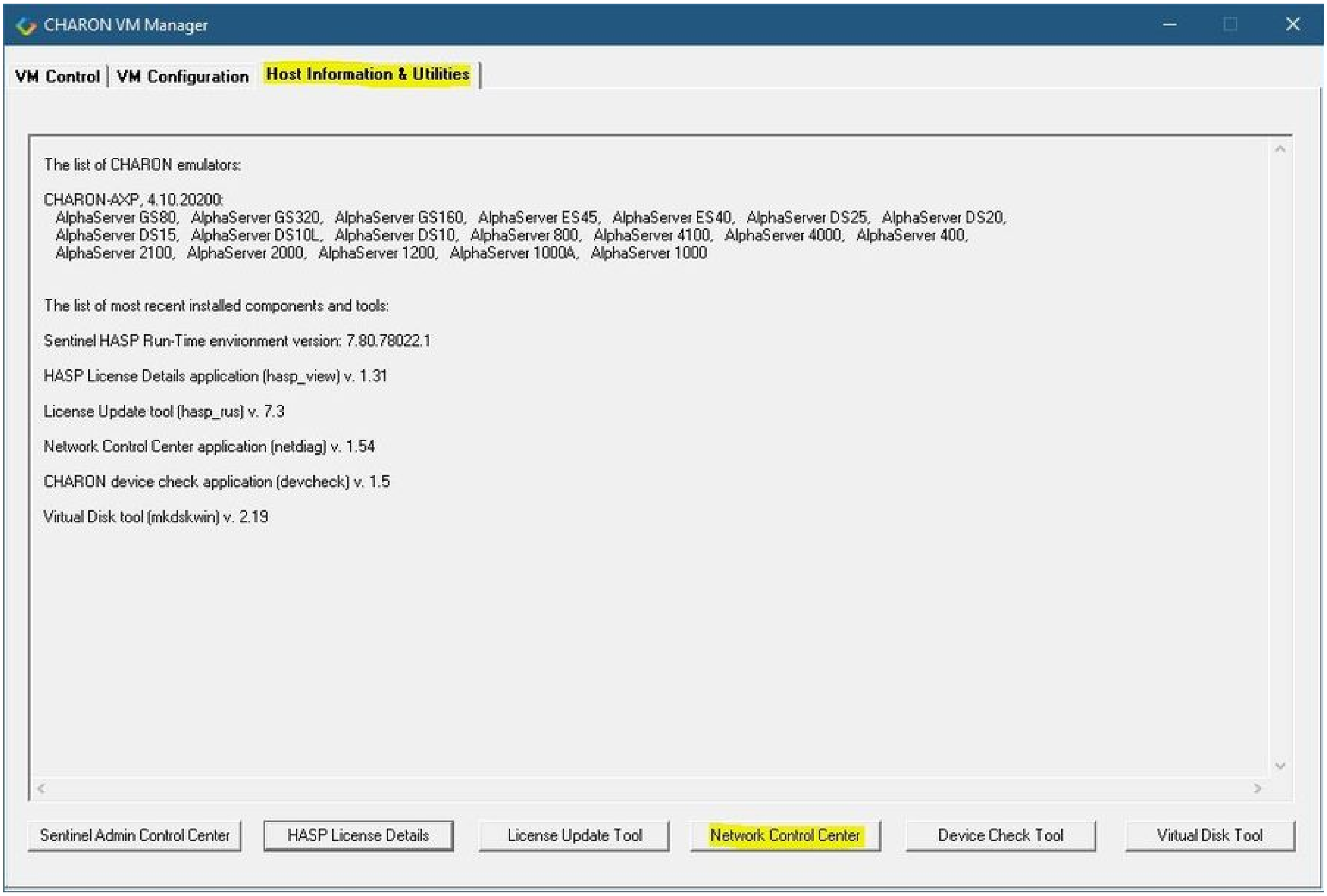
Example:

```
set session license_key_id="1877752571,354850588"
```

Network configuration

If the CHARON virtual machine needs access to the network, one or more dedicated network interfaces cleared from any other protocols including TCP /IP will have to be defined.

Configuring the network is done with the "Network Control Center" (NCC) utility. Double click the "CHARON Virtual Machines Manager" icon on the desktop or select this utility in the tray menu; select the "Host Information and Utilities" section and press the "Network Control Center" button:



The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
AlphaServer GS80, AlphaServer GS320, AlphaServer GS160, AlphaServer ES45, AlphaServer ES40, AlphaServer DS25, AlphaServer DS20, AlphaServer DS15, AlphaServer DS10L, AlphaServer DS10, AlphaServer 800, AlphaServer 4100, AlphaServer 4000, AlphaServer 400, AlphaServer 2100, AlphaServer 2000, AlphaServer 1200, AlphaServer 1000A, AlphaServer 1000

The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

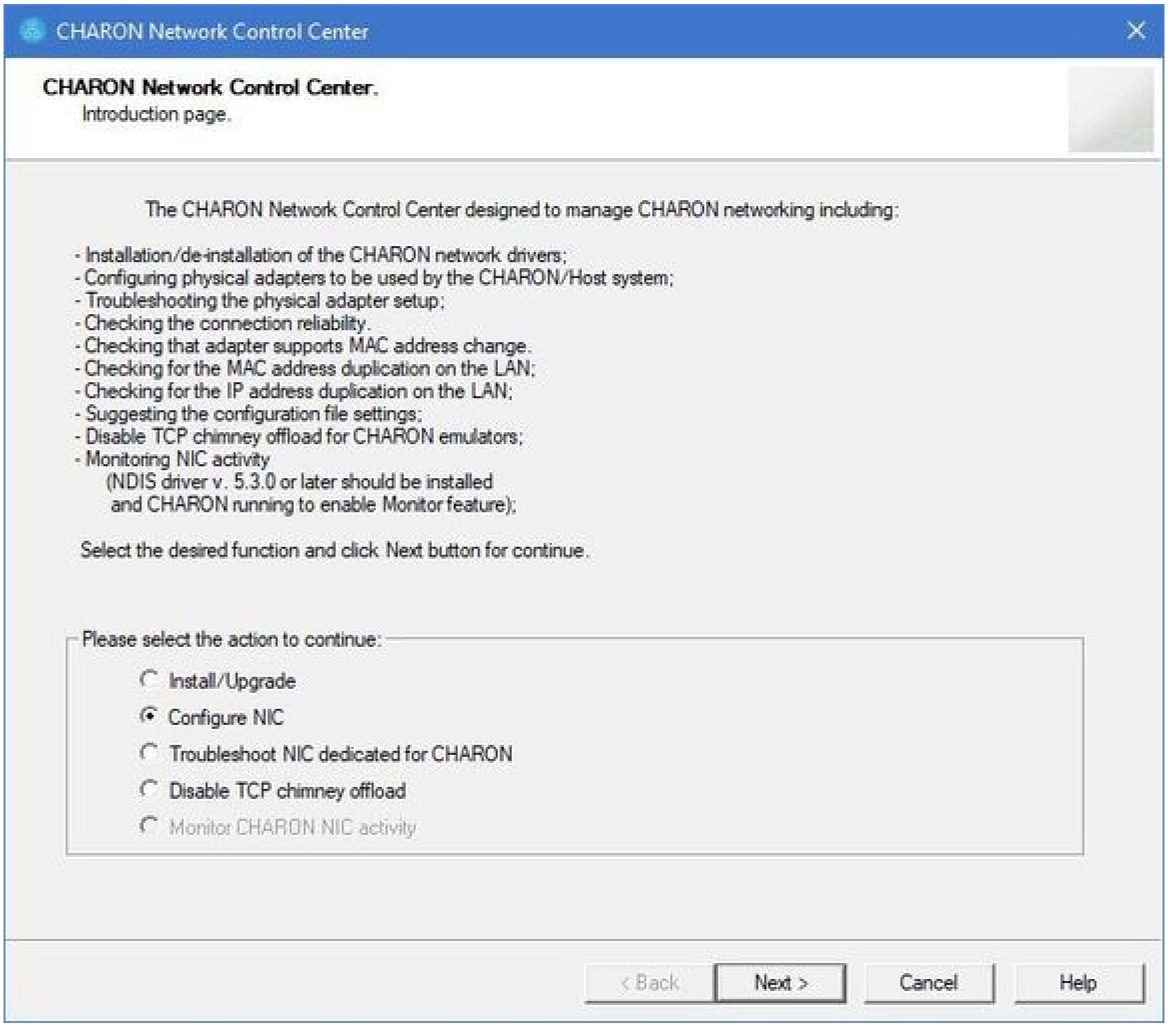
License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19

In the appearing dialog, select "Configure NIC":



CHARON Network Control Center.
Introduction page.

The CHARON Network Control Center designed to manage CHARON networking including:

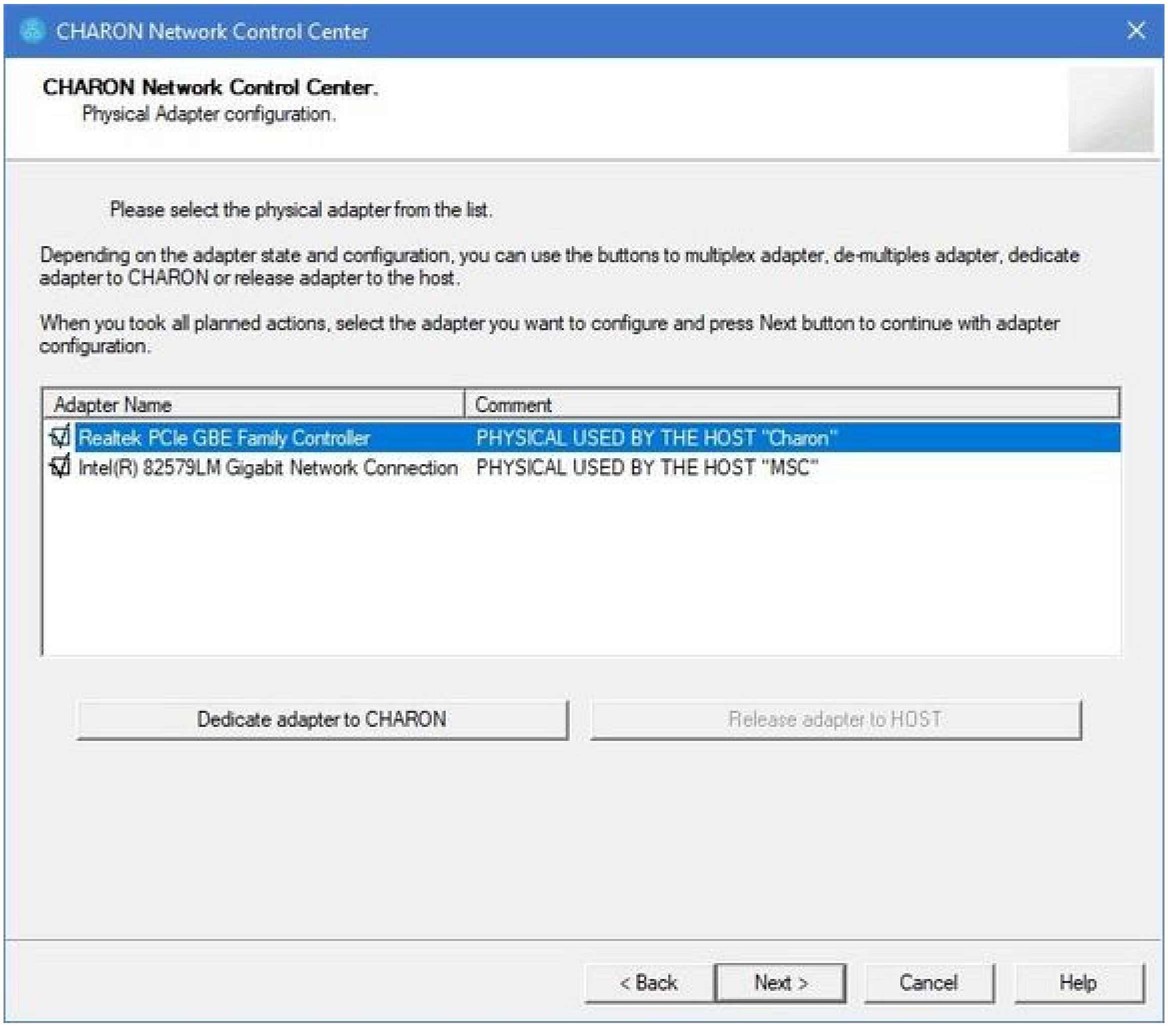
- Installation/de-installation of the CHARON network drivers;
- Configuring physical adapters to be used by the CHARON/Host system;
- Troubleshooting the physical adapter setup;
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

○ Install/Upgrade
● Configure NIC
○ Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload
○ Monitor CHARON NIC activity

Press the "Next" button, the following dialog will appear:



CHARON Network Control Center.
Physical Adapter configuration.

Please select the physical adapter from the list.

Depending on the adapter state and configuration, you can use the buttons to multiplex adapter, de-multiples adapter, dedicate adapter to CHARON or release adapter to the host.

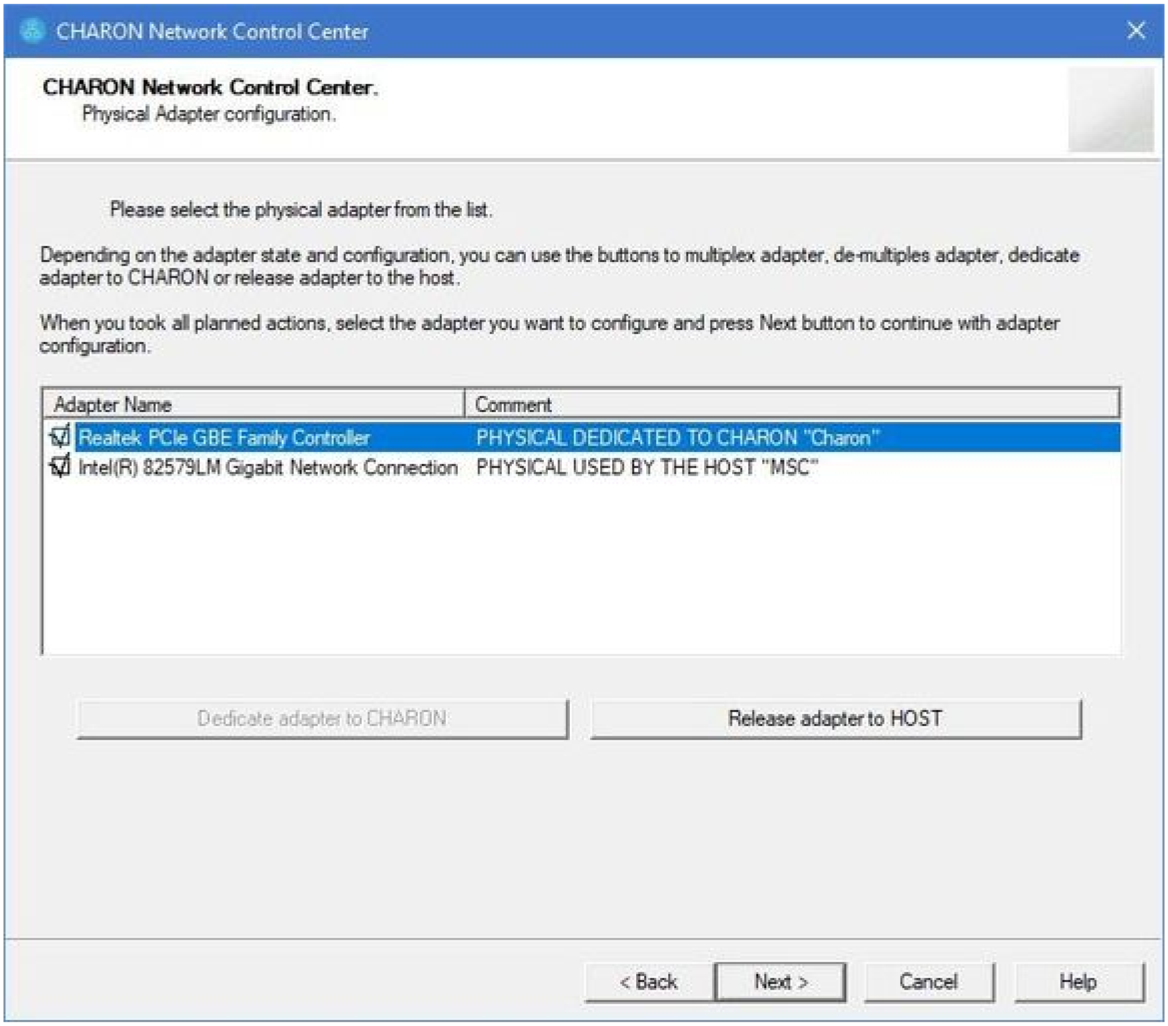
When you took all planned actions, select the adapter you want to configure and press Next button to continue with adapter configuration.

Adapter Name	Comment
Realtek PCIe GBE Family Controller	PHYSICAL USED BY THE HOST "Charon"
Intel(R) 82579LM Gigabit Network Connection	PHYSICAL USED BY THE HOST "MSC"

Select the interface to be dedicated to CHARON (in our example it is Realtek PCIe GBE Family Controller named "Charon") and press the "Dedicate adapter to CHARON" button.

CHARON supports VLAN adapters. If you are going to use them, proceed with their installation and configuration according to the network adapter vendor User's Guide and then select the VLAN interface in the dialog shown above, the same as you would for a regular network interface. There is no difference in configuring a regular network adapter and a VLAN one, so all the provided instructions are fully applicable for VLAN adapters as well.

After a few seconds the chosen interface will be assigned to CHARON:



CHARON Network Control Center
CHARON Network Control Center.
Physical Adapter configuration.

Please select the physical adapter from the list.

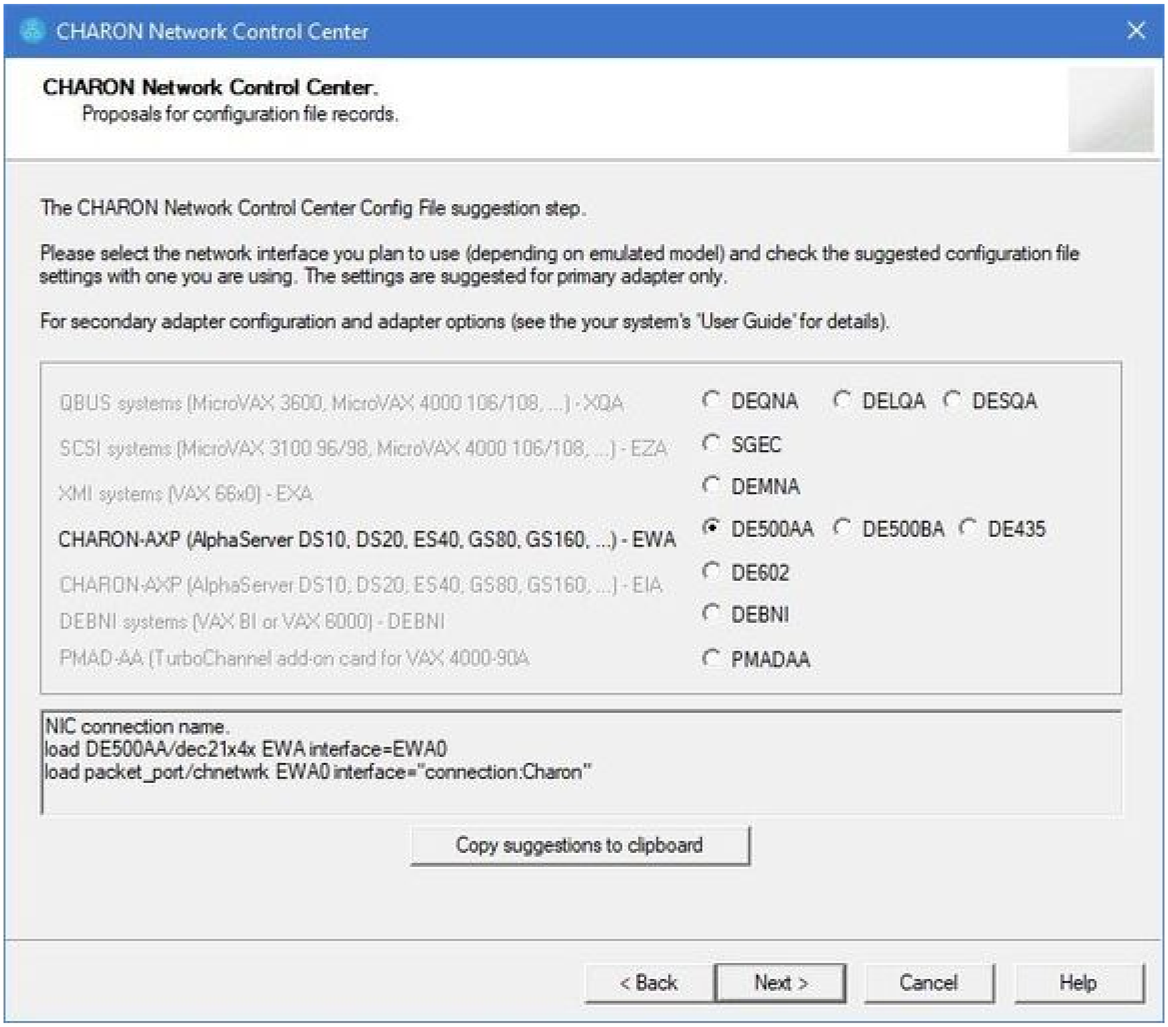
Depending on the adapter state and configuration, you can use the buttons to multiplex adapter, de-multiples adapter, dedicate adapter to CHARON or release adapter to the host.

When you took all planned actions, select the adapter you want to configure and press Next button to continue with adapter configuration.

Adapter Name	Comment
Realtek PCIe GBE Family Controller	PHYSICAL DEDICATED TO CHARON "Charon"
Intel(R) 82579LM Gigabit Network Connection	PHYSICAL USED BY THE HOST "MSC"

It is possible to release the interface back to the CHARON host by selecting the target interface and pressing the "Release adapter to HOST" button.

The next step displays the text to be included in the CHARON configuration file for the interface dedicated to CHARON. Select the target interface and press the "Next" button. The following dialog will appear:



CHARON Network Control Center

CHARON Network Control Center.
Proposals for configuration file records.

The CHARON Network Control Center Config File suggestion step.

Please select the network interface you plan to use (depending on emulated model) and check the suggested configuration file settings with one you are using. The settings are suggested for primary adapter only.

For secondary adapter configuration and adapter options (see the your system's 'User Guide' for details).

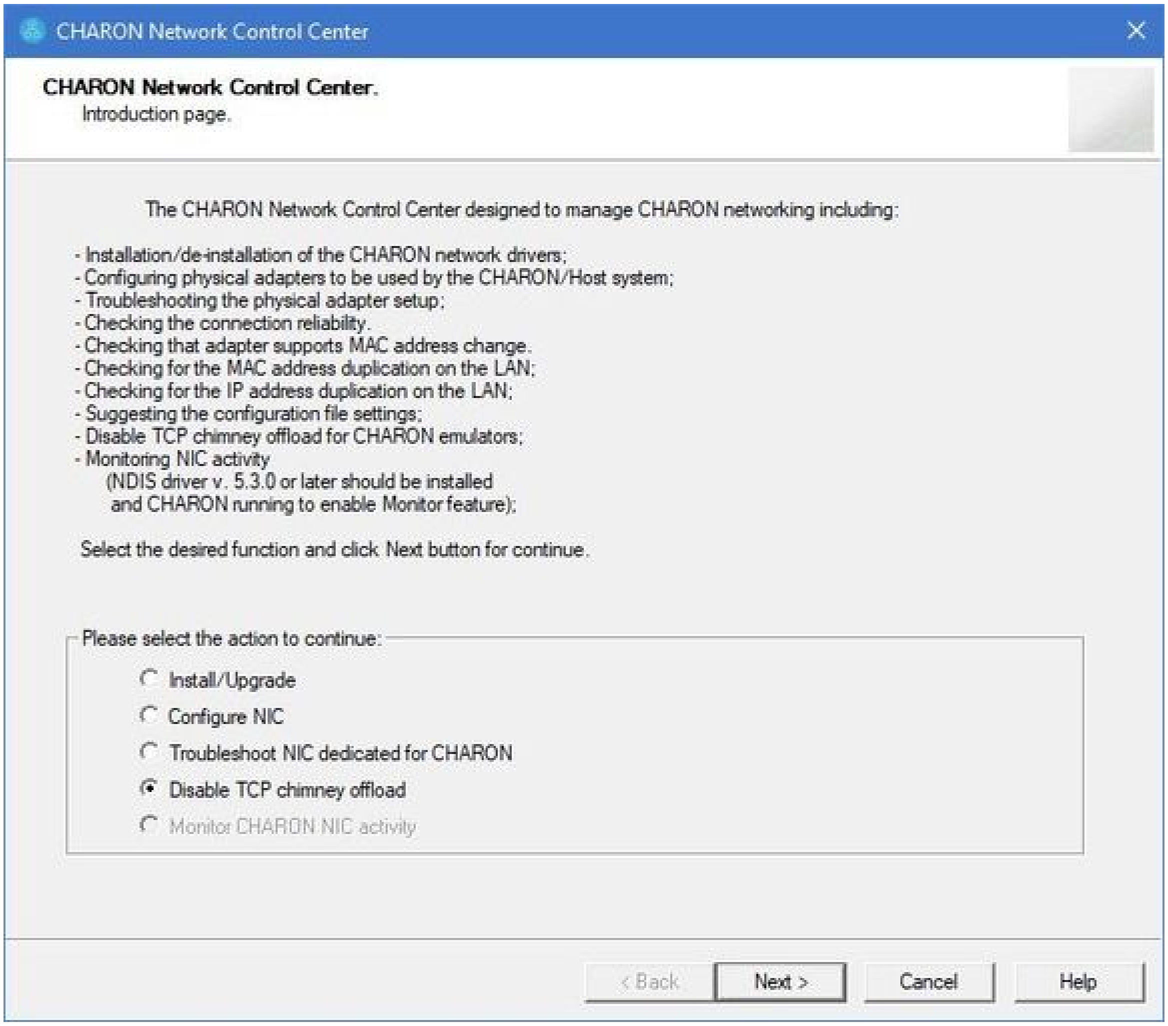
QBUS systems (MicroVAX 3600, MicroVAX 4000 106/108, ...) - XQA ○ DEQNA ○ DELQA ○ DESQA
SCSI systems (MicroVAX 3100 96/98, MicroVAX 4000 106/108, ...) - EZA ○ SGEC
XMI systems (VAX 66x0) - EXA ○ DEMNA
CHARON-AXP (AlphaServer DS10, DS20, ES40, GS80, GS160, ...) - EWA ● DE500AA ○ DE500BA ○ DE435
CHARON-AXP (AlphaServer DS10, DS20, ES40, GS80, GS160, ...) - EIA ○ DE602
DEBNI systems (VAX BI or VAX 6000) - DEBNI ○ DEBNI
PMAD-AA (TurboChannel add-on card for VAX 4000-90A ○ PMADAA

```
NIC connection name.
load DE500AA/dec21x4x EWA interface=EWA0
load packet_port/chnetwrk EWA0 interface="connection:Charon"
```

Selecting the target emulated network interface displays the configuration lines specific for the selected CHARON host network interface. Press the "Copy suggestions to clipboard" button to copy the suggested configuration lines. They can be pasted into the CHARON-AXP configuration file during the next editing session by pressing "Ctrl-V".

Press the "Cancel" button to exit from the "Network Control Center" utility.

Restart the "Network Control Center" utility again and select "Disable TCP chimney offload for CHARON":



CHARON Network Control Center.
Introduction page.

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- Troubleshooting the physical adapter setup;
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

○ Install/Upgrade
○ Configure NIC
○ Troubleshoot NIC dedicated for CHARON
● Disable TCP chimney offload
○ Monitor CHARON NIC activity

Press the "Next" button to apply the "offload" parameters settings.

Press the "Cancel" button to exit from the "Network Control Center" utility.

⚠ When the NIC properties are configured in Windows, a reboot of the CHARON host is required for the changes, specifically "offload" parameters, to take effect.

After installation

If you plan to use the local system administrator acount ("Administrator") or the CHARON-AXP user having administrative privileges, no other actions are required.

⚠ If the CHARON-AXP user belongs to some domain, you have to add this user to the CHARON-GRP group as described in this article and then reboot the CHARON host.

Otherwise it is possible to use a standard account (both local and domain) for running CHARON-AXP:

1. Login as the local system administrator ("Administrator") on the host system.
2. Create a special user for running CHARON-AXP. This user must have administrative or standard privileges (in this case login as Administrator for manging NDIS drivers and running NCC utility). Please consult with Windows online documentation for details.
3. Add this user to the CHARON-GRP group as it is described in this article and then reboot CHARON host.
4. Login as the created user.

Running and managing CHARON-AXP for Windows

Table of Contents

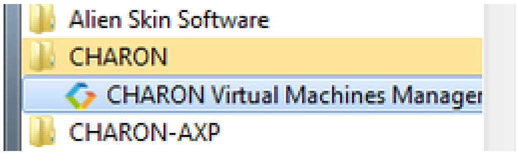
Starting CHARON Virtual Machines Manager

CHARON execution is controlled by the "CHARON Virtual Machines Manager" that manages each CHARON instance, called a "CHARON Virtual Machine", running on the host.

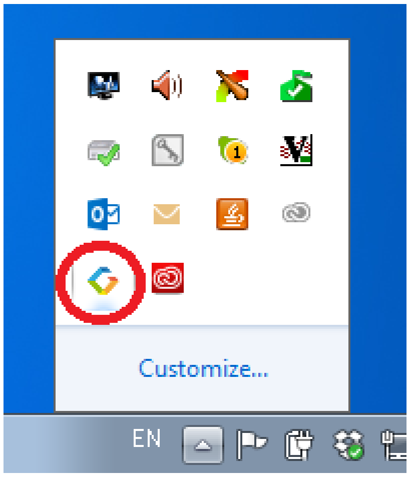
The CHARON installation procedure creates a shortcut on the desktop and under the Windows Start menu for the CHARON Virtual Machines Manager.

Desktop shortcut:

"Start" menu shortcut:



The CHARON Virtual Machines Manager runs automatically at Windows startup. If it is minimized to tray, it can be re-opened in the following way:



After clicking the shortcuts, the main dialog of CHARON Virtual Machines Manager appears.

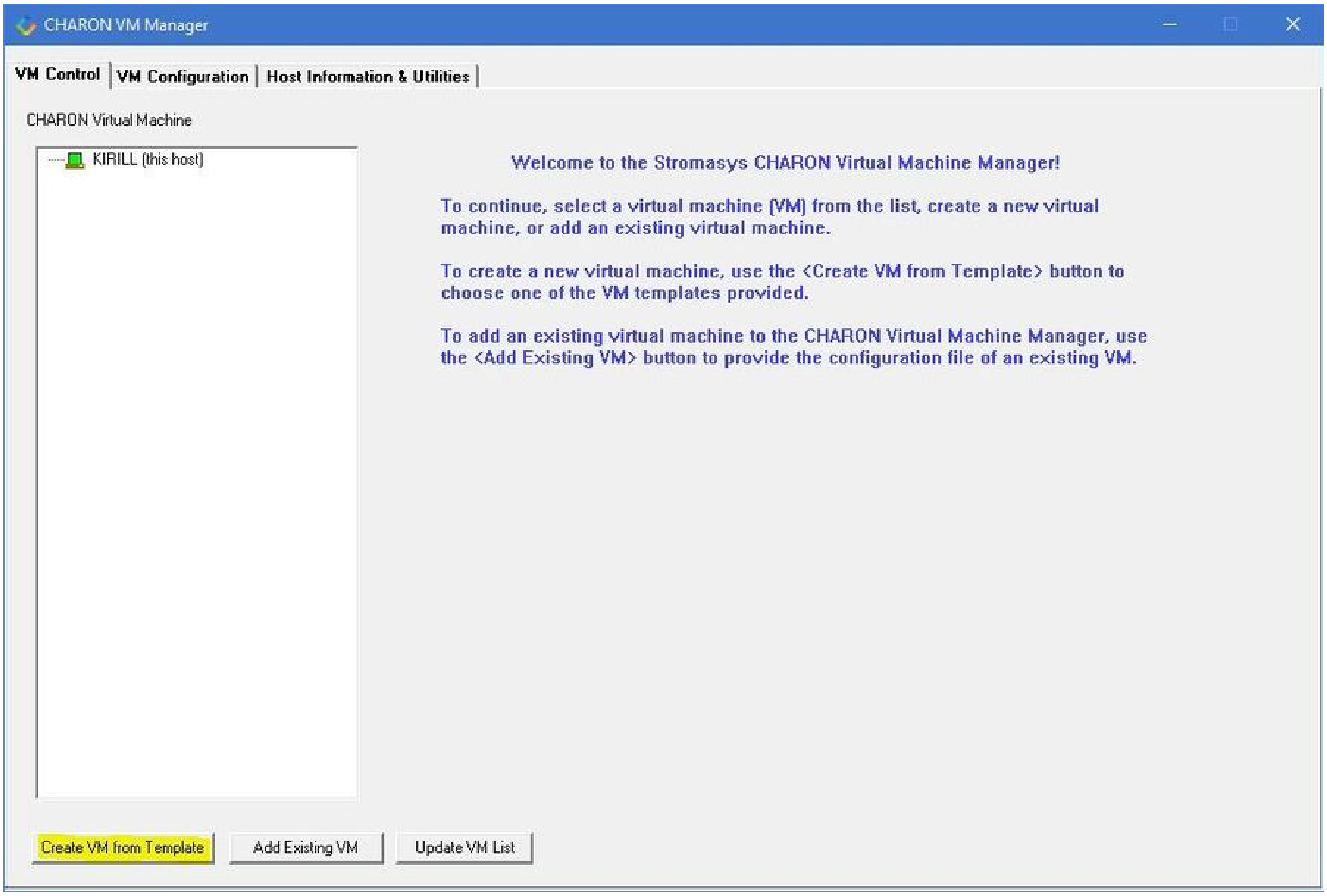
Creating a CHARON Virtual Machine

Creating a CHARON VM using provided templates

CHARON installation contains a set of template files for creating a base configuration for each AXP model. Once the CHARON Virtual Machine (VM) is created using these templates it can be configured further to meet your requirements and all the specifics of the emulated system.

> ⚠ By default the CHARON templates do not contain any specification for disks and network; you need to update the configuration file created from the template to specify your specific disk and network configuration.

Start the CHARON Virtual Machines Manager (see above) and press the "Create VM from Template" button:



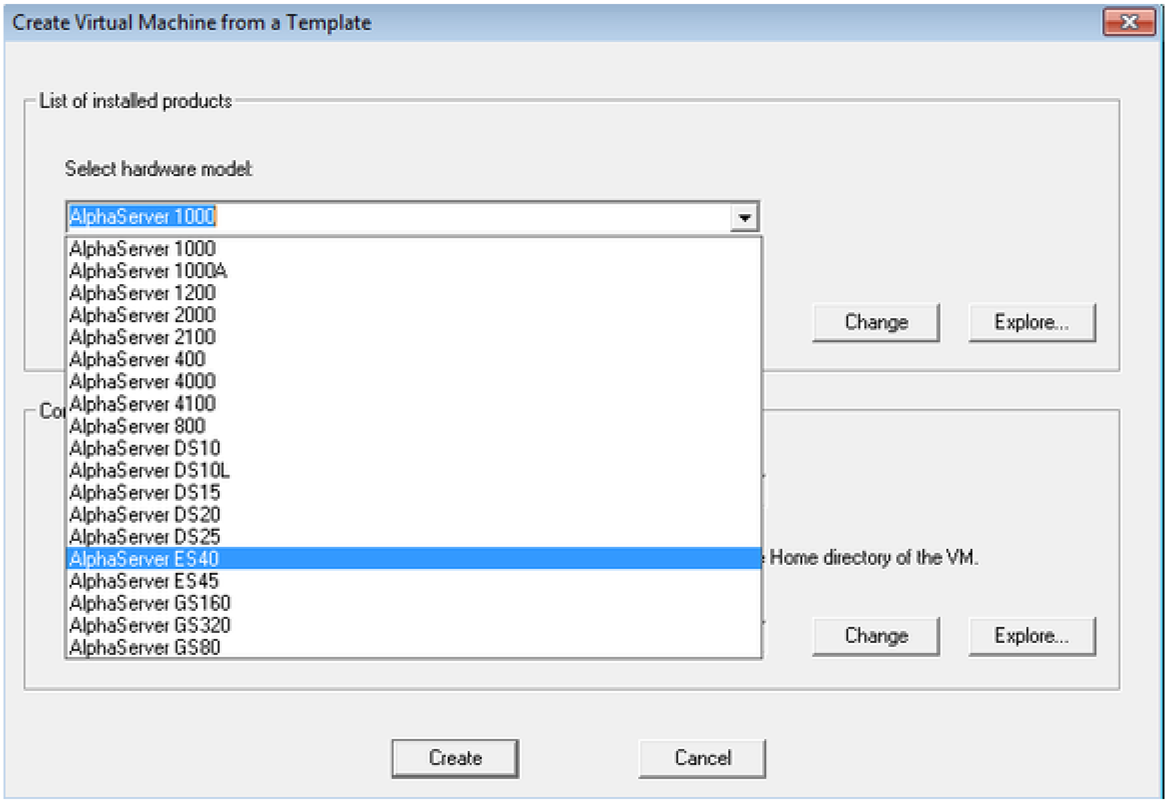
Welcome to the Stromasys CHARON Virtual Machine Manager!

To continue, select a virtual machine (VM) from the list, create a new virtual machine, or add an existing virtual machine.

To create a new virtual machine, use the <Create VM from Template> button to choose one of the VM templates provided.

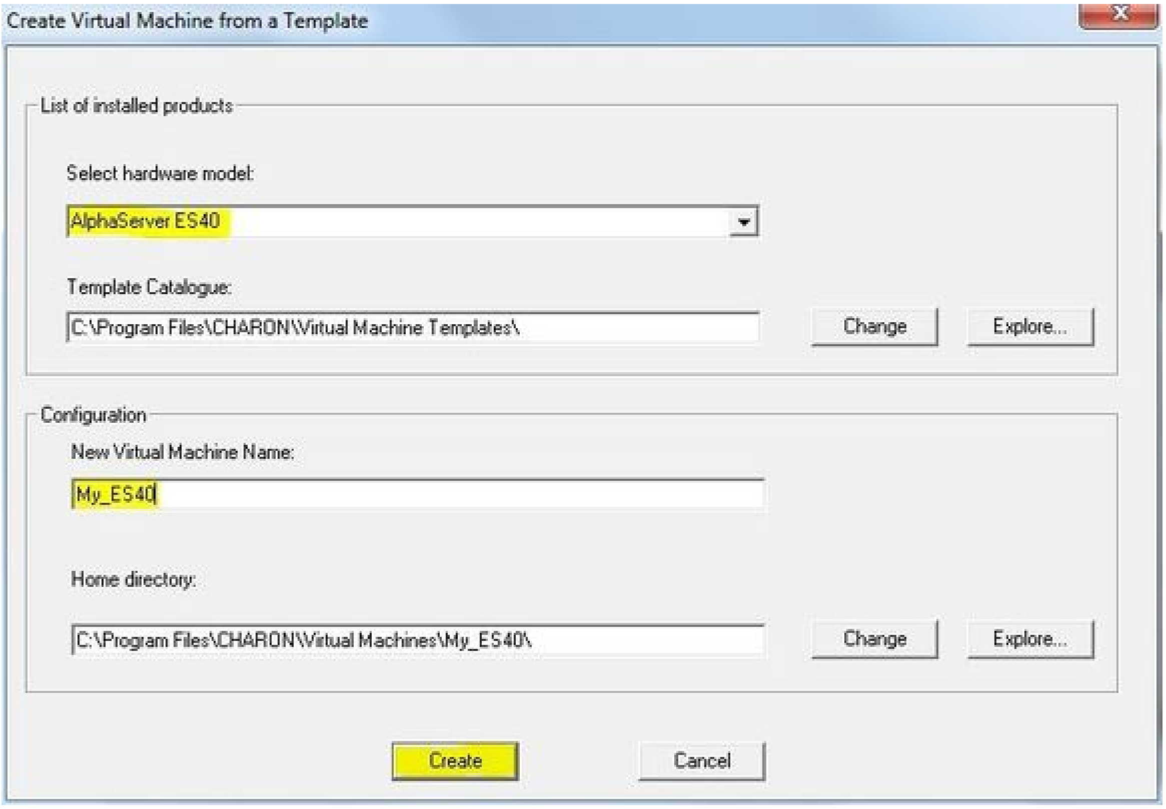
To add an existing virtual machine to the CHARON Virtual Machine Manager, use the <Add Existing VM> button to provide the configuration file of an existing VM.

In the appearing dialog select the Alpha hardware model:



Note the Home Directory for the VM (see screenshot below), it will be used by default for storing logs, virtual disk images, toy and container files if no path is specified in the configuration file.

Specify a name for the VM and press the "Create" button:



Create Virtual Machine from a Template

List of installed products

Select hardware model: AlphaServer ES40

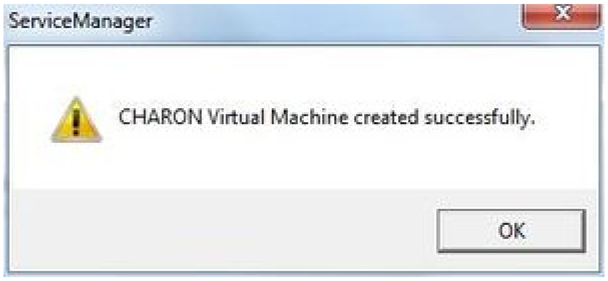
Template Catalogue: C:\Program Files\CHARON\Virtual Machine Templates\

Configuration

New Virtual Machine Name: My_ES40

Home directory: C:\Program Files\CHARON\Virtual Machines\My_ES40\

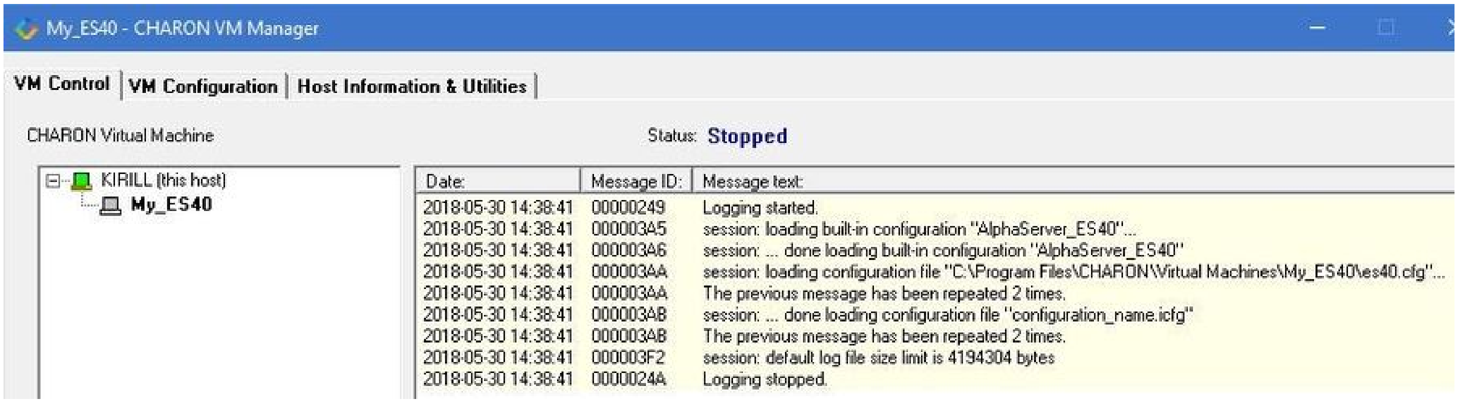
The CHARON Virtual Machines Manager will report the VM has been created successfully:



ServiceManager

CHARON Virtual Machine created successfully.

It will then appear in the left pane:



My_ES40 - CHARON VM Manager

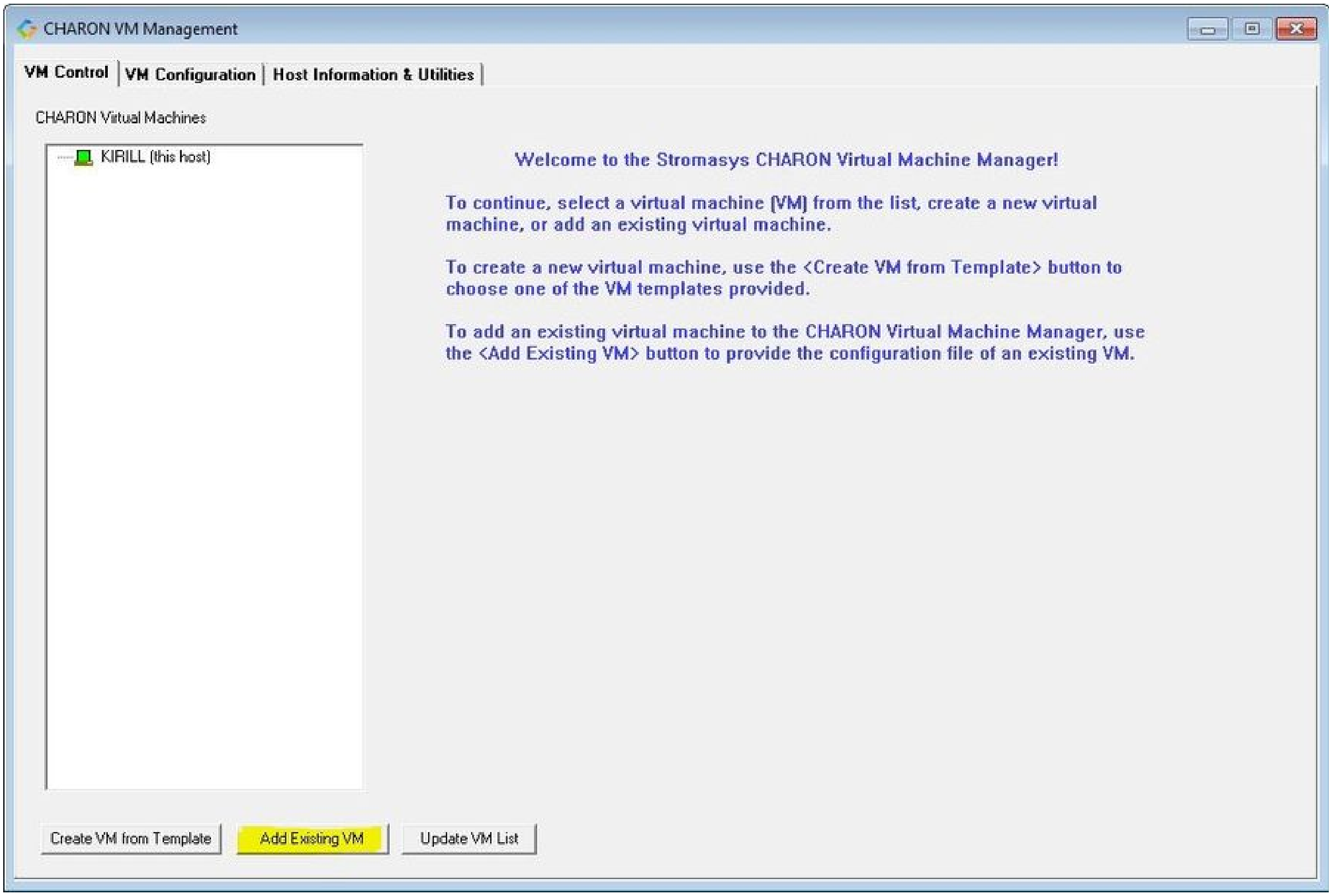
Status: Stopped

```
Date:                Message ID:  Message text:
2018-05-30 14:38:41  00000249     Logging started.
2018-05-30 14:38:41  000003A5     session: loading built-in configuration "AlphaServer_ES40"...
2018-05-30 14:38:41  000003A6     session: ... done loading built-in configuration "AlphaServer_ES40"
2018-05-30 14:38:41  000003AA     session: loading configuration file "C:\Program Files\CHARON\Virtual Machines\My_ES40\es40.cfg"...
2018-05-30 14:38:41  000003AA     The previous message has been repeated 2 times.
2018-05-30 14:38:41  000003AB     session: ... done loading configuration file "configuration_name.icfg"
2018-05-30 14:38:41  000003AB     The previous message has been repeated 2 times.
2018-05-30 14:38:41  000003F2     session: default log file size limit is 4194304 bytes
2018-05-30 14:38:41  0000024A     Logging stopped.
```

Creating a CHARON VM using an existing configuration file

It is also possible to use an existing configuration file for creating a CHARON Virtual Machine.

Open the CHARON Virtual Machines Manager (see above) and press the "Add Existing VM" button:



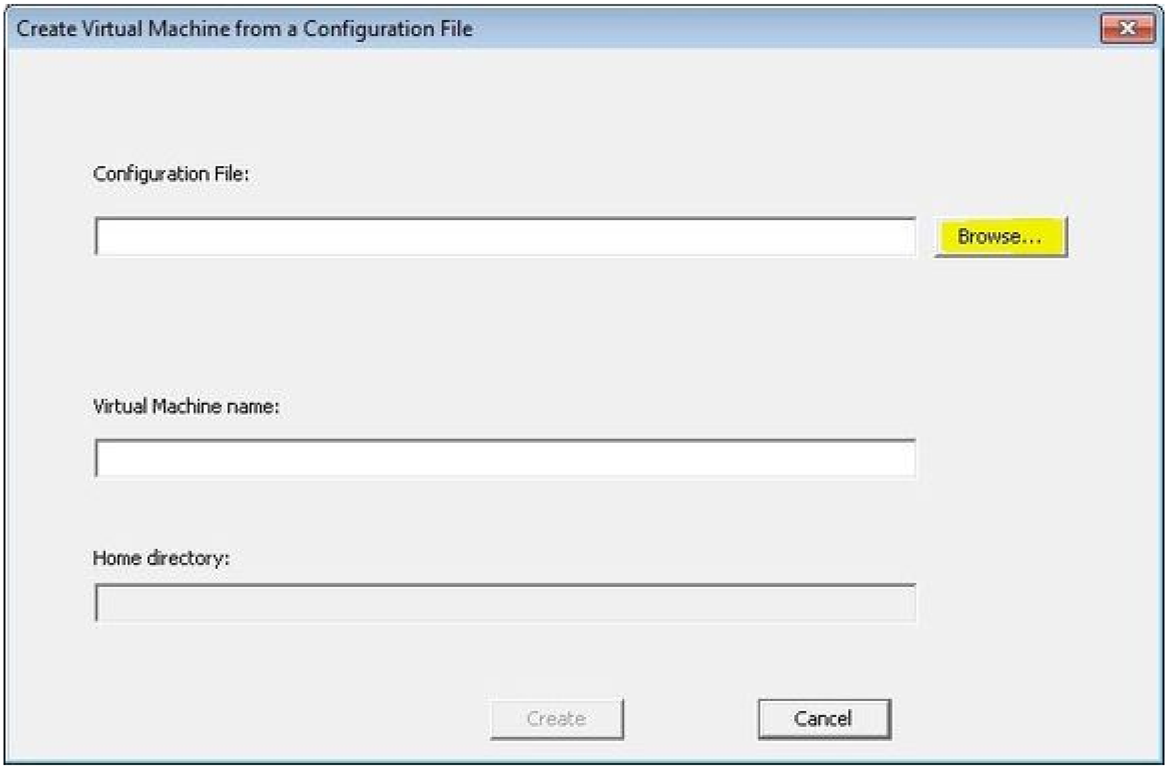
Welcome to the Stromasys CHARON Virtual Machine Manager!

To continue, select a virtual machine (VM) from the list, create a new virtual machine, or add an existing virtual machine.

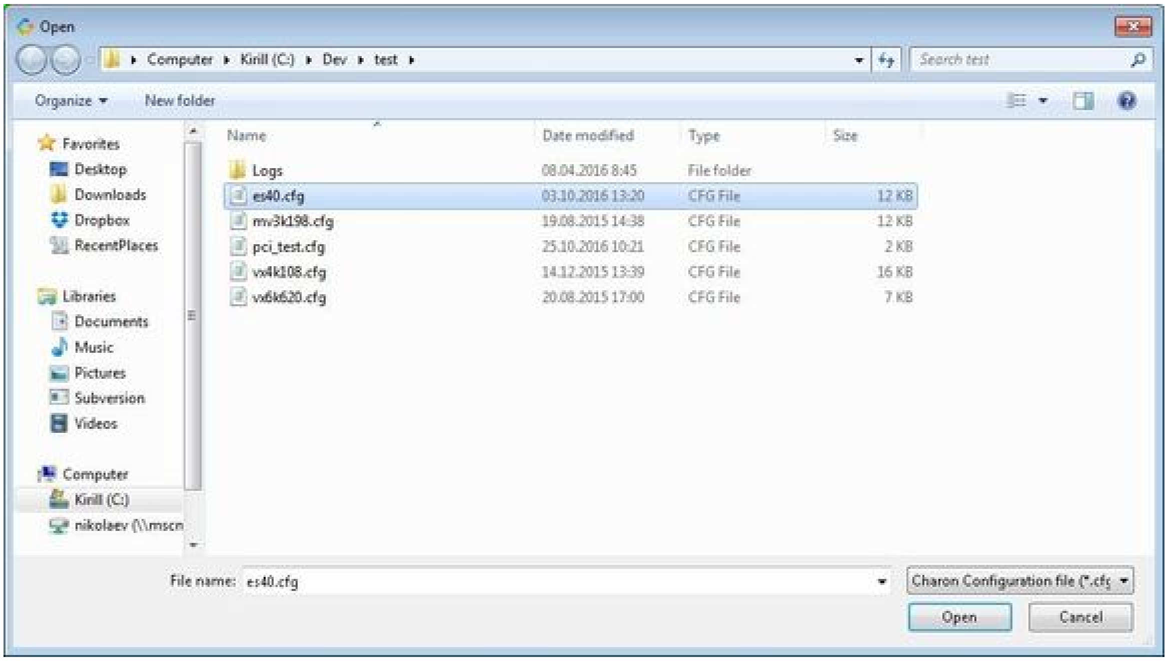
To create a new virtual machine, use the <Create VM from Template> button to choose one of the VM templates provided.

To add an existing virtual machine to the CHARON Virtual Machine Manager, use the <Add Existing VM> button to provide the configuration file of an existing VM.

In the appearing dialog select the target configuration file by pressing the "Browse" button:



Select the configuration file and press the "Open" button:



Name	Date modified	Type	Size
Logs	08.04.2016 8:45	File folder	
es40.cfg	03.10.2016 13:20	CFG File	12 KB
mv3k198.cfg	19.08.2015 14:38	CFG File	12 KB
pci_test.cfg	25.10.2016 10:21	CFG File	2 KB
vx4k108.cfg	14.12.2015 13:39	CFG File	16 KB
vx6k620.cfg	20.08.2015 17:00	CFG File	7 KB

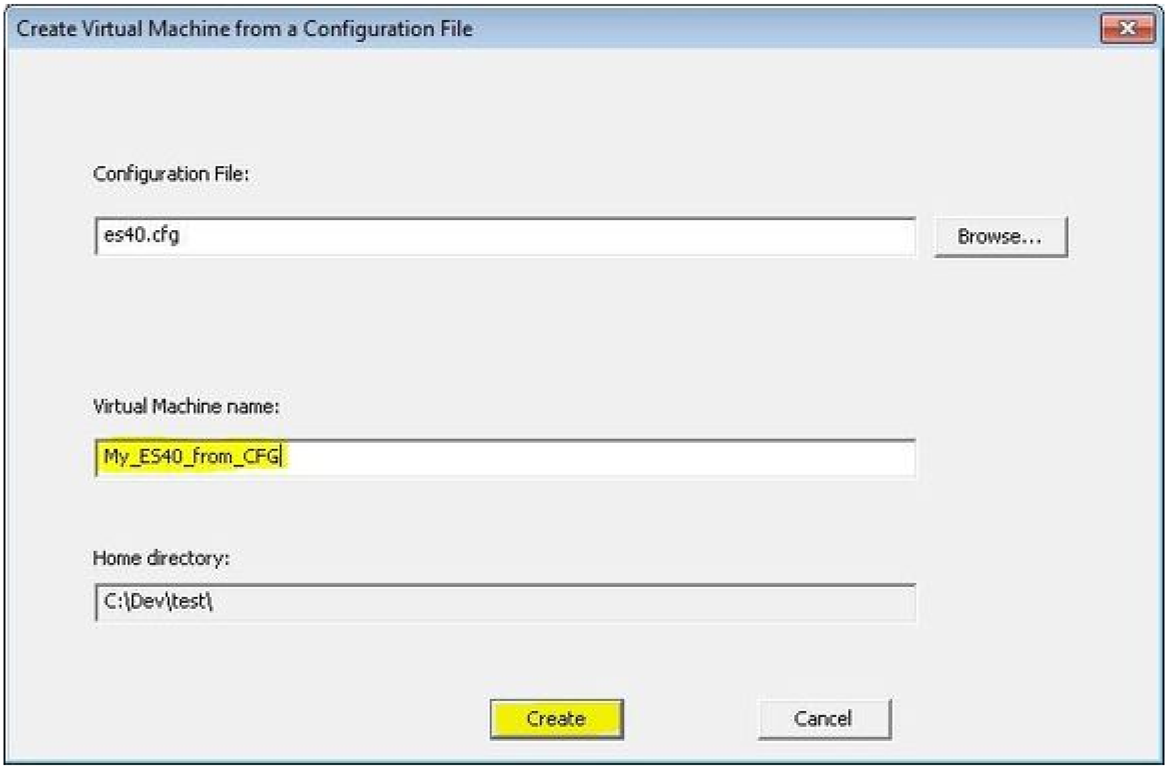
File name: es40.cfg

Charon Configuration file (*.cfg

⚠ Never select a configuration file template provided in the Charon installation folder as these files could be overwritten with patching.

Enter the CHARON Virtual Machine name and note the Home Directory for this VM, it will be used by default for storing logs, virtual disk images, toy and container files if no path is specified in the configuration file.

Press the "Create" button:

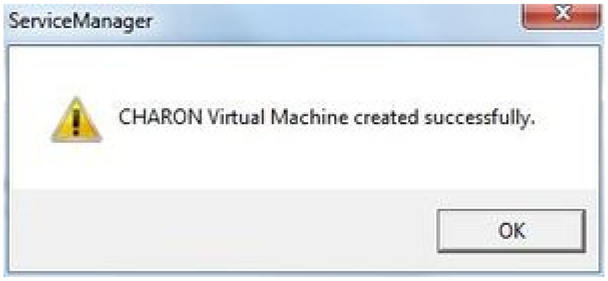


Configuration File: es40.cfg

Virtual Machine name: My_ES40_from_CFG

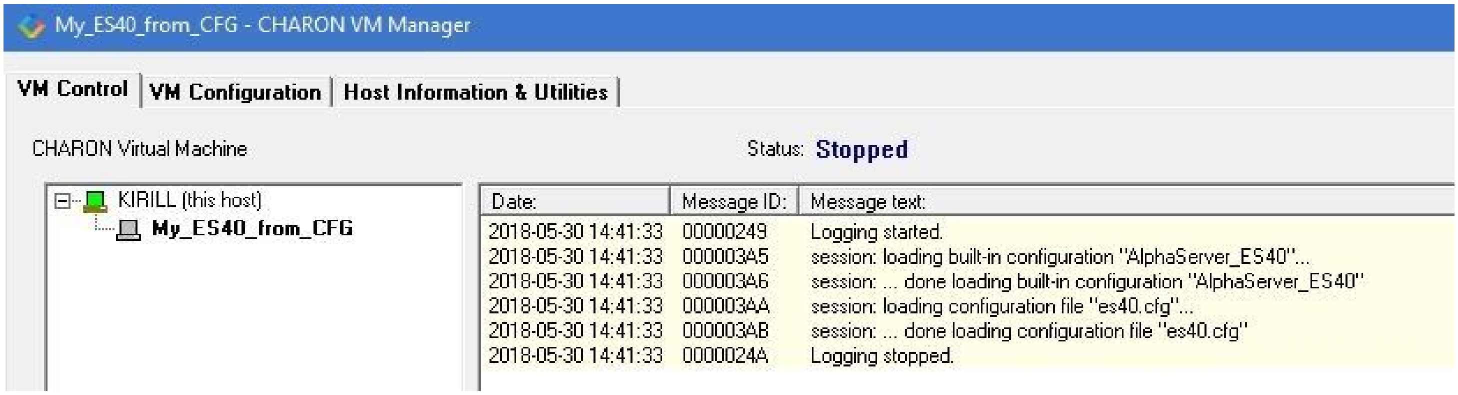
Home directory: C:\Dev\test\

The CHARON Virtual Machines Manager will report the VM has been created successfully:



CHARON Virtual Machine created successfully.

It will then appear in the left pane:



Date:	Message ID:	Message text:
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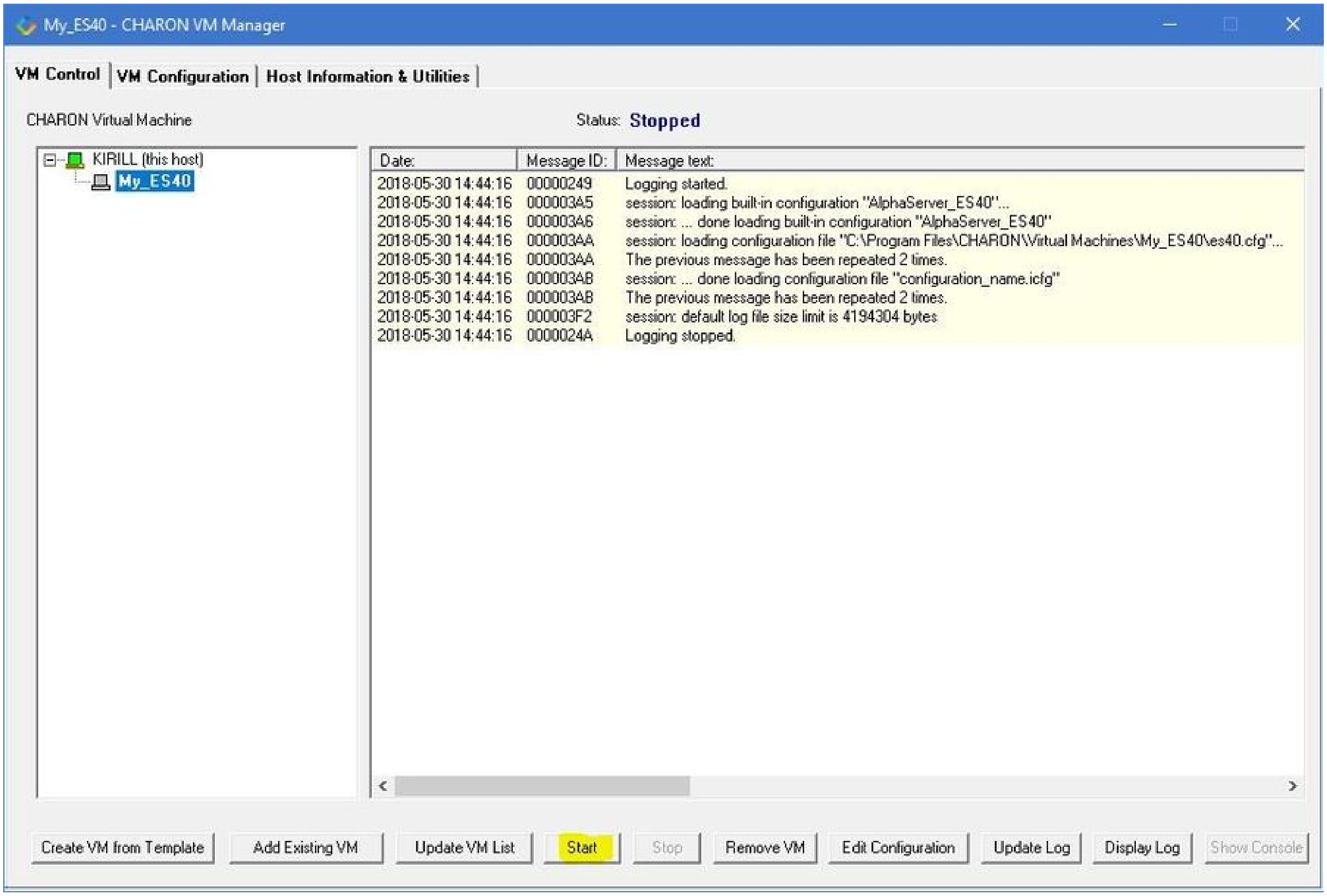
2018-05-30 14:41:33	000003A5	session: loading built-in configuration "AlphaServer_ES40"...
2018-05-30 14:41:33	000003A6	session: ... done loading built-in configuration "AlphaServer_ES40"
2018-05-30 14:41:33	000003AA	session: loading configuration file "es40.cfg"...
2018-05-30 14:41:33	000003AB	session: ... done loading configuration file "es40.cfg"
2018-05-30 14:41:33	0000024A	Logging stopped.

Running a CHARON Virtual Machine

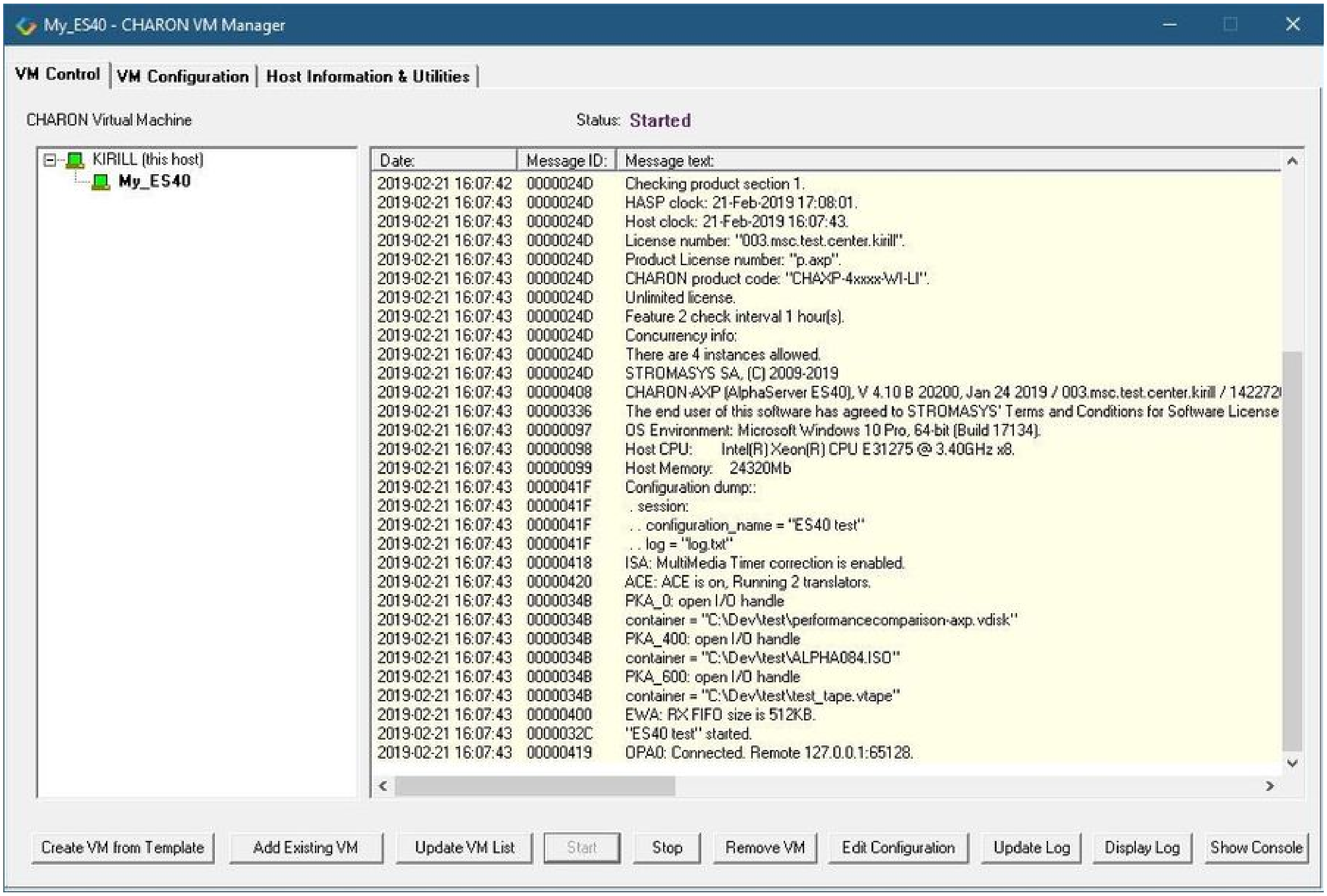
Select the target CHARON VM in the left pane and press the "Start" button:



Status: Stopped

```
Date:                Message ID:  Message text:
2018-05-30 14:44:16  00000249     Logging started.
2018-05-30 14:44:16  000003A5     session: loading built-in configuration "AlphaServer_ES40"...
2018-05-30 14:44:16  000003A6     session: ... done loading built-in configuration "AlphaServer_ES40"
2018-05-30 14:44:16  000003AA     session: loading configuration file "C:\Program Files\CHARON\Virtual Machines\My_ES40\es40.cfg"...
2018-05-30 14:44:16  000003AA     The previous message has been repeated 2 times.
2018-05-30 14:44:16  000003AB     session: ... done loading configuration file "configuration_name.icfg"
2018-05-30 14:44:16  000003AB     The previous message has been repeated 2 times.
2018-05-30 14:44:16  000003F2     session: default log file size limit is 4194304 bytes
2018-05-30 14:44:16  0000024A     Logging stopped.
```

CHARON Virtual Machines Manager will display the execution log:

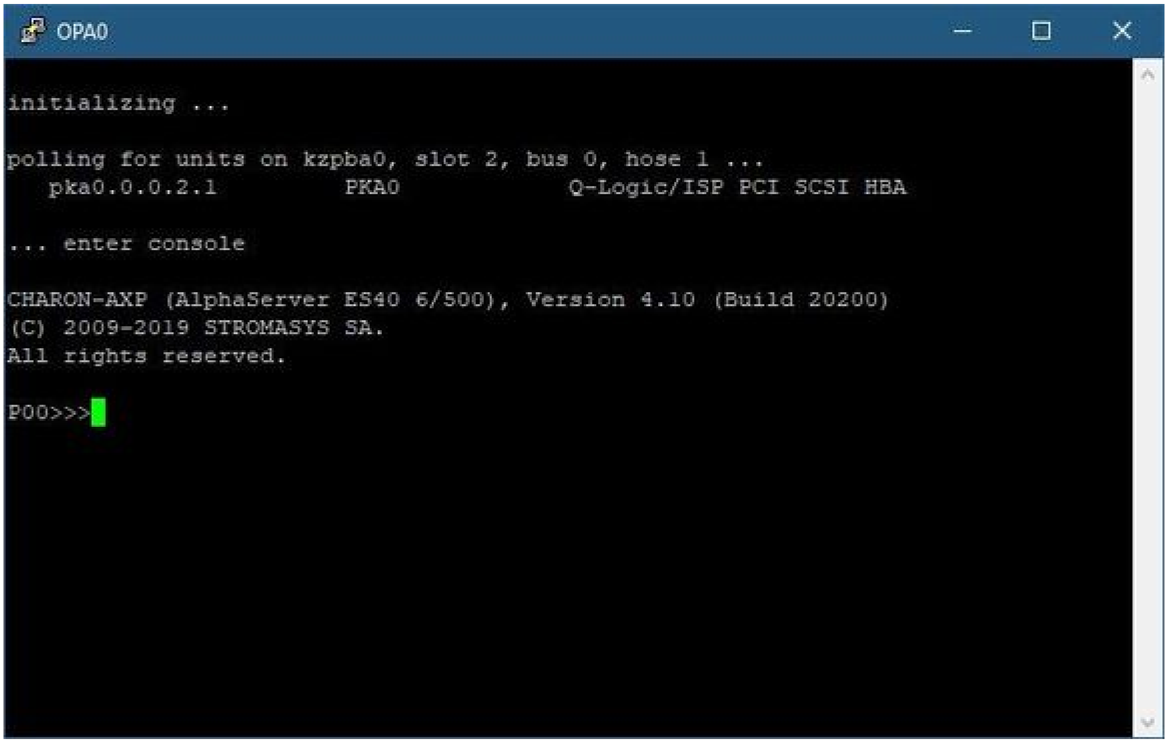


```
Date:                Message ID:  Message text:
2019-02-21 16:07:42  0000024D     Checking product section 1.
2019-02-21 16:07:43  0000024D     HASP clock: 21-Feb-2019 17:08:01.
2019-02-21 16:07:43  0000024D     Host clock: 21-Feb-2019 16:07:43.
2019-02-21 16:07:43  0000024D     License number: "003.msc.test.center.kirill".
2019-02-21 16:07:43  0000024D     Product License number: "p.axp".
2019-02-21 16:07:43  0000024D     CHARON product code: "CHAXP-4xxxx-WI-LI".
2019-02-21 16:07:43  0000024D     Unlimited license.
2019-02-21 16:07:43  0000024D     Feature 2 check interval 1 hour(s).
2019-02-21 16:07:43  0000024D     Concurrency info:
2019-02-21 16:07:43  0000024D     There are 4 instances allowed.
2019-02-21 16:07:43  0000024D     STROMASYS SA, (C) 2009-2019
2019-02-21 16:07:43  00000408     CHARON-AXP (AlphaServer ES40), V 4.10 B 20200, Jan 24 2019 / 003.msc.test.center.kirill / 142272
2019-02-21 16:07:43  00000336     The end user of this software has agreed to STROMASYS' Terms and Conditions for Software License
2019-02-21 16:07:43  00000097     OS Environment: Microsoft Windows 10 Pro, 64-bit (Build 17134).
2019-02-21 16:07:43  00000098     Host CPU:      Intel(R) Xeon(R) CPU E31275 @ 3.40GHz x8.
2019-02-21 16:07:43  00000099     Host Memory:    24320Mb
2019-02-21 16:07:43  0000041F     Configuration dump::
2019-02-21 16:07:43  0000041F      . session:
2019-02-21 16:07:43  0000041F      . . configuration_name = "ES40 test"
2019-02-21 16:07:43  0000041F      . . log = "log.txt"
2019-02-21 16:07:43  00000418     ISA: MultiMedia Timer correction is enabled.
2019-02-21 16:07:43  00000420     ACE: ACE is on, Running 2 translators.
2019-02-21 16:07:43  0000034B     PKA_0: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\performancecomparison-axp.vdisk"
2019-02-21 16:07:43  0000034B     PKA_400: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\ALPHA084.ISO"
2019-02-21 16:07:43  0000034B     PKA_600: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\test_tape.vtape"
2019-02-21 16:07:43  00000400     EWA: RX FIFO size is 512KB.
2019-02-21 16:07:43  0000032C     "ES40 test" started.
2019-02-21 16:07:43  00000419     OPA0: Connected. Remote 127.0.0.1:65128.
```

Note the color meaning:

Colors	Meaning	Example
Red	Error	This is an error message
Light blue	Warning	This is a warning message
Light yellow	Information	This is an informational message
Purple	Begin/End of the Windows system log	Begin / End

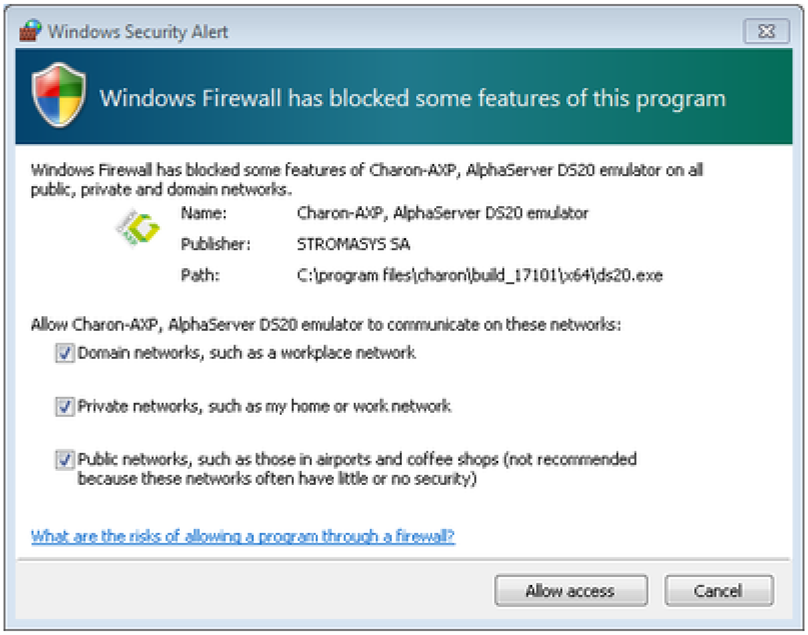
The console of this particular CHARON VM will then appear (if defined in the configuration file):



```
initializing ...

polling for units on kzpba0, slot 2, bus 0, hose 1 ...
   pka0.0.0.2.1          PKA0            Q-Logic/ISP PCI SCSI HBA

... enter console

CHARON-AXP (AlphaServer ES40 6/500), Version 4.10 (Build 20200)
(C) 2009-2019 STROMASYS SA.
All rights reserved.

P00>>>
```

The total number of devices (both controllers and units, including disks) displayed by CHARON SRM console is limited to 48. Note that it does not affect the actual number of configured devices provided to CHARON guest OS.

Depending on settings, Windows may display a Firewall warning dialog asking to confirm CHARON access to different networks.



Windows Firewall has blocked some features of this program

Windows Firewall has blocked some features of Charon-AXP, AlphaServer DS20 emulator on all public, private and domain networks.

Name: Charon-AXP, AlphaServer DS20 emulator

Publisher: STROMASYS SA

Path: C:\program files\charon\build_17101\x64\ds20.exe

Allow Charon-AXP, AlphaServer DS20 emulator to communicate on these networks:

☑ Domain networks, such as a workplace network

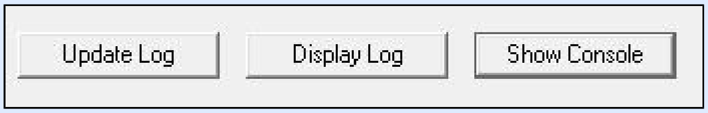
☑ Private networks, such as my home or work network

☑ Public networks, such as those in airports and coffee shops (not recommended because these networks often have little or no security)

What are the risks of allowing a program through a firewall?
Allow access
Cancel

Check the desired options and press the "Allow access" button.

If you closed the CHARON VM console, it is always possible to re-open it by pressing the "Show Console" button:

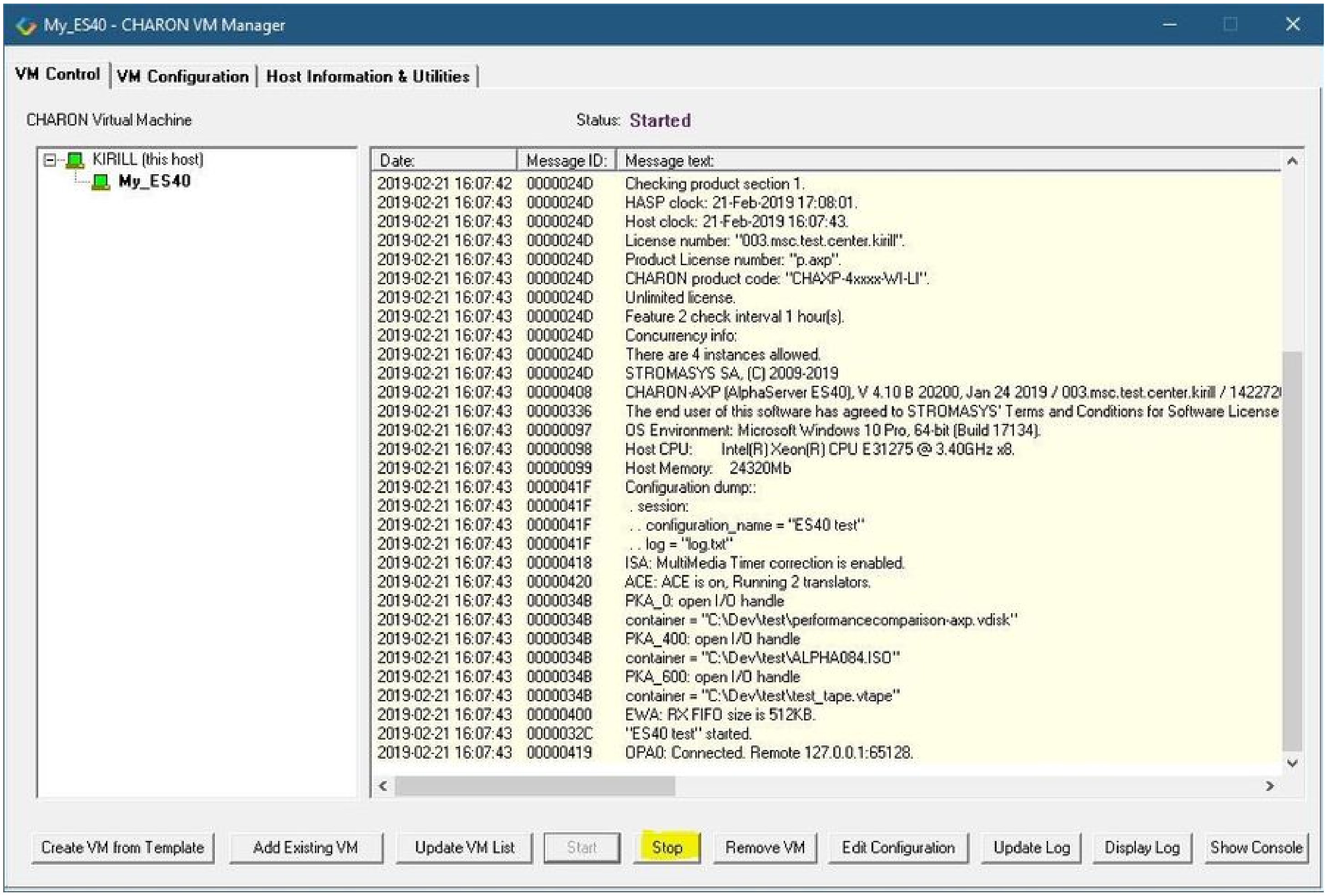


Closing the console will not stop the CHARON Virtual Machine

Stopping a CHARON Virtual Machine

⚠ Note: before stopping the virtual machine from the CHARON Virtual Machines Manager, a clean shutdown of the operating system running on the VM has to be performed.

Select the target CHARON VM in the left pane and press the "Stop" button. A dialog will appear to confirm, select "Yes" to continue to stop the VM:

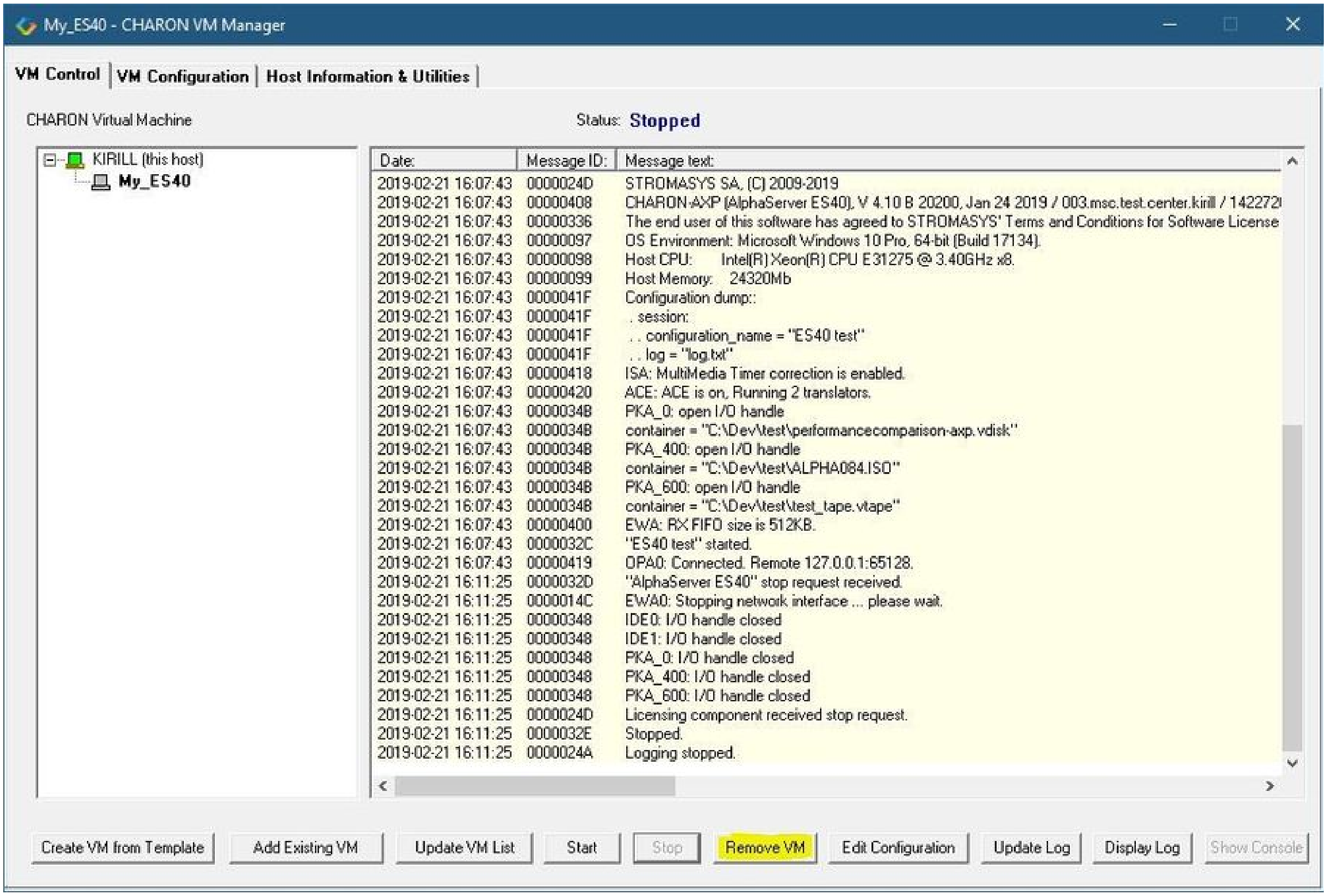


Status: Started

```
Date:                Message ID:  Message text:
2019-02-21 16:07:42  0000024D     Checking product section 1.
2019-02-21 16:07:43  0000024D     HASP clock: 21-Feb-2019 17:08:01.
2019-02-21 16:07:43  0000024D     Host clock: 21-Feb-2019 16:07:43.
2019-02-21 16:07:43  0000024D     License number: "003.msc.test.center.kirill".
2019-02-21 16:07:43  0000024D     Product License number: "p.axp".
2019-02-21 16:07:43  0000024D     CHARON product code: "CHAXP-4xxxx-WI-LI".
2019-02-21 16:07:43  0000024D     Unlimited license.
2019-02-21 16:07:43  0000024D     Feature 2 check interval 1 hour(s).
2019-02-21 16:07:43  0000024D     Concurrency info:
2019-02-21 16:07:43  0000024D     There are 4 instances allowed.
2019-02-21 16:07:43  0000024D     STROMASYS SA, (C) 2009-2019
2019-02-21 16:07:43  00000408     CHARON-AXP (AlphaServer ES40), V 4.10 B 20200, Jan 24 2019 / 003.msc.test.center.kirill / 142272
2019-02-21 16:07:43  00000336     The end user of this software has agreed to STROMASYS' Terms and Conditions for Software License
2019-02-21 16:07:43  00000097     OS Environment: Microsoft Windows 10 Pro, 64-bit (Build 17134).
2019-02-21 16:07:43  00000098     Host CPU:      Intel(R) Xeon(R) CPU E31275 @ 3.40GHz x8.
2019-02-21 16:07:43  00000099     Host Memory:    24320Mb
2019-02-21 16:07:43  0000041F     Configuration dump::
2019-02-21 16:07:43  0000041F      . session:
2019-02-21 16:07:43  0000041F      . . configuration_name = "ES40 test"
2019-02-21 16:07:43  0000041F      . . log = "log.txt"
2019-02-21 16:07:43  00000418     ISA: MultiMedia Timer correction is enabled.
2019-02-21 16:07:43  00000420     ACE: ACE is on, Running 2 translators.
2019-02-21 16:07:43  0000034B     PKA_0: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\performancecomparison-axp.vdisk"
2019-02-21 16:07:43  0000034B     PKA_400: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\ALPHA084.ISO"
2019-02-21 16:07:43  0000034B     PKA_600: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\test_tape.vtape"
2019-02-21 16:07:43  00000400     EWA: RX FIFO size is 512KB.
2019-02-21 16:07:43  0000032C     "ES40 test" started.
2019-02-21 16:07:43  00000419     OPA0: Connected. Remote 127.0.0.1:65128.
```

Removing a CHARON Virtual Machine

To remove a CHARON VM, select it and pressing the "Remove VM" button:

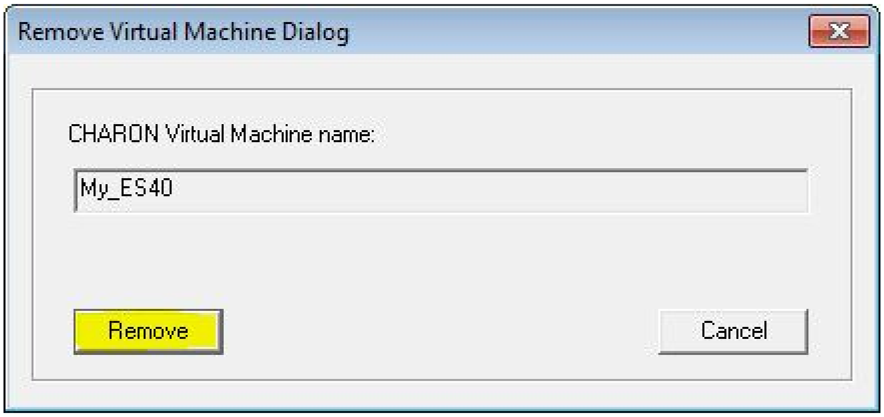


Status: Stopped

```
Date:                Message ID:  Message text:
2019-02-21 16:07:43  0000024D     STROMASYS SA, (C) 2009-2019
2019-02-21 16:07:43  00000408     CHARON-AXP (AlphaServer ES40), V 4.10 B 20200, Jan 24 2019 / 003.msc.test.center.kirill / 142272
2019-02-21 16:07:43  00000336     The end user of this software has agreed to STROMASYS' Terms and Conditions for Software License
2019-02-21 16:07:43  00000097     OS Environment: Microsoft Windows 10 Pro, 64-bit (Build 17134).
2019-02-21 16:07:43  00000098     Host CPU:      Intel(R) Xeon(R) CPU E31275 @ 3.40GHz x8.
2019-02-21 16:07:43  00000099     Host Memory:   24320Mb
2019-02-21 16:07:43  0000041F     Configuration dump::
2019-02-21 16:07:43  0000041F      . session:
2019-02-21 16:07:43  0000041F      . . configuration_name = "ES40 test"
2019-02-21 16:07:43  0000041F      . . log = "log.txt"
2019-02-21 16:07:43  00000418     ISA: MultiMedia Timer correction is enabled.
2019-02-21 16:07:43  00000420     ACE: ACE is on, Running 2 translators.
2019-02-21 16:07:43  0000034B     PKA_0: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\performancecomparison-axp.vdisk"
2019-02-21 16:07:43  0000034B     PKA_400: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\ALPHA084.ISO"
2019-02-21 16:07:43  0000034B     PKA_600: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\test_tape.vtape"
2019-02-21 16:07:43  00000400     EWA: RX FIFO size is 512KB.
2019-02-21 16:07:43  0000032C     "ES40 test" started.
2019-02-21 16:07:43  00000419     OPA0: Connected. Remote 127.0.0.1:65128.
2019-02-21 16:11:25  0000032D     "AlphaServer ES40" stop request received.
2019-02-21 16:11:25  0000014C     EWA0: Stopping network interface ... please wait.
2019-02-21 16:11:25  00000348     IDE0: I/O handle closed
2019-02-21 16:11:25  00000348     IDE1: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_0: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_400: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_600: I/O handle closed
2019-02-21 16:11:25  0000024D     Licensing component received stop request.
2019-02-21 16:11:25  0000032E     Stopped.
2019-02-21 16:11:25  0000024A     Logging stopped.
```

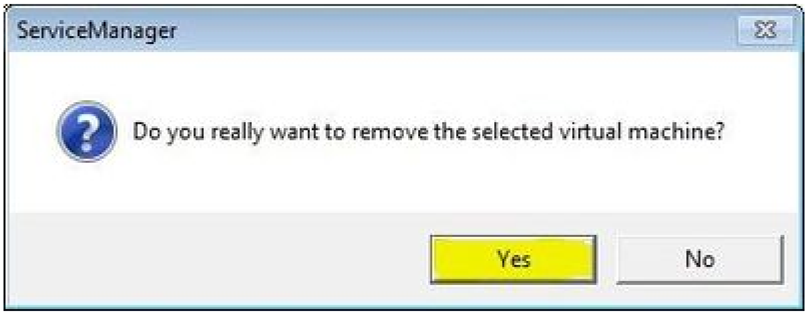
⚠ The Virtual machine has to be stopped before removing it (see Stopping a CHARON Virtual Machine chapter above)

A confirmation dialog will be displayed:



CHARON Virtual Machine name: My_ES40

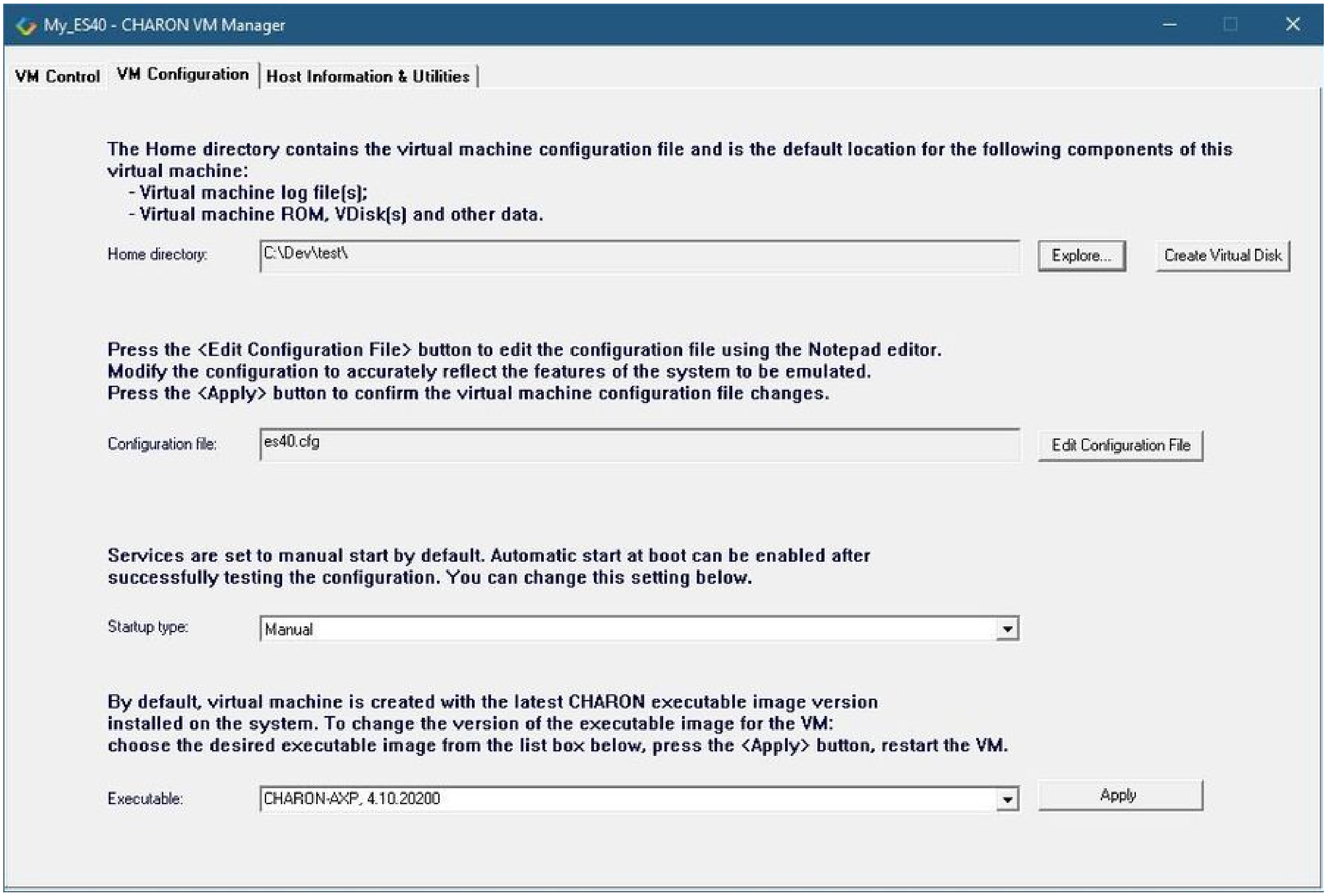
Press the "Remove" button and confirm the CHARON VM removal by pressing the "Yes" button:



Do you really want to remove the selected virtual machine?

Modifying a CHARON Virtual Machine

Select the target CHARON VM and switch to the "VM Configuration" tab to see its features:



The Home directory contains the virtual machine configuration file and is the default location for the following components of this virtual machine:
- Virtual machine log file(s);
- Virtual machine ROM, VDisk(s) and other data.

Home directory: C:\Dev\test\

Press the <Edit Configuration File> button to edit the configuration file using the Notepad editor.
Modify the configuration to accurately reflect the features of the system to be emulated.
Press the <Apply> button to confirm the virtual machine configuration file changes.

Configuration file: es40.cfg

Services are set to manual start by default. Automatic start at boot can be enabled after successfully testing the configuration. You can change this setting below.

Startup type: Manual

By default, virtual machine is created with the latest CHARON executable image version installed on the system. To change the version of the executable image for the VM:
choose the desired executable image from the list box below, press the <Apply> button, restart the VM.

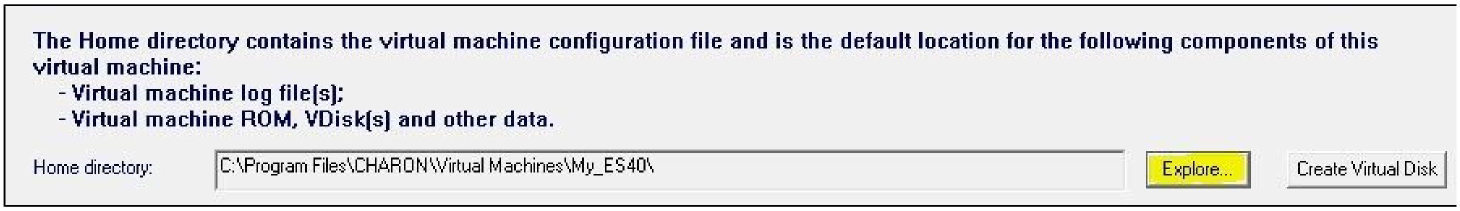
Executable: CHARON-AXP, 4.10.20200

Using this dialog it is possible to:

- Explore the Home Directory of the CHARON VM.
- Create virtual disks by pressing the "Create Virtual Disks" button.
- Edit the CHARON VM configuration file.
- Change the startup mode.
- Select the CHARON version used for this Virtual Machine.

Exploring CHARON Virtual Machine Home Directory

Press the "Explore" button to open up a Windows Explorer window showing the content of the selected CHARON VM home folder:



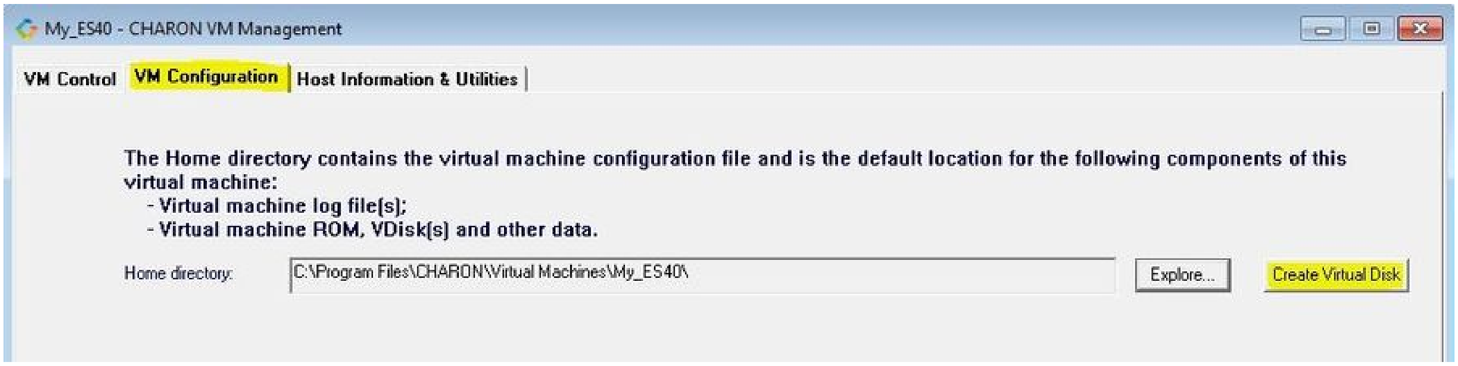
The Home directory contains the virtual machine configuration file and is the default location for the following components of this virtual machine:
- Virtual machine log file(s);
- Virtual machine ROM, VDisk(s) and other data.

Home directory: C:\Program Files\CHARON\Virtual Machines\My_ES40\

This content includes the CHARON VM configuration file and may also include virtual disks and tapes images, logs, ROM files, etc.

Making a new virtual disk

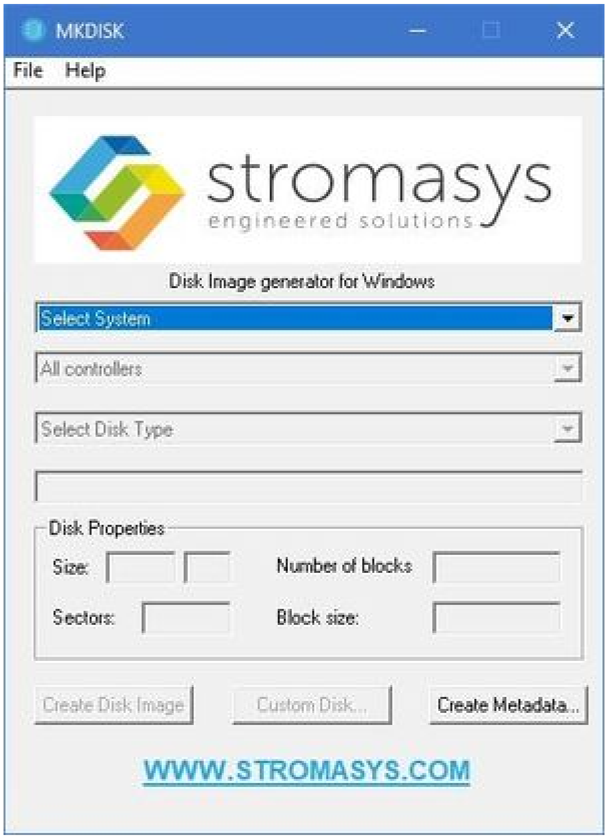
It is very convenient to use the "Create Virtual Disk" button to create empty disk images in the CHARON VM Home Directory:



The Home directory contains the virtual machine configuration file and is the default location for the following components of this virtual machine:
- Virtual machine log file(s);
- Virtual machine ROM, VDisk(s) and other data.

Home directory: C:\Program Files\CHARON\Virtual Machines\My_ES40\

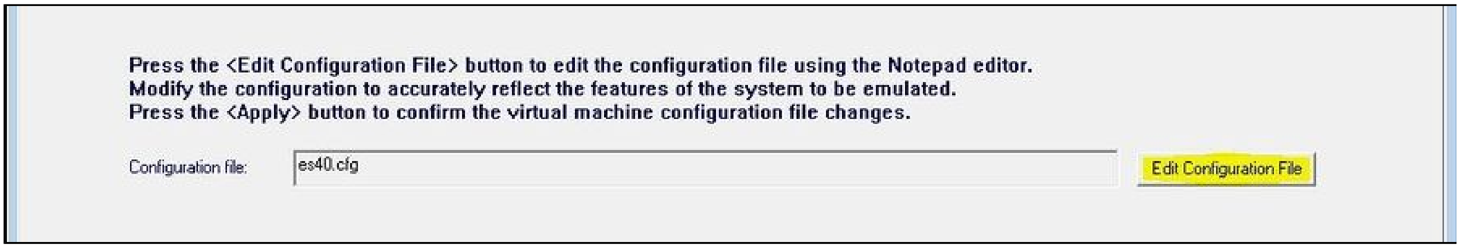
The MkDisk utility will be called for this operation:



Refer to the "Utilities" section of this User's Guide for more information about the MkDisk utility.

CHARON Virtual Machine configuration file

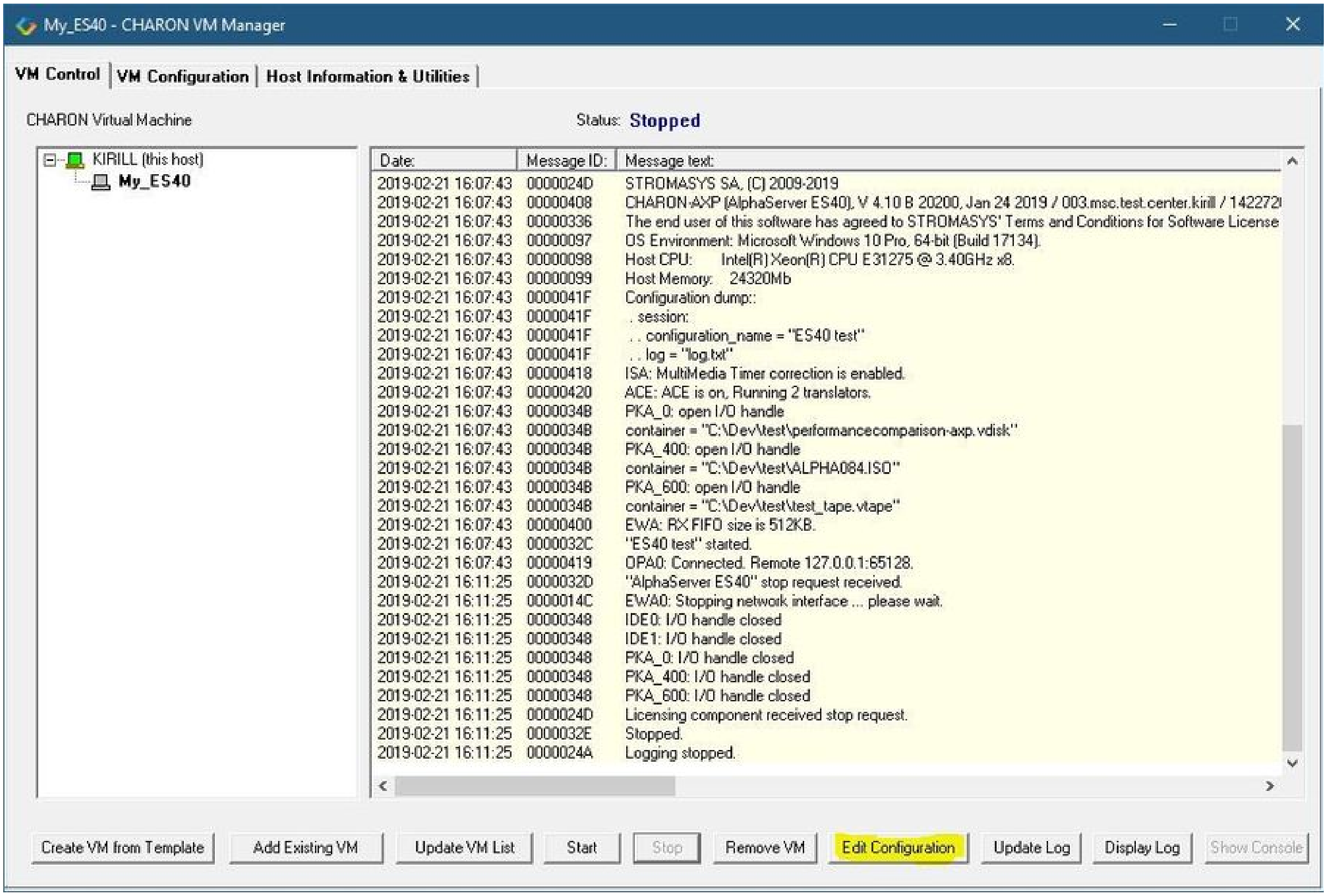
Press the "Edit Configuration file" button:



Press the <Edit Configuration File> button to edit the configuration file using the Notepad editor.
Modify the configuration to accurately reflect the features of the system to be emulated.
Press the <Apply> button to confirm the virtual machine configuration file changes.

Configuration file: es40.cfg

Alternatively it is possible to select the target CHARON VM and press the "Edit Configuration" button:



Status: **Stopped**

```
Date:                Message ID:  Message text:
2019-02-21 16:07:43  0000024D     STROMASYS SA, (C) 2009-2019
2019-02-21 16:07:43  00000408     CHARON-AXP (AlphaServer ES40), V 4.10 B 20200, Jan 24 2019 / 003.msc.test.center.kirill / 142272
2019-02-21 16:07:43  00000336     The end user of this software has agreed to STROMASYS' Terms and Conditions for Software License
2019-02-21 16:07:43  00000097     OS Environment: Microsoft Windows 10 Pro, 64-bit (Build 17134).
2019-02-21 16:07:43  00000098     Host CPU:      Intel(R) Xeon(R) CPU E31275 @ 3.40GHz x8.
2019-02-21 16:07:43  00000099     Host Memory:    24320Mb
2019-02-21 16:07:43  0000041F     Configuration dump::
2019-02-21 16:07:43  0000041F      . session:
2019-02-21 16:07:43  0000041F      . . configuration_name = "ES40 test"
2019-02-21 16:07:43  0000041F      . . log = "log.txt"
2019-02-21 16:07:43  00000418     ISA: MultiMedia Timer correction is enabled.
2019-02-21 16:07:43  00000420     ACE: ACE is on, Running 2 translators.
2019-02-21 16:07:43  0000034B     PKA_0: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\performancecomparison-axp.vdisk"
2019-02-21 16:07:43  0000034B     PKA_400: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\ALPHA084.ISO"
2019-02-21 16:07:43  0000034B     PKA_600: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\test_tape.vtape"
2019-02-21 16:07:43  00000400     EWA: RX FIFO size is 512KB.
2019-02-21 16:07:43  0000032C     "ES40 test" started.
2019-02-21 16:07:43  00000419     OPA0: Connected. Remote 127.0.0.1:65128.
2019-02-21 16:11:25  0000032D     "AlphaServer ES40" stop request received.
2019-02-21 16:11:25  0000014C     EWA0: Stopping network interface ... please wait.
2019-02-21 16:11:25  00000348     IDE0: I/O handle closed
2019-02-21 16:11:25  00000348     IDE1: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_0: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_400: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_600: I/O handle closed
2019-02-21 16:11:25  0000024D     Licensing component received stop request.
2019-02-21 16:11:25  0000032E     Stopped.
2019-02-21 16:11:25  0000024A     Logging stopped.
```

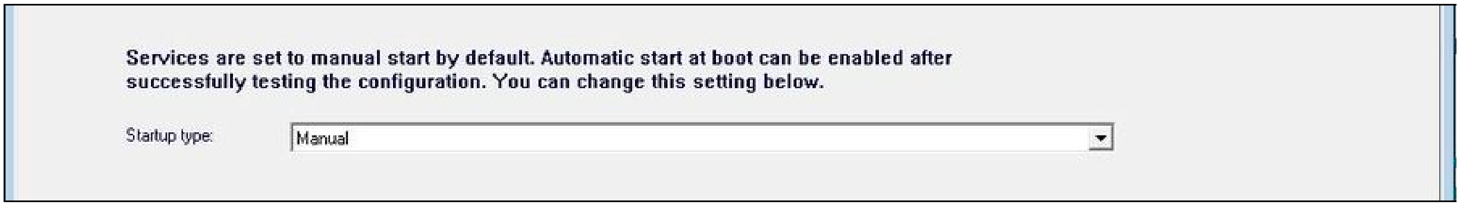
The configuration file specifies all the settings of the CHARON VM. This will be discussed in the next chapter.

CHARON Virtual Machine startup mode

By default, the CHARON VM startup mode is set to "Manual" meaning a user has to start the CHARON VM manually using the CHARON Virtual Machines Manager after a host reboot. If the CHARON VM has to start automatically, select the "Automatic" option.

⚠ Setting the mode to "Automatic" will only start the CHARON VM, it will not boot the operating system. This part will be discussed in the next chapter.

Select the CHARON VM startup behavior in the "Startup type" drop down list:



Services are set to manual start by default. Automatic start at boot can be enabled after successfully testing the configuration. You can change this setting below.

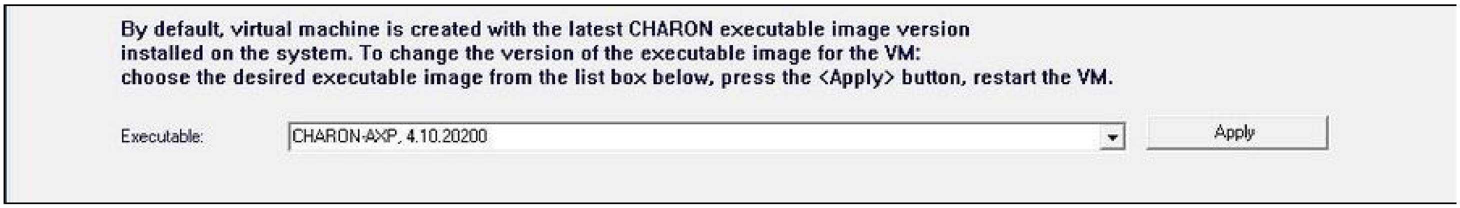
Startup type: Manual

CHARON version to be used for CHARON VM

The CHARON installation procedure allows several versions of CHARON to be installed on the host at the same time (V4.8 and later only). This option can be used for testing.

⚠ If a patch has been applied to a specific version, only the patched version will appear, not the vanilla one. If you need to rollback to a vanilla version, please uninstall the patch according to the documentation provided with the patch.

Select the target CHARON version from the "Executable" drop-down list and press the "Apply" button:

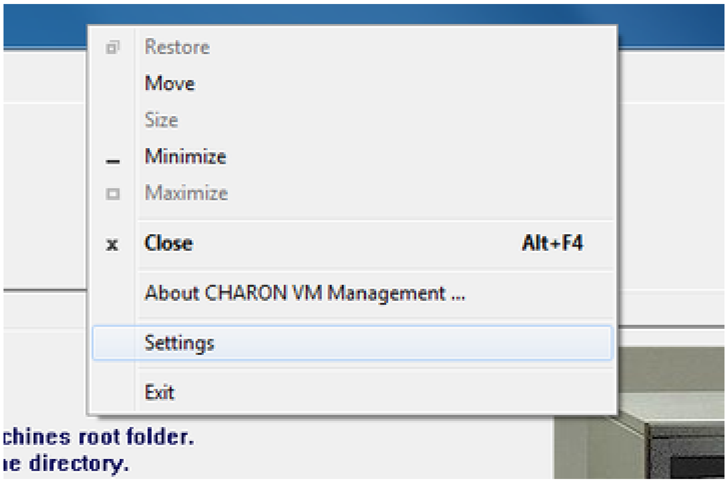
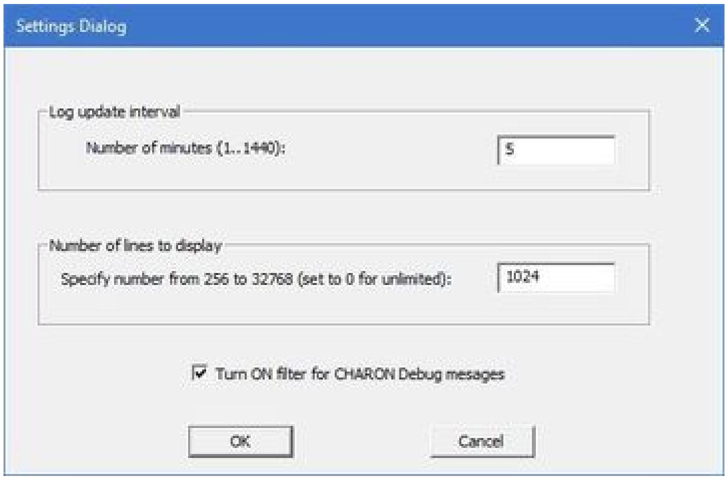


By default, virtual machine is created with the latest CHARON executable image version installed on the system. To change the version of the executable image for the VM: choose the desired executable image from the list box below, press the <Apply> button, restart the VM.

Executable: CHARON-AXP, 4.10.20200

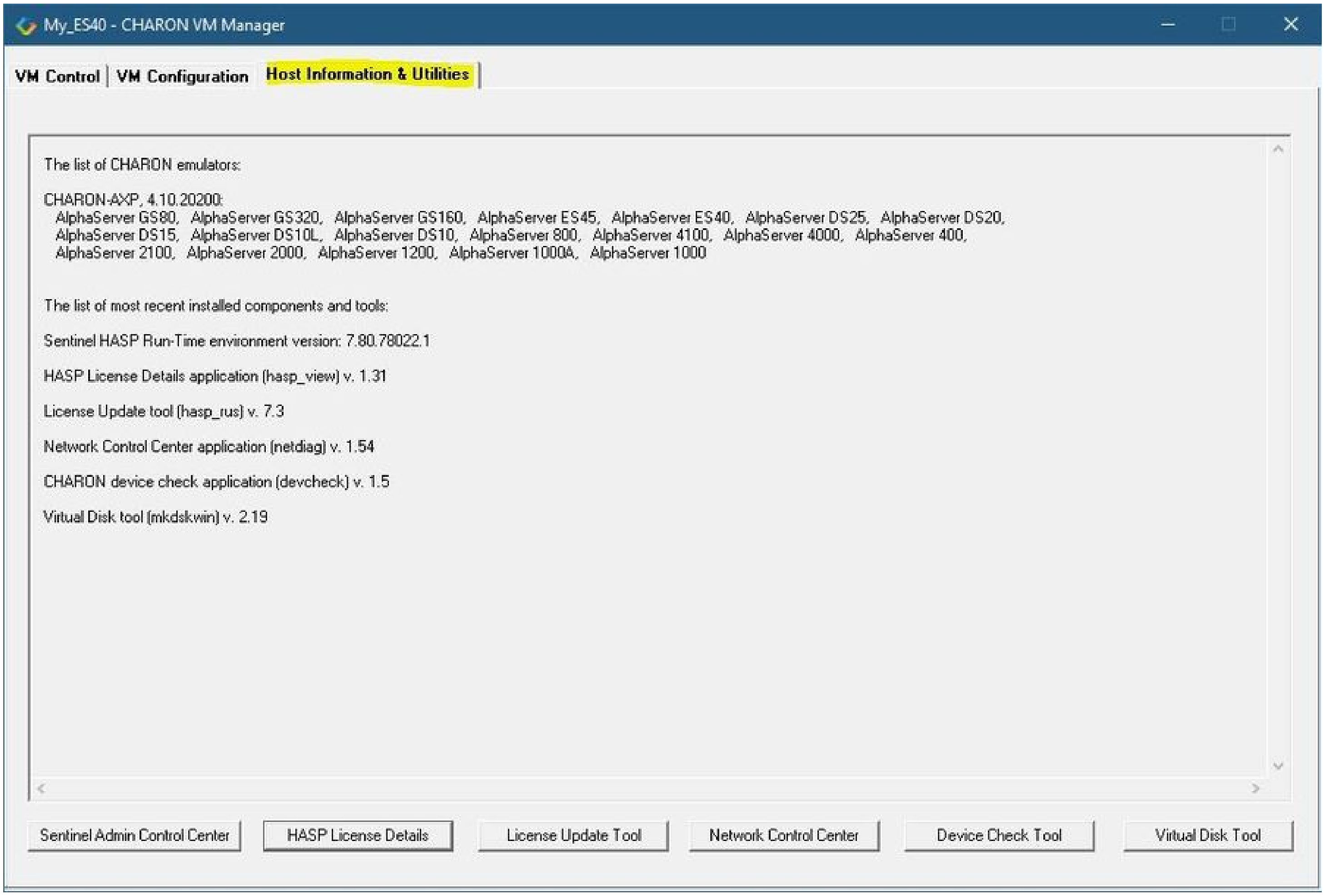
Service functions

Additional functionalities are available and described below:

Function	Description
Update Log and Number of lines to display	The CHARON Virtual Machines Manager updates the displayed log every 5 minutes and displays up to 1024 lines by default. It can be changed in the "Settings" dialog of the program system menu. Right click on top of the CHARON Virtual Machines Manager window and select "Settings":  Restore Move Size Minimize Maximize Close Alt+F4 About CHARON VM Management ... Settings Exit chines root folder. ie directory. In the appearing dialog you can change the interval:  Settings Dialog Log update interval Number of minutes (1..1440): 5 Number of lines to display Specify number from 256 to 32768 (set to 0 for unlimited): 1024 ☑ Turn ON filter for CHARON Debug mesages If it is required to see most up-to-date version of the log, press the "Update Log" button.
Display Log	Available from the VM control tab, bottom right. Creates a separate window containing the selected CHARON VM log
Show Console	Available from the VM control tab, bottom right, and if the VM is running. Opens the selected CHARON VM console if it has been closed

Running CHARON utilities

Select the "Host Information & Utilities" tab to get a quick access to the CHARON utilities:



```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

These utilities are described below:

Button	Description
Sentinel Admin Control Center	Used to view CHARON licenses and manage them.
HASP License Details	Used to display the CHARON license content.
License Update Tool	Used to manage the CHARON licenses, collect the host system fingerprint.
Network Control Center	Used to configure the CHARON network.
Device Check tool	Used to review the system resources that can be mapped to CHARON.
Virtual Disk Tool	GUI-based utility used to create custom or standard CHARON virtual disk containers.

CHARON-AXP for Windows configuration

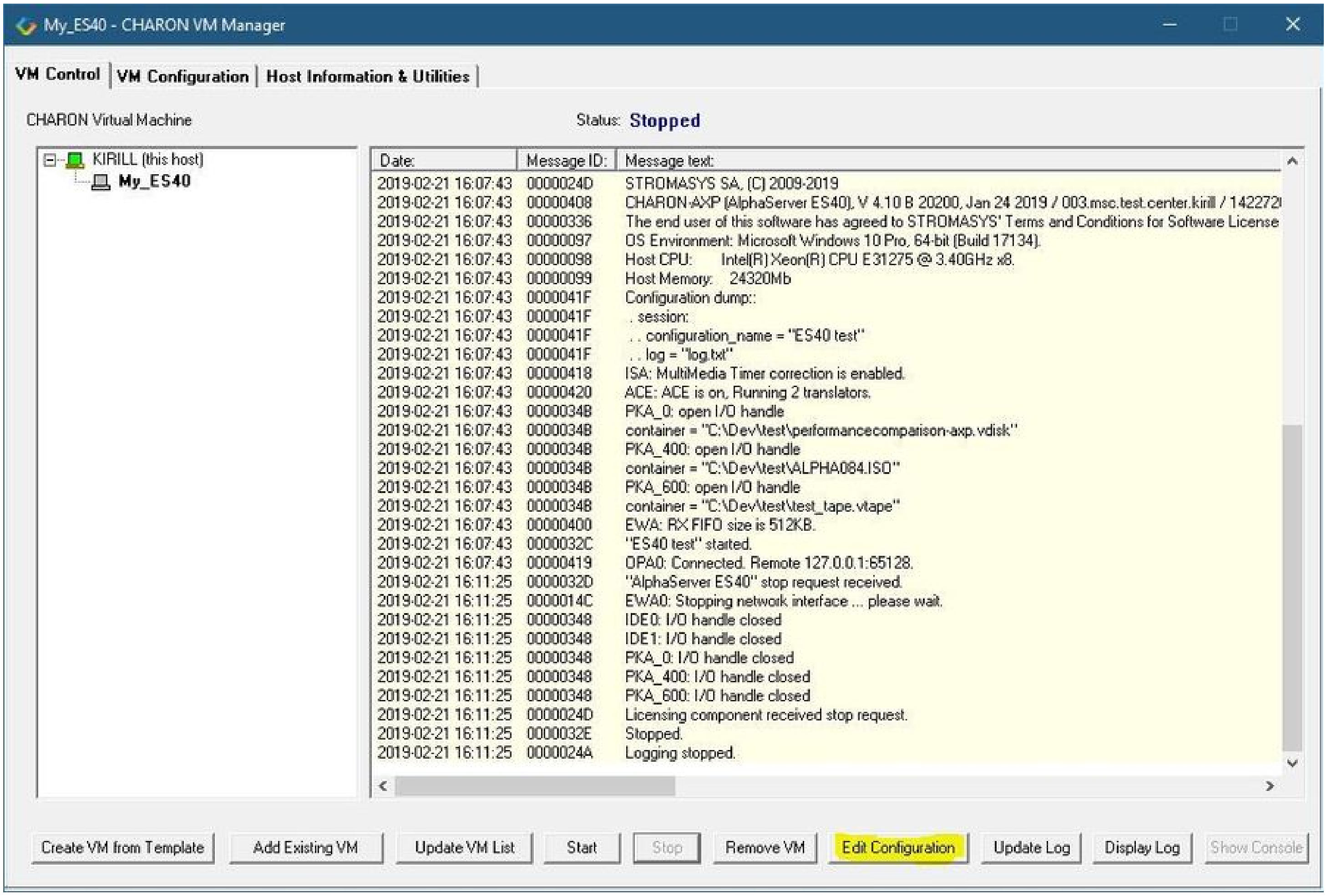
Table of Contents

Creation of CHARON VM configuration

When a CHARON Virtual Machine (VM) is created from a template using the CHARON Virtual Machines Manager, it has to be updated to meet the desired configuration.

This configuration is represented as a text file ("configuration file") containing some specific keywords to define the main settings such as amount of memory, number of CPUs, peripheral devices as well as specifics of CHARON VM executions such as name of VM log file, number of host CPUs used for emulation, etc.

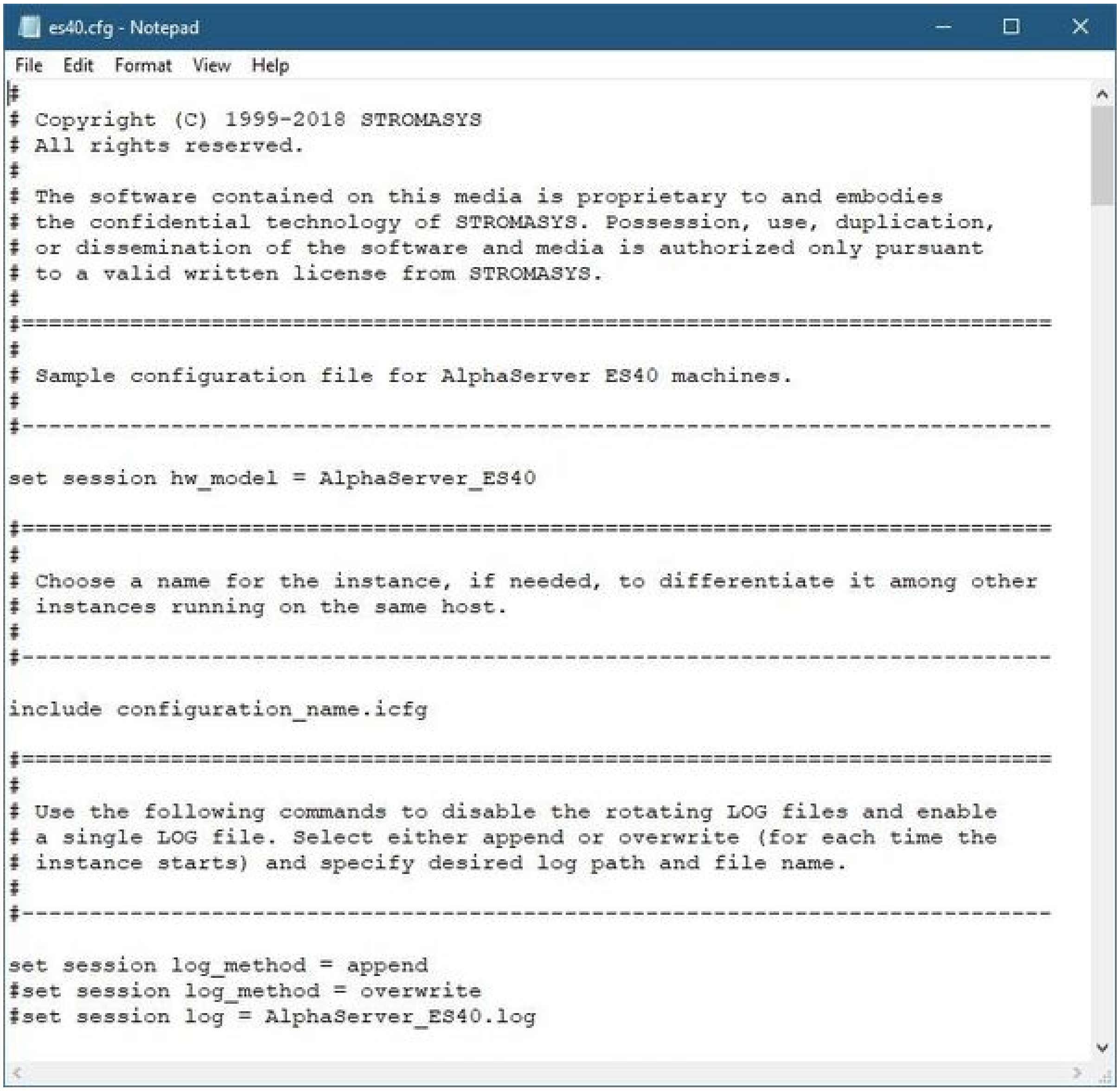
To change the configuration file, open the CHARON Virtual Machines Manager from its shortcut on Desktop / Start menu or from the tray menu item, select the target CHARON VM and press the "Edit Configuration" button:



Status: Stopped

```
Date:                Message ID:  Message text:
2019-02-21 16:07:43  0000024D     STROMASYS SA, (C) 2009-2019
2019-02-21 16:07:43  00000408     CHARON-AXP (AlphaServer ES40), V 4.10 B 20200, Jan 24 2019 / 003.msc.test.center.kirill / 142272
2019-02-21 16:07:43  00000336     The end user of this software has agreed to STROMASYS' Terms and Conditions for Software License
2019-02-21 16:07:43  00000097     OS Environment: Microsoft Windows 10 Pro, 64-bit (Build 17134).
2019-02-21 16:07:43  00000098     Host CPU:      Intel(R) Xeon(R) CPU E31275 @ 3.40GHz x8.
2019-02-21 16:07:43  00000099     Host Memory:    24320Mb
2019-02-21 16:07:43  0000041F     Configuration dump::
2019-02-21 16:07:43  0000041F      . session:
2019-02-21 16:07:43  0000041F      . . configuration_name = "ES40 test"
2019-02-21 16:07:43  0000041F      . . log = "log.txt"
2019-02-21 16:07:43  00000418     ISA: MultiMedia Timer correction is enabled.
2019-02-21 16:07:43  00000420     ACE: ACE is on, Running 2 translators.
2019-02-21 16:07:43  0000034B     PKA_0: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\performancecomparison-axp.vdisk"
2019-02-21 16:07:43  0000034B     PKA_400: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\ALPHA084.ISO"
2019-02-21 16:07:43  0000034B     PKA_600: open I/O handle
2019-02-21 16:07:43  0000034B     container = "C:\Dev\test\test_tape.vtape"
2019-02-21 16:07:43  00000400     EWA: RX FIFO size is 512KB.
2019-02-21 16:07:43  0000032C     "ES40 test" started.
2019-02-21 16:07:43  00000419     OPA0: Connected. Remote 127.0.0.1:65128.
2019-02-21 16:11:25  0000032D     "AlphaServer ES40" stop request received.
2019-02-21 16:11:25  0000014C     EWA0: Stopping network interface ... please wait.
2019-02-21 16:11:25  00000348     IDE0: I/O handle closed
2019-02-21 16:11:25  00000348     IDE1: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_0: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_400: I/O handle closed
2019-02-21 16:11:25  00000348     PKA_600: I/O handle closed
2019-02-21 16:11:25  0000024D     Licensing component received stop request.
2019-02-21 16:11:25  0000032E     Stopped.
2019-02-21 16:11:25  0000024A     Logging stopped.
```

Notepad will be used to edit the configuration file:



```
#
# Copyright (C) 1999-2018 STROMASYS
# All rights reserved.
#
# The software contained on this media is proprietary to and embodies
# the confidential technology of STROMASYS. Possession, use, duplication,
# or dissemination of the software and media is authorized only pursuant
# to a valid written license from STROMASYS.
#
#=============================================================================
#
# Sample configuration file for AlphaServer ES40 machines.
#
#-----------------------------------------------------------------------------

set session hw_model = AlphaServer_ES40

#=============================================================================
#
# Choose a name for the instance, if needed, to differentiate it among other
# instances running on the same host.
#
#-----------------------------------------------------------------------------

include configuration_name.icfg

#=============================================================================
#
# Use the following commands to disable the rotating LOG files and enable
# a single LOG file. Select either append or overwrite (for each time the
# instance starts) and specify desired log path and file name.
#
#-----------------------------------------------------------------------------

set session log_method = append
#set session log_method = overwrite
#set session log = AlphaServer_ES40.log
```

HP Alpha model specification

The first configuration statement is the specification of the exact HP Alpha hardware model to emulate, for example:

```
set session hw_model = AlphaServer_ES40
```

You must leave this line untouched.

⚠ If you create the CHARON VM configuration file from scratch, it must be the very first uncommented line in the configuration file.

Configuration name

The next configuration statement is the "Configuration name" option. If the virtual machine has been created using an existing template, the configuration name is defined in the configuration_name.icfg file otherwise it is defined directly in the configuration file using the "set session configuration_name = <...>" syntax:

```
include configuration_name.icfg
```

Notes:

- The configuration name is reported in the log file and is used to set the log file name for rotating log (see explanations further).
- Changing the configuration name in the "configuration_name.icfg" file does not change the name of the virtual machine at Virtual Machines Manager level.
- The "configuration_name.icfg" file can be found in the home directiory of the VM. Select the target VM, open "VM Configuration" tab and press "Explore" button.

The configuration name can be any label that is meaningful.

Example:

```
set session configuration_name = My_ES40
```

It is possible to specify a configuration name containing spaces, in this case use quotation marks:

```
set session configuration_name = "My ES40"
```

Log file parameters

The execution of a CHARON VM creates one log file or a set of log files reflecting the progress of its start-up and ongoing operations: start and end time of execution, system information, license and configuration details, warnings, reports on problems that may occur, etc. In case of problems with either the running CHARON VM or the emulated system configuration (such as the absence or malfunction of certain devices), the log file is the primary source to be analyzed for troubleshooting.

ℹ If it becomes necessary to contact Stromasys for support, the configuration and log files, plus the license number, will be requested to begin the problem resolution.

CHARON-AXP log file example (part1)

```
20190221:160742:INFO :0:00000249:ethane.cxx(9026): Logging started.
20190221:160742:INFO :0:000003A5:ethane.cxx( 147): session: loading built-in configuration
"AlphaServer_ES40"...
20190221:160742:INFO :0:000003A6:ethane.cxx( 179): session: ... done loading built-in configuration
"AlphaServer_ES40"
20190221:160742:INFO :0:000003A7:ethane.cxx( 337): session: loading service configuration "My_ES40"...
20190221:160742:INFO :0:000003A8:ethane.cxx( 372): session: ... done loading service configuration "My_ES40"
20190221:160742:INFO :0:000003AA:ethane.cxx( 420): session: loading configuration file "es40.cfg"...
20190221:160742:INFO :0:000003AB:ethane.cxx( 456): session: ... done loading configuration file "es40.cfg"
20190221:160742:INFO :0:0000032B:ethane.cxx(2707): Start request received.
20190221:160742:INFO :0:000003AC:ethane.cxx( 818): session: process affinity is 00000000000000FF, system
affinity is 00000000000000FF
20190221:160742:INFO :0:000003D1:ethane.cxx(1476): session: I/O domain affinity is 0000000000000003, CPU
domain affinity is 00000000000000FC
20190221:160742:INFO :0:0000024D:licenseman(1823): Checking the available license key "1422726238".
20190221:160742:INFO :0:0000024D:licenseman(1823): Found license key: "1422726238".
20190221:160742:INFO :0:0000024D:licenseman(1823): Checking product section 0.
20190221:160742:INFO :0:0000024D:licenseman(1823): The value "ALPHASERVER_ES40" of the required parameter
"P_HW" is not found in the list "PDP1193,PDP1194" for the product 0.
20190221:160742:INFO :0:0000024D:licenseman(1823): Checking product section 1.
20190221:160743:INFO :0:0000024D:licenseman(1823): HASP clock: 21-Feb-2019 17:08:01.
20190221:160743:INFO :0:0000024D:licenseman(1823): Host clock: 21-Feb-2019 16:07:43.
20190221:160743:INFO :0:0000024D:licenseman(1823): License number: "003.msc.test.center.kirill".
20190221:160743:INFO :0:0000024D:licenseman(1823): Product License number: "p.axp".
20190221:160743:INFO :0:0000024D:licenseman(1823): CHARON product code: "CHAXP-4xxxx-WI-LI".
20190221:160743:INFO :0:0000024D:licenseman(1823): Unlimited license.
20190221:160743:INFO :0:0000024D:licenseman(1823): Feature 2 check interval 1 hour(s).
20190221:160743:INFO :0:0000024D:licenseman(1823): Concurrency info:
20190221:160743:INFO :0:0000024D:licenseman(1823): There are 4 instances allowed.
20190221:160743:INFO :0:0000024D:ethane.cxx(2838): STROMASYS SA, (C) 2009-2019
20190221:160743:INFO :0:00000408:ethane.cxx(2880): CHARON-AXP (AlphaServer ES40), V 4.10 B 20200, Jan 24
2019 / 003.msc.test.center.kirill / 1422726238
20190221:160743:INFO :0:00000336:ethane.cxx(2921): The end user of this software has agreed to STROMASYS'
Terms and Conditions for Software License and Limited Warranty, as described at: http://www.stromasys.com/pub
/doc/30-17-033.pdf
20190221:160743:INFO :0:00000097:ethane.cxx(3000): OS Environment: Microsoft Windows 10 Pro, 64-bit (Build
17134).
20190221:160743:INFO :0:00000098:ethane.cxx(3005): Host CPU: Intel(R) Xeon(R) CPU E31275 @ 3.40GHz x8.
20190221:160743:INFO :0:00000099:ethane.cxx(3010): Host Memory: 24320Mb
20190221:160743:INFO :0:0000041F:ethane.cxx(3236): Configuration dump::
. session:
. . configuration_name = "ES40 test"
. . log = "log.txt"

. . log_method = "overwrite"
. . log_locale = "English"
. . log_show_messages = "all"
. . log_repeat_filter = "off"
. c_chip:
. . mm_timer_correction_disable = "false"
. RAM:
. . size = "512"
. ACE:
. . num_entries = "2139"
. . num_translators = "0"
. . cache_size = "1024"
. . cache_base_size = "200"
. . host_options = " --locked-size=16"
. . enabled = "true"
. . ext_compiler = "ml64.exe"
. . ext_path = ""
. . cpu_architecture = "EV6"
. . locked_size = "16"
```

CHARON-AXP log file example (part2)

```
. axp_bus_0:
. . mm_timer_correction_disable = "false"
. cpu_0:
. . locked_size = "16"
. . wtint_idle = "true"
. axp_bus_1:
. . mm_timer_correction_disable = "false"
. cpu_1:
. . locked_size = "16"
. . wtint_idle = "true"
. axp_bus_2:
. . mm_timer_correction_disable = "false"
. cpu_2:
. . locked_size = "16"
. . wtint_idle = "true"
. axp_bus_3:
. . mm_timer_correction_disable = "false"
. cpu_3:
. . locked_size = "16"
. . wtint_idle = "true"
. ROM:
. . container = "clipper.bin"
. . dsrdb[0] = "1816"
. . dsrdb[1] = "50"
. . dsrdb[4] = "50"
. . dsrdb[11] = "1050"
. . dsrdb[12] = "1050"
. . system_name = "AlphaServer ES40 6/500"
. pci_0:
. . mm_timer_correction_disable = "false"
. pci_1:
. . mm_timer_correction_disable = "false"
. ISA:
. . clock_period = "10000"
. . mm_timer_correction_disable = "false"
. TOY:
. . sync_to_host = "as_vms, nowrite"
. COM1:
. . line = "OPA0"
. . communication = "console"
. COM2:
. . line = "(void)"
. . communication = "ascii"
. OPA0:
. . trace = "disabled"
. . port = "10003"
. . application = "putty -load OPA0"
. EWA:
. . adapter_mode = "auto"
. . interface = "EWA0"
. . rx_fifo_delay_on_overload = "false"

. EWA0:
. . interface = "(disabled)"
. . port_show_driver_statistics = "false"
. . port_enable_mac_addr_change = "true"
. . port_delay_tx_on_overload = "true"
. . suspend_msg_on_mac_change = "true"
. . legacy_mode = "false"
. PKA:
. . scsi_id = "7"
. . min_n_of_threads = "0"
. . container[0] = "C:\Dev\test\performancecomparison-axp.vdisk"
. . container[400] = "C:\Dev\test\ALPHA084.ISO"
. . container[600] = "C:\Dev\test\test_tape.vtape"
. . removable[600] = "true"
```

CHARON-AXP log file example (part3)

```
20190221:160743:INFO :0:00000418:busemul.cx( 188): ISA: MultiMedia Timer correction is enabled.
20190221:160743:INFO :0:00000420:dit_server(1038): ACE: ACE is on, Running 2 translators.
20190221:160743:INFO :0:0000034B:scsi_disk.( 485): PKA_0: open I/O handle
container = "C:\Dev\test\performancecomparison-axp.vdisk"
20190221:160743:INFO :0:0000034B:scsi_cdrom( 211): PKA_400: open I/O handle
container = "C:\Dev\test\ALPHA084.ISO"
20190221:160743:INFO :0:0000034B:scsi_tape.( 348): PKA_600: open I/O handle
container = "C:\Dev\test\test_tape.vtape"
20190221:160743:INFO :0:00000400:ethdev.cxx( 388): EWA: RX FIFO size is 512KB.
20190221:160743:INFO :0:0000032C:ethane.cxx(2743): "ES40 test" started.
20190221:160743:INFO :0:00000419:winsckio.c(2703): OPA0: Connected. Remote 127.0.0.1:65128.
```

The next group of parameters defines the name of the CHARON VM log file and how the CHARON VM will use it:

```
set session log_method = append
#set session log_method = overwrite
#set session log = "AlphaServer_ES40.log"
```

Rotating log (default)

By default the CHARON VM utilizes a so-called "rotating log" method. This means that a new default log file is always created each time the CHARON VM starts and if the size of the log file exceeds 64Kb (previous log files are kept).

This mode is turned on if all the log parameters above are disabled (commented out) or the "session_log" parameter is pointing to a directory rather than to a file. If a directory is specified, the log files will be created in that directory.

The names of the rotating log files are composed as follows:

```
configuration_name-YYYY-MM-DD-hh-mm-ss-xxxxxxxxx.log
```

If the "Configuration name" parameter described before is omitted (commented out), the log name has the following format instead:

```
hw_model-YYYY-MM-DD-hh-mm-ss-xxxxxxxxx.log
```

Note that "xxxxxxxxx" is an increasing decimal number starting from "000000000" to separate log files with the same time of creation.

⚠ The "log" parameter, if specified, must correspond to an existing folder.

ℹ If the path is not specified, the log file is created in the "Home directory" mentioned in the VM Configuration tab of the CHARON Virtual Machine Manager.

Single log

Alternatively it is possible to use a single log file. Uncomment the "set session log" line and specify the desired log file name. Optionally, a path can be added to the log file name.

ℹ If the path is not specified, the log file is created in the "Home directory" mentioned in the VM Configuration tab of the CHARON Virtual Machine Manager.

The log file can be extended specifying "log_method = append" (*recommended for reporting issues*) or overwritten, specifying "log_method = overwrite".

Below is a specification of a CHARON VM log file located in the "`C:\CHARON logs`" directory which will be appended each time the CHARON VM starts:

```
set session log_method = append
set session log = "C:\CHARON logs\my_ES40.log"
```

CPU affinity

This setting binds the running CHARON VM CPUs to particular host CPUs.This should be used for soft partitioning host CPU resources or for isolating multiple CHARON VMs on the same host from each other. By default the emulator instance allocates as many host CPUs as possible.

“Affinity” overrides the default and allows explicit specification of which host CPUs will be used by the instance. Affinity does not reserve the CPU for exclusive use.

```
set session affinity="0, 1, 2, 3"
```

The example above directs CHARON VM to use CPU 0,1,2 and 3.

If this parameter is omitted CHARON host will allocate available CPUs automatically.

⚠ Note that the number of the specified host CPUs must correspond to the number of the emulated CPUs (one host CPU for one emulated CPU; this value is specific for each HP Alpha model) and number of CPUs needed for CHARON application itself ("n_of_io_cpus").

Number of host CPUs dedicated to CHARON I/O

This setting reserves host CPUs (of those specified by “affinity” parameter, if any) for use by CHARON VM for I/O handling. By default CHARON VM reserves one third of available host CPUs for I/O processing (round down, at least one).

The “n_of_io_cpus” overrides the default by specifying the number of I/O host CPUs explicitly

Example:

```
set session n_of_io_cpus=2
```

The example above directs CHARON VM to use 2 CPUs for CHARON I/O operations.

⚠ Note that the number of the specified CPUs dedicated to CHARON VM I/O operations must correspond to the total number of available for CHARON CPUs (restricted by "affinity" parameter if needed) and the number of the virtual HP Alpha CPUs to be emulated.

Setting a specific HP Alpha model

CHARON-AXP allows to specify an exact model of HP Alpha.

For example for HP AlphaServer ES40 family the template configuration file contains the following options:

```
#============================================================================
#
# AlphaServer ES40 6/500
#
#----------------------------------------------------------------------------

#set ace cpu_architecture = EV6
#set rom dsrdb[0] = 1816 system_name = "AlphaServer ES40 6/500"
#set rom version[1] = 1.98-4 version[2] = 1.92-5

#============================================================================
#
# AlphaServer ES40 6/667
#
#----------------------------------------------------------------------------

set ace cpu_architecture = EV67
set rom dsrdb[0] = 1820 system_name = "AlphaServer ES40 6/667"
```

Just uncomment the provided lines to apply a certain model (It is "AlphaServer ES40 6/667" in the example above).

The full description of the parameters and other models that can be also configured is available in the "Configuration details" chapter of this User's Guide.

Reducing number of emulated CPUs

If the CHARON host does not contain enough CPUs to emulate full range of the CPUs provided by a certain HP Alpha model, it is possible to direct the CHARON VM to reduce the number of emulated Alpha CPUs:

```
set session n_of_cpus=1
```

This parameter can also be used to avoid warning messages in the log if the number of CPUs allowed by the license is less than the default number of CPUs of the emulated HP Alpha model.

Setting system serial number

If necessary, a specific system serial number instead of the default one:

```
set rom system_serial_number = SN01234567
```

TOY and ROM containers

The TOY and ROM containers have to be configured. Their presence depends on the HP Alpha model. It is always recommended to enable them. If a container file of the given name does not exist, starting the CHARON VM will create it.

TOY means "Time of Year". Its container records time, date and some console parameters while the CHARON VM is not running. It is highly recommended to define and activate this container:

```
set toy container="clipper.dat"
```

The ROM container stores an intermediate state of the Flash ROM and some console parameters. It is highly recommended to define and activate this container:

```
set rom container="clipper.bin"
```

Emulated memory (RAM) size

The next parameter defines the amount of host memory the CHARON VM reserves for the emulation:

```
#set ram size=4096
set ram size=32768
```

The amount of RAM is specified in MB. It cannot exceed or be lower than certain values specific for each HP Alpha model. It is very important to keep the listed predefined increment between possible memory values.

The following table shows all the parameters:

Hardware Model	RAM size (in MB)			
	Min	Max	Default	Increment
AlphaServer 400	64	1024	512	64
AlphaServer 800	256	8192	512	256
AlphaServer 1000	256	1024	512	256
AlphaServer 1000A	256	1024	512	256
AlphaServer 1200	256	32768	512	256
AlphaServer 2000	64	2048	512	64
AlphaServer 2100	64	2048	512	64
AlphaServer 4000	64	32768	512	64
AlphaServer 4100	64	32768	512	64
AlphaServer DS10	64	32768	512	64
AlphaServer DS10L	64	32768	512	64
AlphaServer DS15	64	32768	512	64
AlphaServer DS20	64	32768	512	64
AlphaServer DS25	64	32768	512	64
AlphaServer ES40	64	32768	512	64
AlphaServer ES45	64	32768	512	64
AlphaServer GS80	256	65536	512	256
AlphaServer GS160	512	131072	512	512
AlphaServer GS320	1024	262144	1024	1024

It is possible to leave the RAM line commented out. In this case the model's default RAM amount is used.

Note that in some particular orders your license may restrict the maximum RAM amount of each HP Alpha model.

Console

Mapping to system resources

The next step is the specification of the HP Alpha console (OPA0) serial line.

Example:

```
#set COM1 alias = OPA0 line = "COM1:"
#set COM1 alias = OPA0 port = 10003
#set COM1 alias = OPA0 port = 10003 application = "opa0.ht"
set COM1 alias = OPA0 port = 10003 application = "putty -load OPA0 -P 10003"
#set COM1 alias = OPA0 port = 10003 application = "c:\kea\user\opa0.ktc"
```

The goal of this configuration step is to tell CHARON-AXP what host device to use as the virtual system console. The following options are available:

Option	Description
line	Mapping to host serial line, "COM<n>:".
port	Mapping to an IP port of the CHARON host. Using this mapping it is possible to connect to the CHARON console and disconnect from it at any time.
application	Starting some application (typically terminal emulator) with its specific options and switches to communicate to CHARON using the IP port defined by the "port" parameter (see above)
alias	Define some meaningful name for "COM1" and "COM2". Usually it is "OPA0" for "COM1" and "TTA0" for "COM2" (see below)

The second console line "TTA0" can be also optionally configured (for 1 CPU models such as HP AlphaServer 400, HP AlphaServer 800, HP AlphaServer 1000, HP AlphaServer 1000A, HP AlphaServer DS10, HP AlphaServer DS10L and HP AlphaServer DS15):

```
#set COM2 alias = TTA0 line = "COM2:"
#set COM2 alias = TTA0 port = 10000
#set COM2 alias = TTA0 port = 10000 application = "tta0.ht"
set COM2 alias = TTA0 port = 10000 application = "putty -load TTA0 -P 10000"
#set COM2 alias = TTA0 port = 10000 application = "c:\kea\user\tta0.ktc"
```

Note that additional parameters for the CHARON VM serial lines configuration can be added. Follow this link for details.

Exit on pressing F6 button

Despite the fact that the CHARON VM can stop with the "`power off`" command entered at SRM console level, it is recommended to set a hot key to stop the VM from the console (when the console is accessed remotely for example):

```
set OPA0 stop_on = F6
```

This line allows the CHARON VM to be stopped by pressing the "**F6**" key.

Improve granularity of emulated timer

The next configuration option can be applied for improving granularity of emulated CHARON-AXP timer:

```
#set isa clock_period=1000
```

Do not uncomment this parameter unless there are some problems with the system time or the system clock intervals in the guest OS.

ATAPI CD/DVD-ROM configuration

If the sample configuration file provides this parameter it is possible to map this particular CHARON VM emulator's "DQA0" CD-ROM to the host CD/DVD-ROM with the following setting:

```
set ide container="\\.\CdRom0"
```

Networking

CHARON-AXP supports DE435, DE450, DE500AA, DE500BA, DE602 and DE602AA virtual network adapters.

All of them are configured in a similar way:

```
load DE500BA/dec21x4x EWA interface=EWA0
load packet_port/chnetwrk EWA0 interface="connection:Charon"
```

```
load DE602/i8255x EIA interface=EIA0
load packet_port/chnetwrk EIA0 interface="connection:Charon"
```

In the examples above the first line loads DE500BA/DE602 virtual adapter with a name "EWA"/"EIA" (note that "/i8255x" syntax must be used only with DE602 and DE602AA adapters); the following line maps it to the host network interface having a name "Charon" ("connection" is a key word). Note that the mapping is performed in 2 steps:

1. A mapping object "packet_port" with a name "EWA0"/"EIA0" is loaded and connected to the host interface named "Charon", so the CHARON VM will use this interface for its networking
2. The loaded DE500BA/DE602 virtual adapter "EWA"/"EIA" is connected to the "packet_port" object "EWA0"/"EIA0".

It is possible to load several DE435, DE450, DE500AA, DE500BA or DE602 controllers. For example (for DE500BA):

```
load DE500BA/dec21x4x EWA interface=EWA0
load packet_port/chnetwrk EWA0 interface="connection:Charon1"
load DE500BA/dec21x4x EWB interface=EWB0
load packet_port/chnetwrk EWB0 interface="connection:Charon2"
```

Some network adapters available in CHARON-AXP are preloaded (for example, HP AlphaServer DS15 contains 2 preloaded adapters EWA and EWB), so their configuration in CHARON VM is even more simple:

```
load packet_port/chnetwrk EWA0 interface = "connection:Charon"
```

CHARON supports VLAN adapters. If used, proceed with their installation and configuration according to the network adapter vendor User's Guide and then use the resulting VLAN interface the same way as the regular network interface.

The AlphaServer DS15 and DS25 contain two built-in PCI Ethernet adapters. Models and names (EI* or EW*) of them depend on configuration addon. Choose one of the two or none, but not both. The first instantiates onboard network interfaces as EIA and EWA. While the second - EWA and EWB (enabled by default for backward compatibility)

Example:

```
#include ds25-onboard-nics.icfg
include ds25-onboard-nics-ew.icfg
```

Follow this link for more details of CHARON-AXP network controllers configuration.

Disk/tape subsystem

The disk and tapes subsystems and the mapping to the system resources can be done using the samples given in the template configuration files.

CHARON-AXP supports KZPBA and KGPSA-CA adapters.

KZPBA PCI SCSI disk/tape controller

Below is the typical configuration options for the KZPBA PCI SCSI disk/tape controller:

```
load KZPBA PKA scsi_id = 7

#set PKA container[0] = "<file-name>.vdisk"

#set PKA container[100]="\\.\PhysicalDrive0"
#set PKA container[101]="\\.\PhysicalDrive(DevID=XXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX)"
#set PKA container[102]="\\.\PhysicalDrive(iScsiTarget = <iSCSI target>, LUN = <LUN number>)"

#set PKA container[200]="\\.\ScsiN:X:Y:Z"

#set PKA container[300]="\\.\CdRom0"
#set PKA container[300]="\\.\CdRom<N>"

#set PKA container[400] = "<file-name>.iso"

#set PKA container[500]="\\.\Tape0"
#set PKA container[500]="\\.\Tape<N>"

#set PKA container[600] = "<file-name>.vtape"

#set PKA container[600]="\\.\A:"
#set PKA media_type[600]="RX23"
```

The first line ("load KZPBA PKA") loads a disk controller KZPBA with name "PKA", followed by 8 groups of lines showing different ways of mapping to the host resources:

- **File representing a physical disk of the HP Alpha system (disk image)**
    - "<file-name>.vdisk"
      These files can be created from scratch with "MkDisk" utility. Data and OS disks backups are transferred from the original system via tapes or network and restored into these container files.
      Mapping may also include the full path, for example: "C:\My disks\my_boot_disk.vdisk". If the path is not specified, the disk images are expected to be in the CHARON VM home directory.

      ✖ Using compressed folders to store virtual disks and tapes is not supported

- **Physical disk**
    - "\\.\PhysicalDrive<N>"
      ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.

      These disks must not be formatted by the host OS.

- **Physical disk by its WWID**
    - "\\.\PhysicalDrive(DevID =XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX)"
      ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.

      These disks must not be formatted by the host OS.

      DevID addresses the target physical disk by its WWID (hexadecimal 128-bit identifier assigned to the disk drive by its manufacturer /originator).

      Example:

      ```
      set PKA container[100]="\\.\PhysicalDrive(DevID= 6008-05F3-0005-2950-BF8E-0B86-A0C7-0001)"
      ```

- **iSCSI disks**
    - "\\.\PhysicalDrive(iScsiTarget = <iSCSI target>, LUN = <LUN number>)"

Parameter	Description
iScsiTarget	Addresses the disk by its iSCSI target name.
LUN	Specifies the LUN on the connected iSCSI disk.

Example:

```
set PKA container[200]="\\.\PhysicalDrive(iScsiTarget= iqn.2008-04:iscsi.charon-target-test1, LUN= 1)"
```

- **SCSI device unknown to Windows for direct mapping, for example, a SCSI disk or tape reader**
    - "\\.\Scsi<N>:<X>:<Y>:<Z>"
      The values of N, X, Y and Z can be collected using special utility "Host Device Check" included in the CHARON distributive - or manually by investigation of the devices connected to CHARON host in the "Device Manager" applet.

Parameter	Description
N	A logical number assigned by host operating system (Microsoft Windows) to logical or host's physical storage resource such as physical SCSI HBA
X	An internal SCSI bus number (usually 0) on host's physical SCSI HBA
Y	A SCSI ID of physical SCSI target device attached to host's physical SCSI HBA
Z	A logical unit number inside physical SCSI target device attached to host's physical SCSI HBA

- **CD-ROM device**
    - "\\.\CdRom<N>"

- **ISO file for reading distribution CD-ROM image**

    - "<file-name>.iso"
      Mapping may also include the full path, for example: "C:\My disks\vms_distributive.iso". If the path is not specified, the CD-ROM images are expected to be in the CHARON VM home directory.

- **Host tape device**
    - "\\.\Tape<N>"

- **File representing the tape (tape image)**
    - "<file-name>.vtape"
      These files are created automatically.
      Mapping may also include a full path, for example: "C:\My tapes\backup.vtape". If the path is not specified, the tape images are expected to be in the CHARON VM home directory.

      ⊗ Using compressed folders to store virtual disks and tapes is not supported

- **Floppy drive**
    - "\\.\A:"

- **Other type of drive, for example magneto-optical drive**
    - "\\.\<N>:"

Additionally it is possible to specify a parameter "media_type" to assign the type of the attached media explicitly.

Example:

```
set PKA media_type[600]="RX23"
```

The numbers in the square brackets represent the SCSI addresses and LUNs associated with each container of the KZBPA controller. They have the following structure:

[XXYY], where

Parameter	Range	Description
XX	0...15	Stands for SCSI ID of each connected unit. ⓘ Note that the KZPBA itself has some ID associated with it. By default it is 7 but it can be changed in the following way: `load KZPBA PKA scsi_id = 0` In this example an instance "PKA" of KZPBA controller is assigned with SCSI ID 0.
YY	00...07	Stands for LUN.

It is possible to load several KZPBA controllers: DKB, DKC, etc. by configuring specific placement for them on the PCI bus. It is discussed in details in the "Configuration details" chapter of this Guide.

Some HP Alpha systems emulated by CHARON-AXP have already one or two KZPBA controllers pre-loaded. If the system has only one preloaded controller, the template configuration file usually provides some sample line on how to add another one. For example:

```
load KZPBA PKA bus=pci_1 device=1 function=0 irq_bus=isa irq=24
```

Follow this link for details on the KZPBA controllers configuration.

KGPSA-CA PCI FC disk controller

Optionally it is possible to configure KGPSA-CA FC disk controllers.

They can be configured in 3 modes:

- Direct mapping to the host resources
- Usage of "presentation mode" of connected or external storage controllers
- Pass Through mode

Below is an example of a KGPSA-CA controller loading:

```
load KGPSA FGA
```

Optionally another KGPSA-CA adapter can be loaded in a similar way:

```
load KGPSA FGB
```

Follow this link for details on the KGPSA-CA controllers configuration.

KGPSA-CA mapping to the host resources

Below is the typical configuration options for a KGPSA-CA PCI FC disk controller, mapped to the host resources:

```
load KGPSA FGA
#set FGA container[0] = "<file-name>.vdisk"
#set FGA container[100]="\\.\PhysicalDrive0"
#set FGA container[200]="\\.\PhysicalDrive(DevID=XXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX)"
#set FGA container[300]="\\.\PhysicalDrive(iScsiTarget = <iSCSI target>, LUN = <LUN number>)"
```

The first line ("load KGPSA FGA") loads a disk controller KGPSA named "FGA" followed by 2 groups of lines showing different ways of mapping to the host resources:

- **File representing a physical disk of the HP Alpha system (disk image)**
  - "<file-name>.vdisk"
    These files can be created from scratch with "MkDisk" utility. Data and OS disks backups are transferred from the original system via tapes or network and restored into these container files.
    Mapping may also include the full path, for example: "C:\My disks\my_boot_disk.vdisk". If the path is not specified, the disk images are expected to be in the CHARON VM home directory.

    ✖ Using compressed folders to store virtual disks and tapes is not supported

- **Physical disk**
  - "\\.\PhysicalDriveN"
    ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.

    These disks must not be formatted by the host OS.

- **Physical disk by its WWID**
  - "\\.\PhysicalDrive(DevID =XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX)"
    ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.

    These disks must not be formatted by the host OS.

    DevID addresses the target physical disk by its WWID (hexadecimal 128-bit identifier assigned to the disk drive by its manufacturer /originator).

    Example:

    ```
    set PKA container[100]="\\.\PhysicalDrive(DevID= 6008-05F3-0005-2950-BF8E-0B86-A0C7-0001)"
    ```

- **iSCSI disks**
  - "\\.\PhysicalDrive(iScsiTarget = <iSCSI target>, LUN = <LUN number>)"
    iScsiTarget addresses the disk by its iSCSI target name. LUN specifies LUN on the connected iSCSI disk.

    Example:

    ```
    set PKA container[200]="\\.\PhysicalDrive(iScsiTarget= iqn.2008-04:iscsi.charon-target-test1, LUN= 1)"
    ```

The numbers in the square brackets represent the KGPSA-CA units. They can be in the range of 0 to 32766 but no more than 255 units can be configured on a single controller.

KGPSA-CA mapping to a storage controller using its "presentation" mode

Some storage controllers allows CHARON VM to use their resources using so called "presentation" mode.

In this type of mapping the CHARON VM automatically creates a set of virtual FC devices for each of the units provided by the storage controller and connects to them through its KGPSA-CA FC adapter.

The main benefit in this type of mapping is a flexible way of the virtual disks management depending on the mapped storage controller configuration. For example if an extra disk is added to the storage controller, it automatically appears as a new disk unit on the corresponding KGPSA-CA virtual adapter mapped to that storage controller.

Below is an example of KGPSA-CA PCI FC disk controller mapped to some storage controller (for example SAN) using its "presentation" mode:

```
load KGPSA FGA storage_controller_path_id = 5008-05F3-0005-2950-5008-05F3-0005-2951
```

This line loads an instance of KGPSA-CA controller and maps it to some external controller having ID "5008-05F3-0005-2950-5008-05F3-0005-2951".

Type of mapping	Description
storage_controller_path_id = <Storage controller path ID>	"Storage controller path ID" is a storage (for example SAN) controller path ID. This ID can be obtained from the special utility "Device check tool" (accessible in the "Host Information and Utilities" section of the CHARON Virtual Machines Manager). Once specified, all the disks attached to the storage are automatically mapped as disk units to the CHARON VM.

KGPSA-CA pass through mode

It is also possible to use the emulated KGPSA-CA in "pass through" mode to address a physical EMULEX LightPulse PCI/PCI-X/PCIe FC adapter plugged into the host’s PCI/PCI-X/PCIe slot.

The sample configuration file provides a template for this type of mapping:

```
#set FGA host_bus_location = "PCI bus X, device Y, function Z"
#set FGB host_bus_location = "PCI bus A, device B, function C"
```

The "host_bus_location" parameter addresses the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter in the following way:

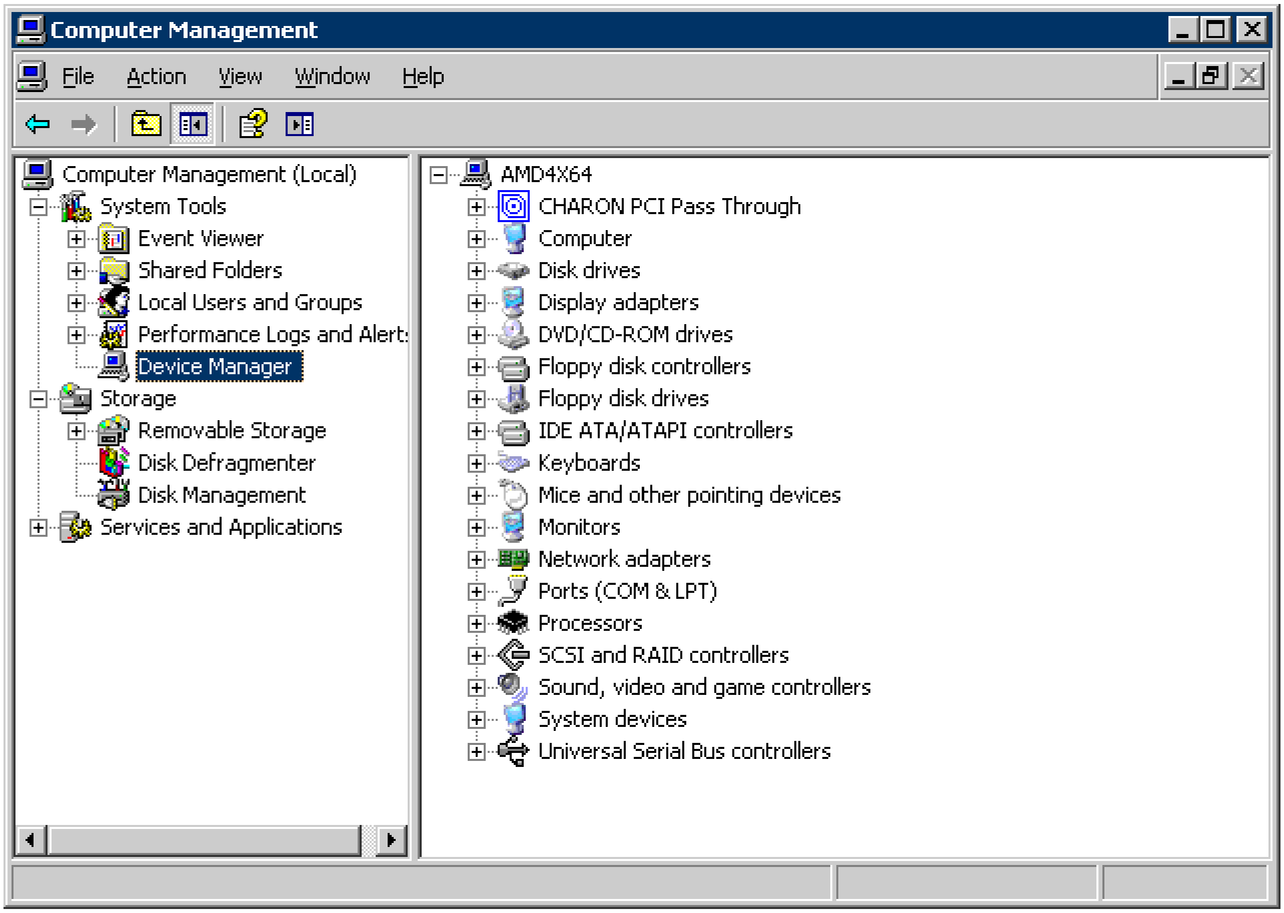
Parameters	Description
"PCI bus X"	PCI bus number of the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter
"device Y"	PCI bus device number of the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter
"function Z"	The "function" parameter of the the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter

To establish "pass through" mode do the following:

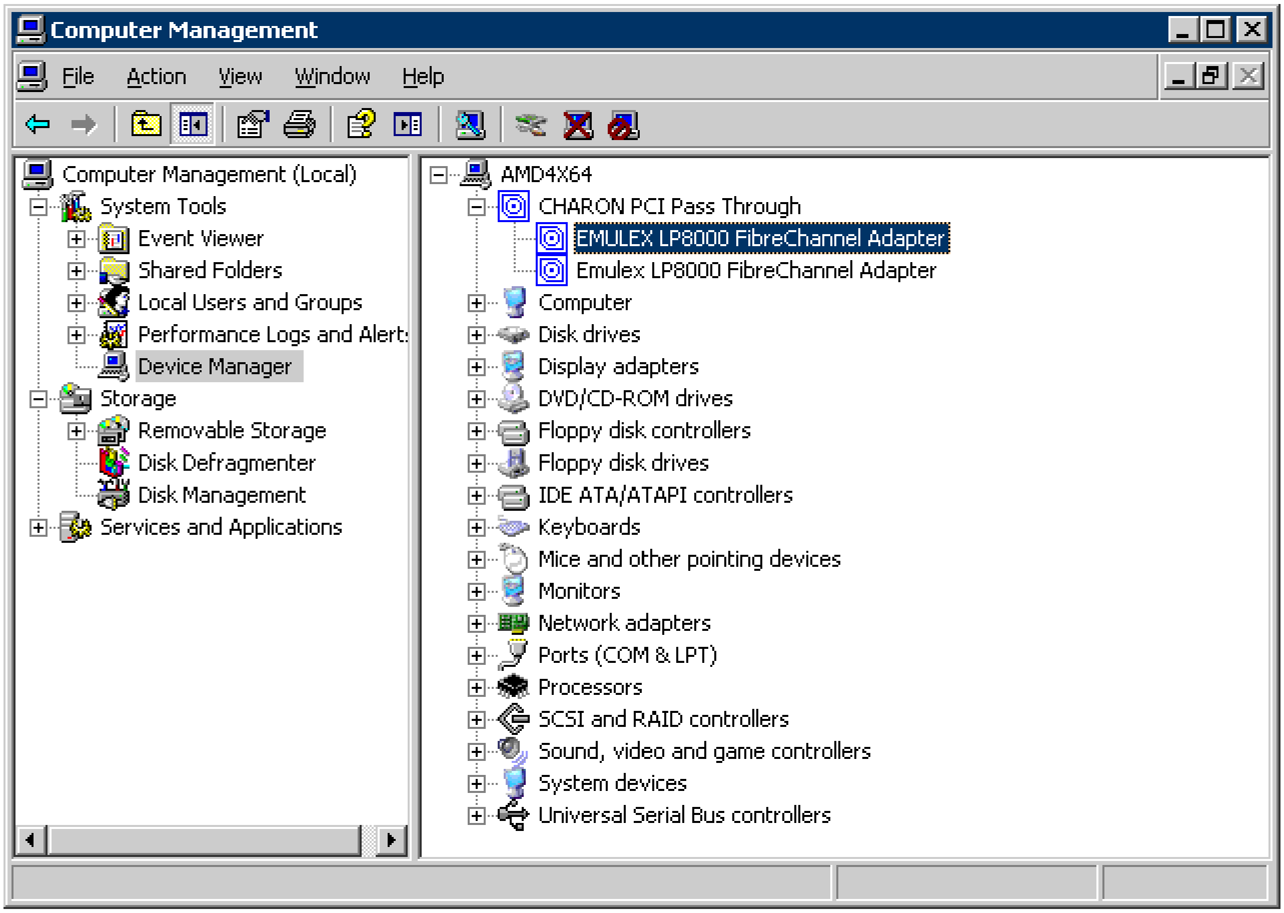
1. Install the EMULEX LightPulse PCI/PCI-X/PCIe FC adapter (see below for a list of supported models) to some spare PCI/PCI-X/PCIe slot of the host system
2. Boot a Windows operating system
3. Install the EMULEX LightPulse PCI/PCI-X/PCIe FC adapter driver from the following directory "C:\Program Files\CHARON\Drivers\EMULEX_X.X.0.XXXXX" by choosing the "Install from a list or specific location (Advanced)" option and then selecting the "emulex_lp_ppt_amd64.inf" file.
4. Reboot the host

Now it is possible to collect the parameters for CHARON VM mapping to the EMULEX LightPulse PCI/PCI-X/PCIe FC adapter.

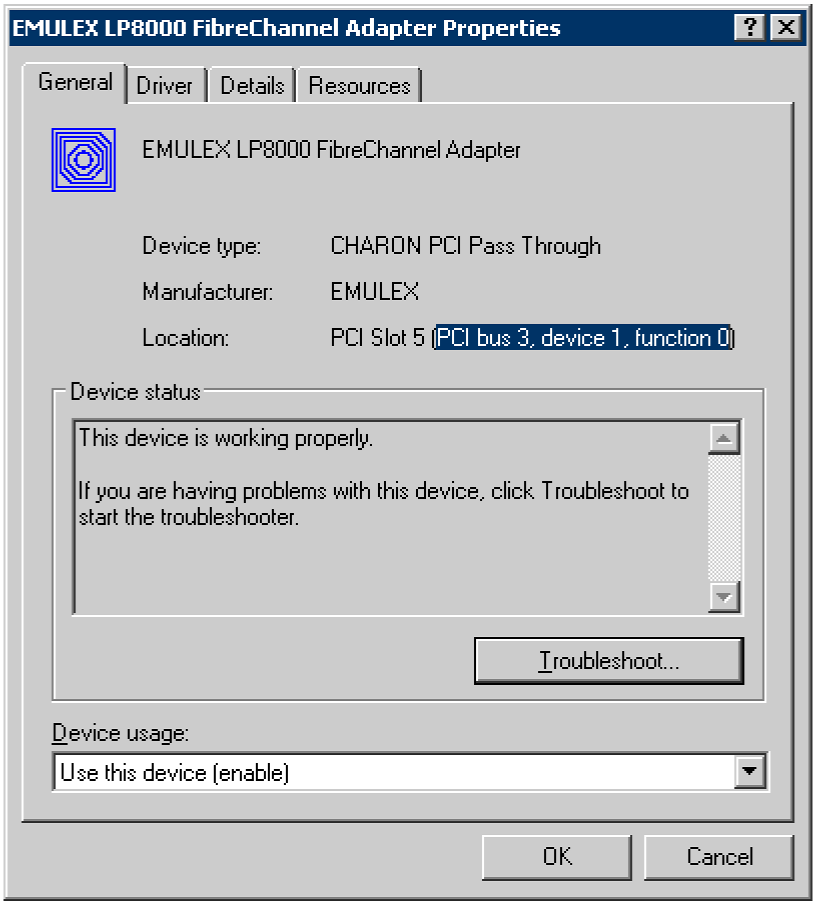
Open the “Computer Management” application and select “Device Manager”:



On the right panel select the desired physical EMULEX LP FibreChannel adapter under "CHARON PCI Pass Through":



Open the properties sheet by double-clicking on the selected adapter:



EMULEX LP8000 FibreChannel Adapter

Device type: CHARON PCI Pass Through

Manufacturer: EMULEX

Location: PCI Slot 5 (PCI bus 3, device 1, function 0)

Device status

This device is working properly.

If you are having problems with this device, click Troubleshoot to start the troubleshooter.

Device usage: Use this device (enable)

The “Location:” on the above picture gives X, Y, and Z for the "host_bus_location" parameter. For example:

```
set FGA host_bus_location = "PCI bus 3, device 1, function 0"
```

⚠ Non-US-EN installations of Windows may present “Location:” string in local language, but "host_bus_location" parameter requires English notation, so the words “PCI”, “bus”, “device”, and “function” must be specified in English.

The following is the list of EMULEX LightPulse PCI/PCI-X/PCIe FC adapters supported by the CHARON-AXP PCI Pass Through driver and suitable for the emulation of a KGPSA-CA PCI FC adapter in CHARON PCI Pass Through mode:

Supported	Not Supported	Not tested
LP8000 LP9000 LP9002 LP9802 LP10000 LP10000DC LP10000-S LPX1000 LP11002 LPe11002 (FC2242SR, A8003A) LPe1105	LPe1150 (FC2142SR, A8002A)	LPe11000

FDDI support via DEFPA PCI FDDI controller in "pass through" mode

Optionally it is possible to configure a DEFPA PCI FDDI controller in "pass through" mode, mapped to a physical DEFPA FDDI adapter installed on the host:

```
load defpa FDDI host_bus_location = "PCI bus X, device Y, function Z"
set FDDI bus=pci_1 device=1 function=0 irq=24 irq_bus=isa
```

Pay attention to the proper placement of the emulated DEFPA adapter on the virtual HP Alpha PCI bus (it is controlled by "bus", "device", "function", "irq" and "irq_bus" parameters). Refer to this chapter of this Guide for more information.

The "host_bus_location" parameter addresses the host DEFPA FDDI adapter in the following way:

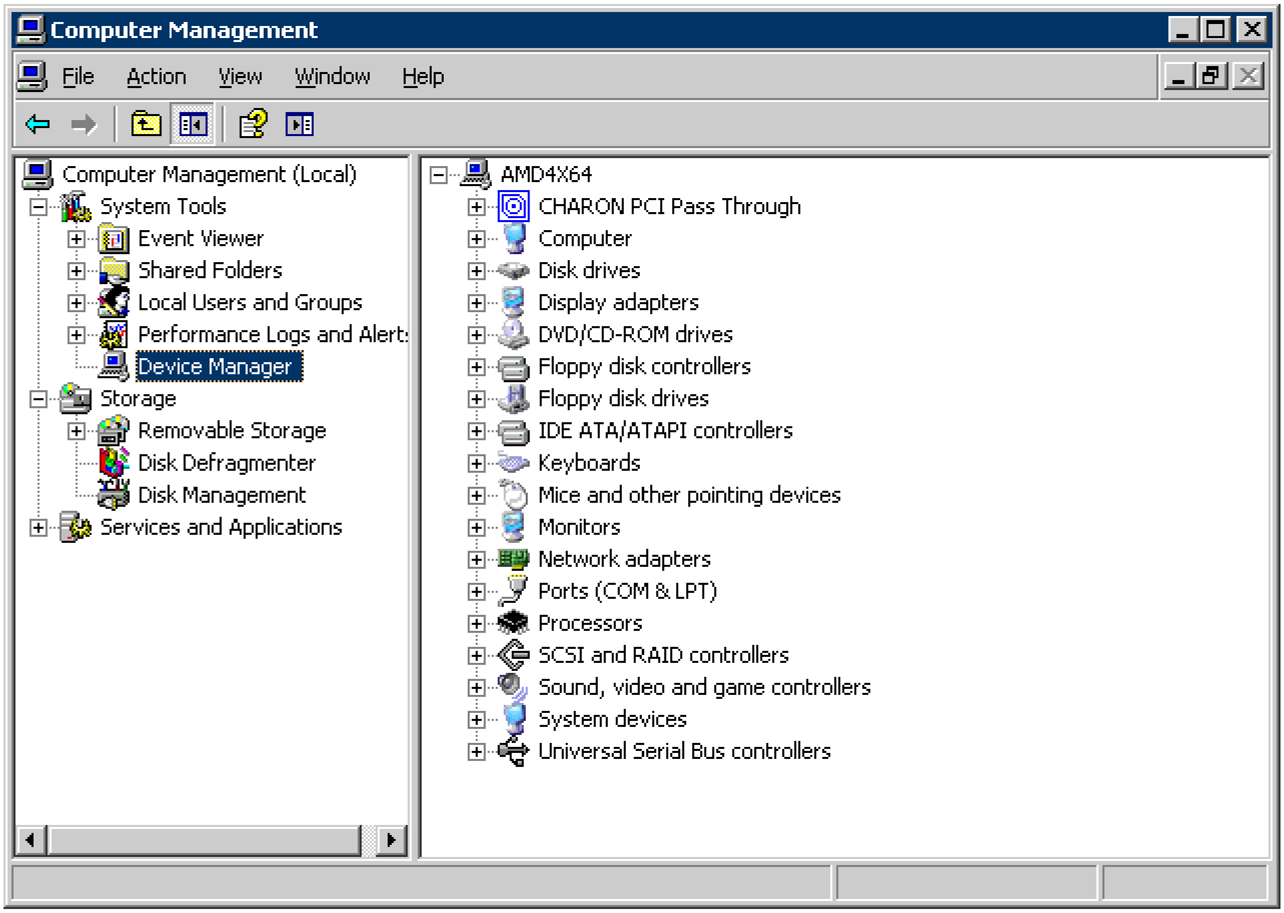
Parameters	Description
"PCI bus X"	PCI bus number of the host DEFPA FDDI adapter
"device Y"	PCI bus device number of the host DEFPA FDDI adapter
"function Z"	The "function" parameter of the the host DEFPA FDDI adapter

To establish the "pass through" mode do the following:

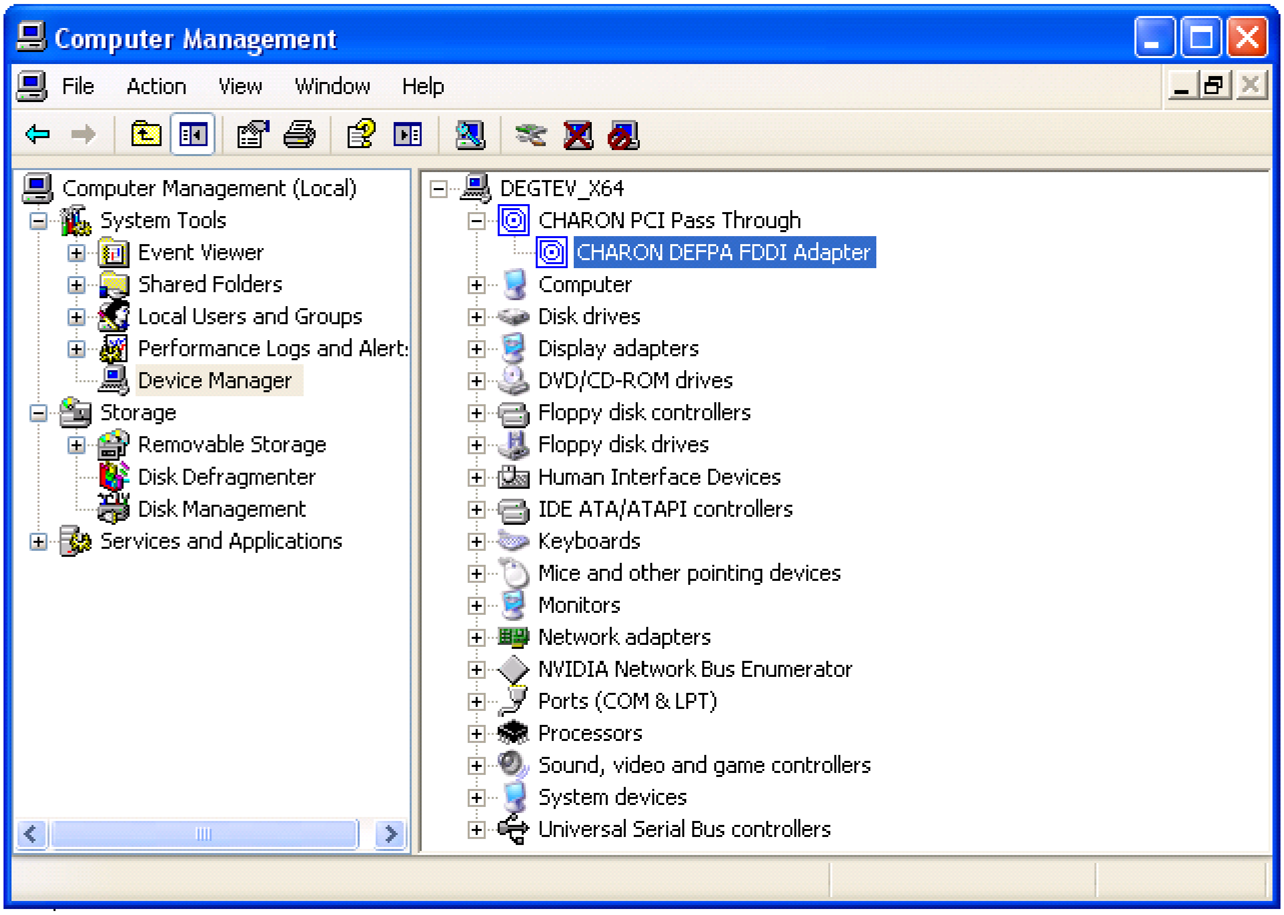
1. Install the DEFPA FDDI adapter to some spare PCI slot of the host system.
   ⚠ Note that PCIe and PCI-X are not supported by the DEFPA FDDI adapter.
2. Boot a Windows operating system
3. Install the DEFPA FDDI adapter driver from the following directory: "C:\Program Files\CHARON\Drivers\DEFPA_X.X.X.XXXXX" by choosing the "Install from a list or specific location (Advanced)" option and then selecting the "defpa_ppt_amd64.inf" file.
4. Reboot the host

Now it is possible to collect the parameters for CHARON VM mapping to the DEFPA FDDI host adapter.

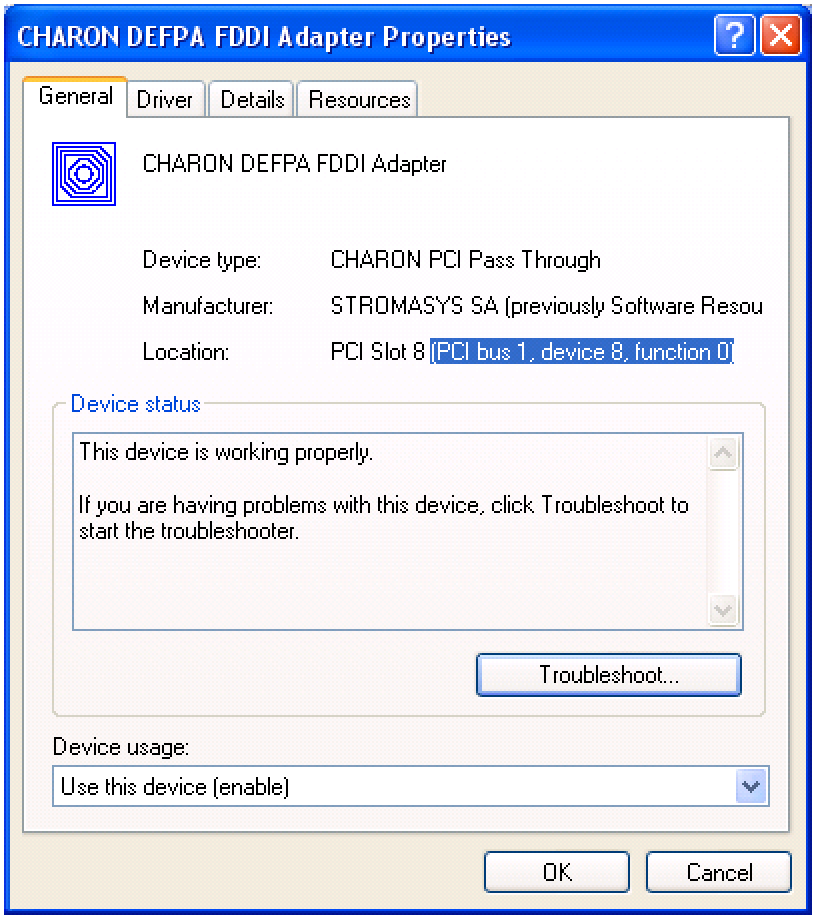
Open the “Computer Management” application and select “Device Manager”:



On the right panel select the installed DEFPA adapter:



Open the properties sheet by double-clicking on the selected adapter:


CHARON DEFPA FDDI Adapter Properties

CHARON DEFPA FDDI Adapter

Device type: CHARON PCI Pass Through

Manufacturer: STROMASYS SA (previously Software Resou

Location: PCI Slot 8 (PCI bus 1, device 8, function 0)

Device status

This device is working properly.

If you are having problems with this device, click Troubleshoot to start the troubleshooter.

Device usage:

Use this device (enable)

The “Location:” on the above picture gives X, Y, and Z for the "host_bus_location" parameter. For example:

```
set FDDI host_bus_location = "PCI bus 1, device 9, function 0"
```

⚠ Non-US-EN installations of Windows may present “Location:” string in local language, but "host_bus_location" parameter requires English notation, so the words “PCI”, “bus”, “device”, and “function” must be specified in English.

Serial lines support via emulated PBXDA-xx family PCI controllers

Optionally it is possible to configure the following models of PBXDA-xx family controllers.

VIrtual PBXDA-xx

Syntax for loading PBXDA-xx family serial lines adapters:

```
#load PBXDA/DIGI <name>
#load PBXDA_BA/DIGI <name>
#load PBXDA_BB/DIGI <name>
#load PBXDA_AC/DIGI <name>
```

Example:

```
load PBXDA_AC/DIGI TXA
```

The adapter instance name ("TXA" in the example above) is used then for parametrization, for example:

```
set TXA line[2]="COM1:"
set TXA port[3]=1706
```

The numbers in the square brackets represent line number on the virtual PBXDA adapter starting from 0.

Controller type	Maximum number of lines
PBXDA	2
PBXDA_BA	4
PBXDA_BB	8
PBXDA_AC	16

It is possible to specify either physical port ("COM<n>") or an IP port for connecting the virtual PBXDA-xx to system resources. No other parameters are applicable in this type of emulation.

PBXDA-xx support in "pass through" mode

In "pass through" mode PBXDA-xx family controllers are mapped to specific models of the physical DIGI serial lines adapters installed on the CHARON VM host:

DEC PBXDA-xx adapter	Name of the device to map to	Controller	Vendor ID	Device ID
PBXDA-BA	DIGI AccelePort 4r 920	ASIC PCI	114Fh	0026h
PBXDA-BB	DIGI AccelePort 8r 920	ASIC PCI	114Fh	0027h
PBXDA-AC	DIGI AccelePort Xem	ASIC PCI	114Fh	0004h
PBXDA-AC	DIGI AccelePort Xem	ASIC PCI	114Fh	0008h

Below is an example of mapping to a physical DIGI adapter installed on the host:

```
load digi PBXDA host_bus_location=“PCI bus 3,device 1,function 0”
set PBXDA bus=pci_1 device=1 function=0 irq=24 irq_bus=isa
```

Pay attention to the proper placement of the emulated PBXDA-xx adapter on the virtual HP Alpha PCI bus (it is controlled by "bus", "device", "function", "irq" and "irq_bus" parameters). Refer to this chapter of this Guide for more information.

The "host_bus_location" parameter addresses the host DIGI adapter in the following way:

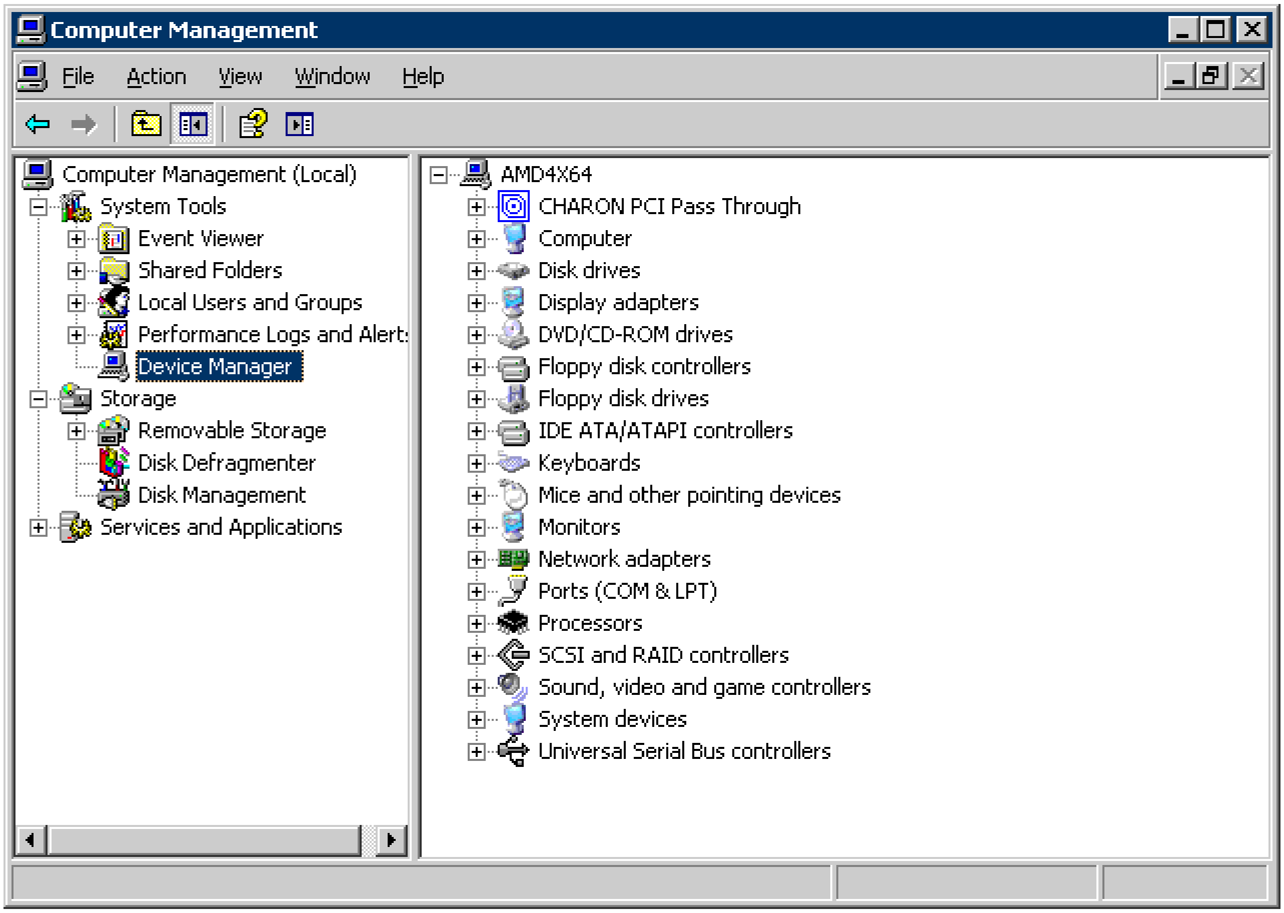
Parameters	Description
"bus X"	PCI bus number of the host DIGI adapter
"device Y"	PCI bus device number of the host DIGI adapter
"function Z"	The "function" parameter of the the host DIGI adapter

To establish the "pass through" mode do the following:

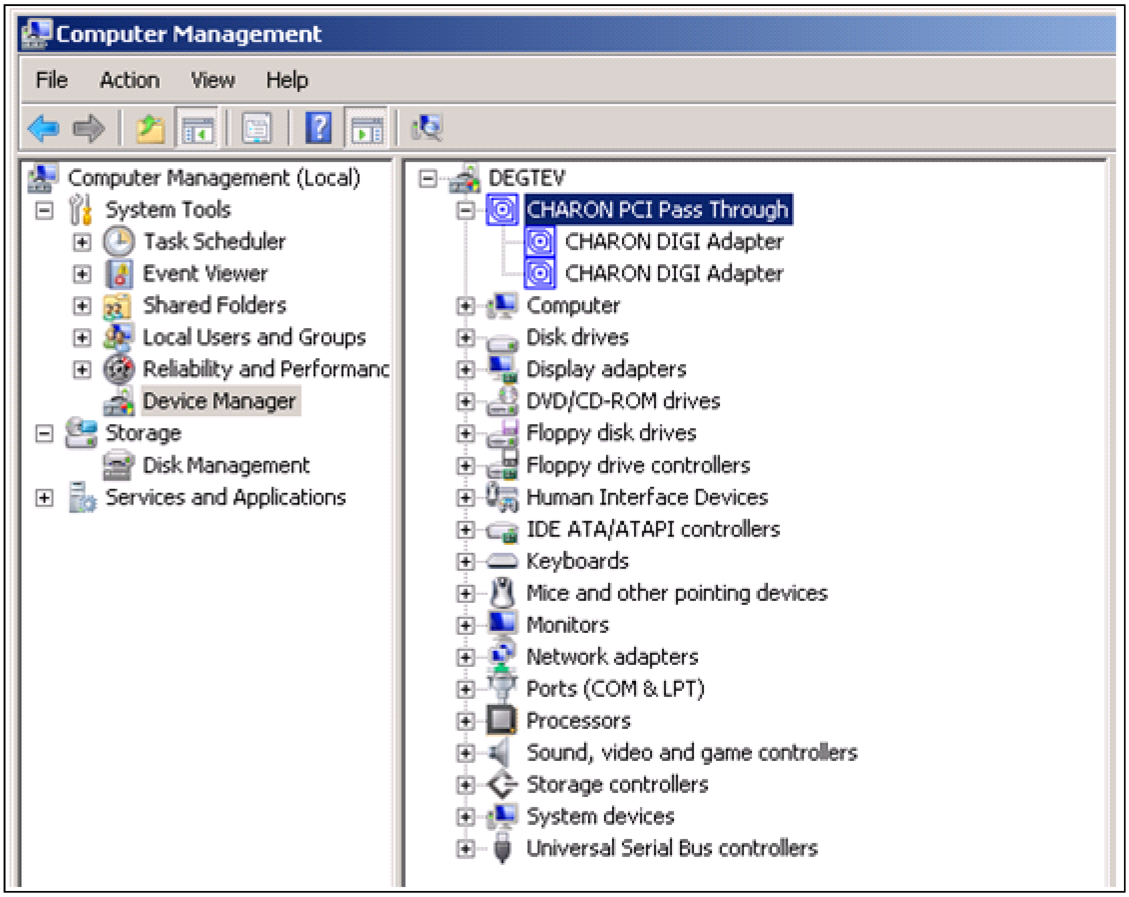
1. Install the DIGI adapter of the required type to some spare PCI/PCI-X/PCIe slot of the host system.
2. Boot a Windows operating system
3. Install the DIGI adapter driver from the following directory: "C:\Program Files\CHARON\Drivers\DIGI_X.X.X.XXXXX" by choosing "Install from a list or specific location (Advanced)" option and then selecting the "digi_ppt_amd64.inf" file.
4. Reboot the host

Now it is possible to collect the parameters for CHARON VM mapping to the DIGI host adapter.

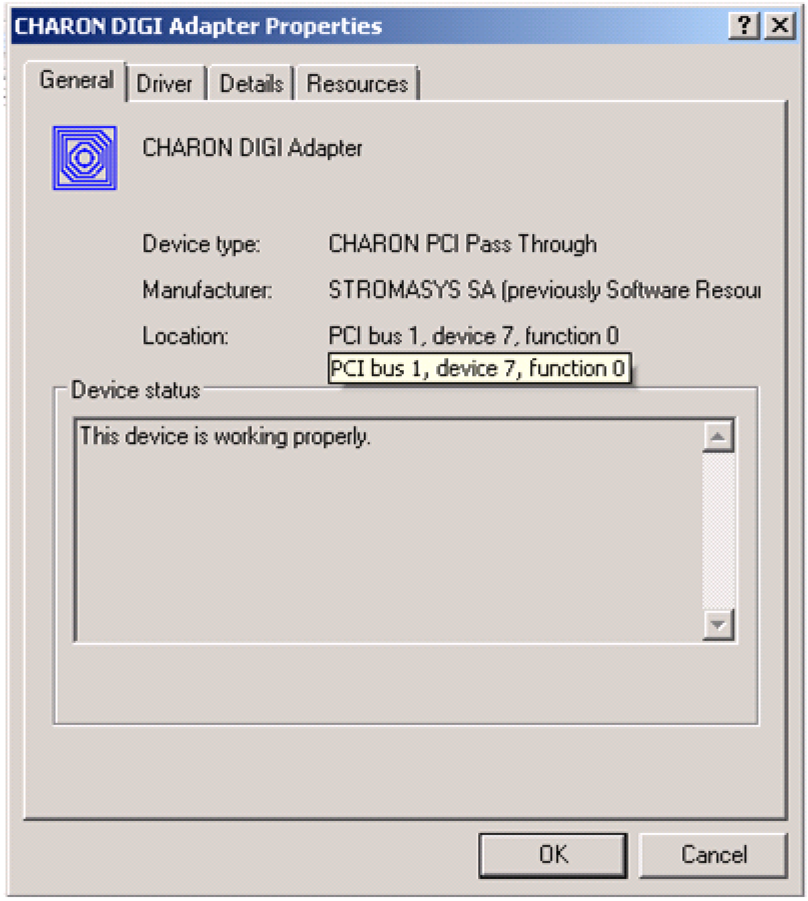
Open the “Computer Management” application and select “Device Manager”:



On the right panel select proper physical DIGI adapter:



Open te properties sheet by double-clicking on the selected adapter:



CHARON DIGI Adapter

Device type: CHARON PCI Pass Through

Manufacturer: STROMASYS SA (previously Software Resou

Location: PCI bus 1, device 7, function 0

PCI bus 1, device 7, function 0

Device status

This device is working properly.

The “Location:” on the above picture gives X, Y, and Z for the "host_bus_location" parameter. For example:

```
set PBXDA host_bus_location = "PCI bus 1, device 7, function 0"
```

⚠ Non-US-EN installations of Windows may present “Location:” string in local language, but "host_bus_location" parameter requires English notation, so the words “PCI”, “bus”, “device”, and “function” must be specified in English.

Auto boot

The CHARON VM can be configured to automatically boot an operating system at start up by specifying the default boot device and setting the 'auto_action' parameter to 'restart' from the console.

Example: dka0 is defined as the default boot device

```
>>>set bootdef_dev dka0
>>>set auto_action restart
```

Migration to CHARON-AXP for Windows

Table of Contents

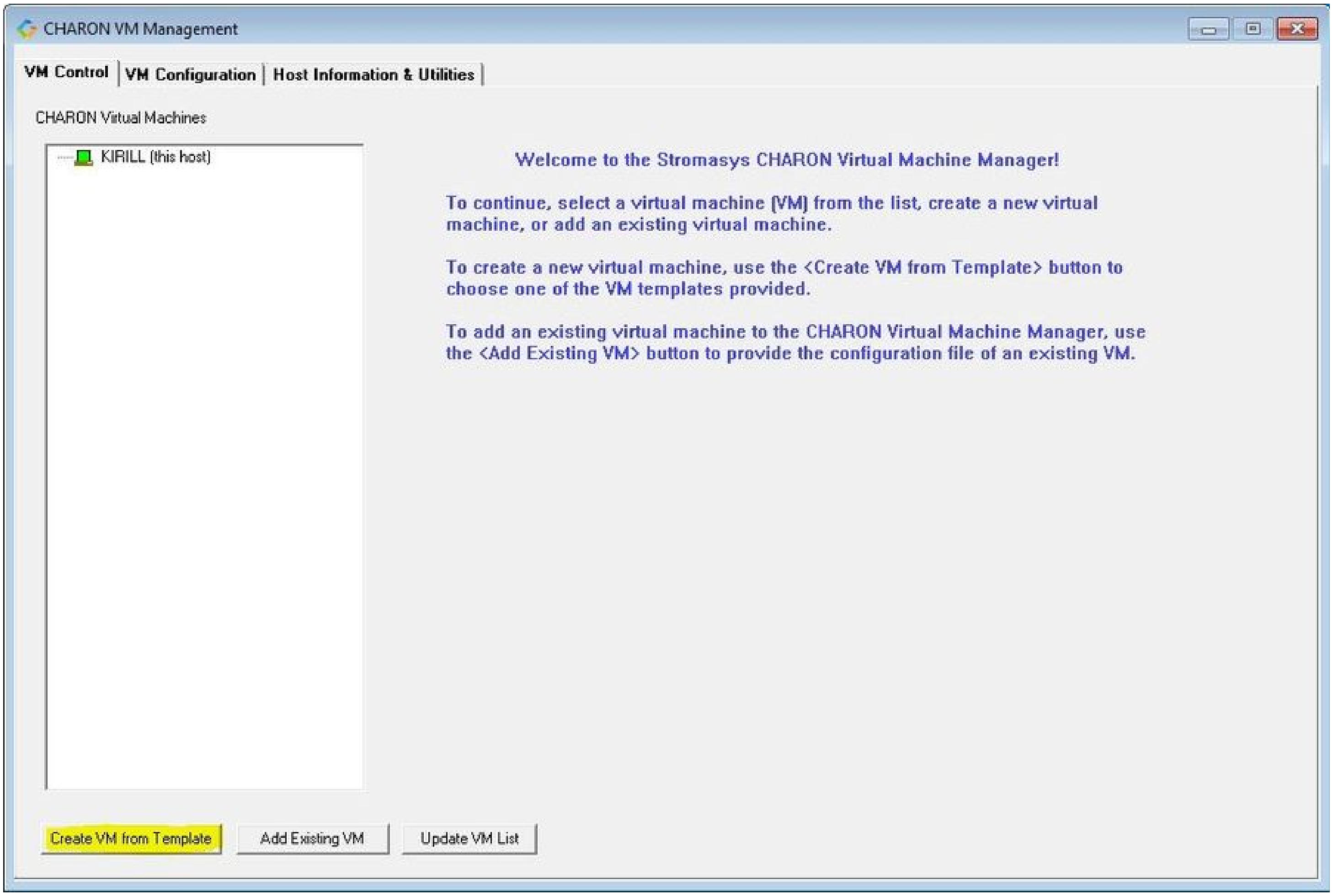
Introduction

This section describes how to migrate your HP Alpha system to CHARON-AXP. We will use a sample HP AlphaServer ES40 system running OpenVMS to demonstrate the migration procedure. The process is similar for all CHARON-AXP models.

Creating CHARON Virtual Machine

As a first step it is required to create a CHARON Virtual Machine (VM) using the CHARON Virtual Machines Manager in the following way:

Press the "Create VM from Template" button:



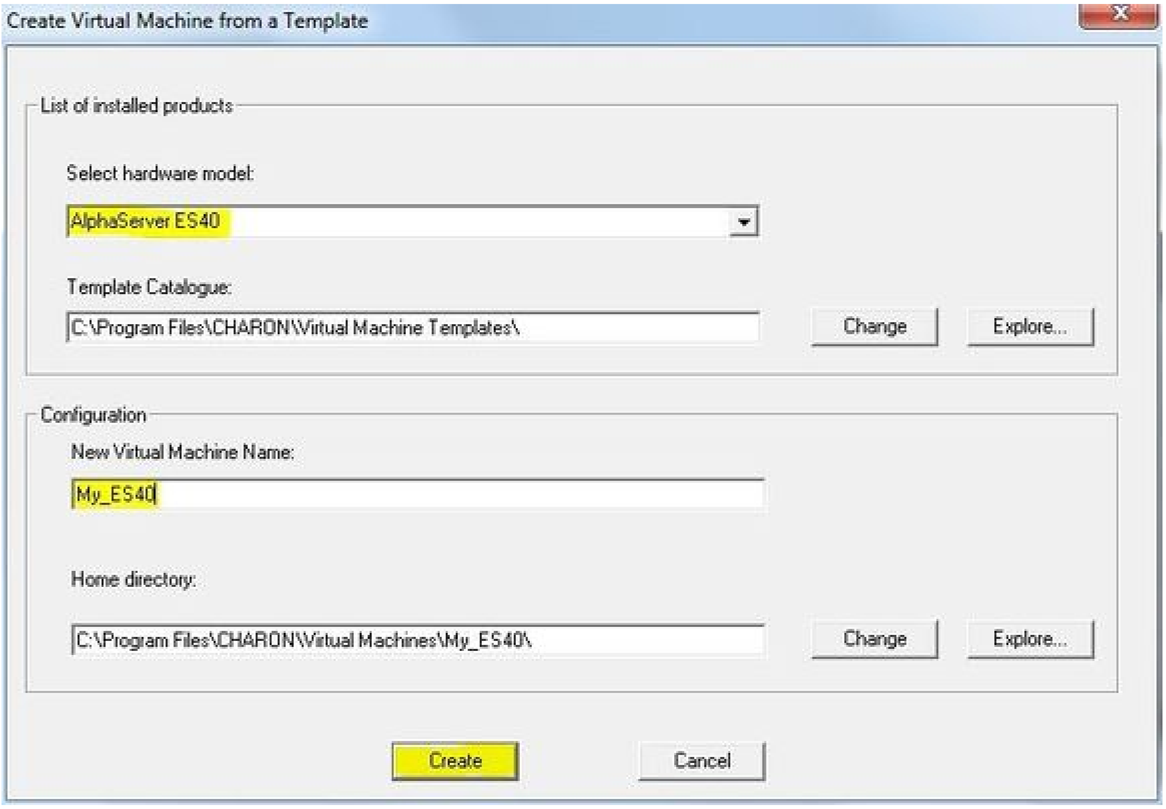
Welcome to the Stromasys CHARON Virtual Machine Manager!

To continue, select a virtual machine (VM) from the list, create a new virtual machine, or add an existing virtual machine.

To create a new virtual machine, use the <Create VM from Template> button to choose one of the VM templates provided.

To add an existing virtual machine to the CHARON Virtual Machine Manager, use the <Add Existing VM> button to provide the configuration file of an existing VM.

Specify the HP Alpha model to be emulated and the name of the VM then press the "Create" button:


Create Virtual Machine from a Template
List of installed products
Configuration
Change
Explore...
Change
Explore...
Create
Cancel

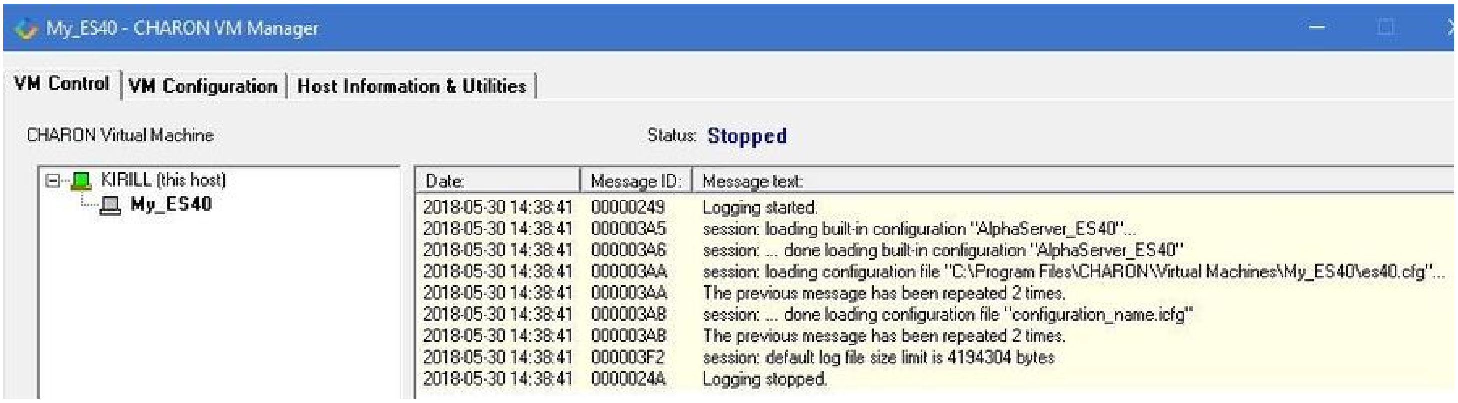
Select hardware model: AlphaServer ES40

Template Catalogue: C:\Program Files\CHARON\Virtual Machine Templates\

New Virtual Machine Name: My_ES40

Home directory: C:\Program Files\CHARON\Virtual Machines\My_ES40\

The VM will be created:

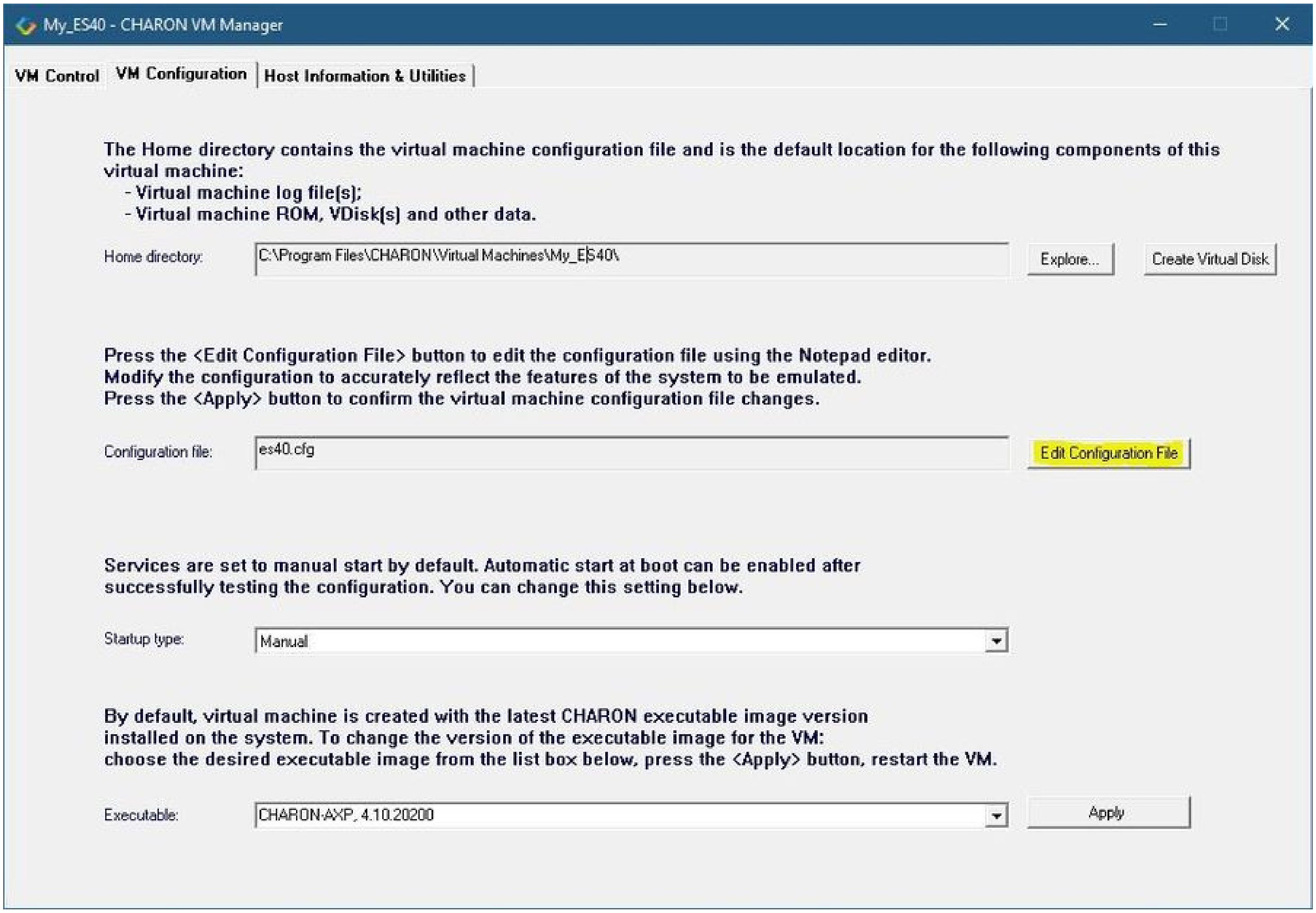


Status: Stopped

```
Date:                Message ID:  Message text:
2018-05-30 14:38:41  00000249     Logging started.
2018-05-30 14:38:41  000003A5     session: loading built-in configuration "AlphaServer_ES40"...
2018-05-30 14:38:41  000003A6     session: ... done loading built-in configuration "AlphaServer_ES40"
2018-05-30 14:38:41  000003AA     session: loading configuration file "C:\Program Files\CHARON\Virtual Machines\My_ES40\es40.cfg"...
2018-05-30 14:38:41  000003AA     The previous message has been repeated 2 times.
2018-05-30 14:38:41  000003AB     session: ... done loading configuration file "configuration_name.icfg"
2018-05-30 14:38:41  000003AB     The previous message has been repeated 2 times.
2018-05-30 14:38:41  000003F2     session: default log file size limit is 4194304 bytes
2018-05-30 14:38:41  0000024A     Logging stopped.
```

Select the VM from the left pane and switch to the "VM Configuration" tab.

In order to reproduce the target HP Alpha configuration, press the "Edit Configuration file" button:



The Home directory contains the virtual machine configuration file and is the default location for the following components of this virtual machine:
- Virtual machine log file(s);
- Virtual machine ROM, VDisk(s) and other data.

Home directory: C:\Program Files\CHARON\Virtual Machines\My_ES40\

Press the <Edit Configuration File> button to edit the configuration file using the Notepad editor.
Modify the configuration to accurately reflect the features of the system to be emulated.
Press the <Apply> button to confirm the virtual machine configuration file changes.

Configuration file: es40.cfg

Services are set to manual start by default. Automatic start at boot can be enabled after successfully testing the configuration. You can change this setting below.

Startup type: Manual

By default, virtual machine is created with the latest CHARON executable image version installed on the system. To change the version of the executable image for the VM: choose the desired executable image from the list box below, press the <Apply> button, restart the VM.

Executable: CHARON-AXP, 4.10.20200

Alternatively it is possible to select the target CHARON VM and press the "Edit Configuration" button.

Collecting information about the source HP Alpha system

The next step is to determine the exact configuration of the HP Alpha hardware in order to create the CHARON VM configuration file.

Turn on the source HP Alpha system. At the ">>>" prompt, issue the "`show device`" command:

```
>>>show device

sys0.0.0.0.0 SYS0 System ROOT Device
ewa0.0.0.1.1 EWA0 F8-D1-11-00-67-E6
pka0.0.0.2.1 PKA0 Q-Logic/ISP PCI SCSI HBA
pga0.0.0.3.1 PGA0 WWN 1000-0000-0248-C550
pqa0.0.0.15.0 PQA0 ALi 1553C Integrated IDE Controller
pqb0.0.1.15.0 PQB0 ALi 1553C Integrated IDE Controller
dqa0.0.0.15.0 DQA0 TSSTcorpCDDVDW SH-222BB
dka0.0.0.2.1 DKA0 DEC RZ28 (C)DEC
dka100.1.0.2.1 DKA100 DEC RZ22 (C)DEC
dka200.2.0.2.1 DKA200 DEC RZ23 (C)DEC
mka600.6.0.2.1 MKA600 Virtual SCSI Tape

>>>
```

To get more detailed information, boot OpenVMS and issue the "show device /full" command:

```
$ show device /full

Disk PFCAXP$DKA0:, device type RZ28, is online, mounted, file-oriented device,
shareable, available to cluster, error logging is enabled.
...

Disk PFCAXP$DKA100:, device type RZ22, is online, file-oriented device,
shareable, available to cluster, error logging is enabled.
...

Disk PFCAXP$DKA200:, device type RZ23, is online, file-oriented device,
shareable, available to cluster, error logging is enabled.
...

Disk PFCAXP$DQA0:, device type TSSTcorpCDDVDW SH-222BB, is online, file-oriented
device, shareable, available to cluster, error logging is enabled.
...

Disk $1$DGA0: (PFCAXP), device type RZ24, is online, file-oriented device,
shareable, available to cluster, error logging is enabled.
...

Magtape PFCAXP$MKA600:, device type Virtual SCSI Tape, is online, file-oriented
device, available to cluster, error logging is enabled, device supports
fastskip (per_io).
...

Terminal OPA0:, device type VT102, is online, record-oriented device, carriage
control.
...

Device EWA0:, device type DE500, is online, network device, device is a template
only.
...

Device FGA0:, device type KGPSA Fibre Channel, is online, shareable, error
logging is enabled.
...

Device PGA0:, device type SCSI FCP, is online, error logging is enabled.

...

Device PKA0:, device type Qlogic ISP1020 SCSI port, is online, error logging is
enabled.
...

Device $1$GGA32767:, device type Generic SCSI device, is online, shareable.

$
```

If Tru64 UNIX V5 is running on the host system, it is recommended to use the following commands to get information on the host configuration:

Command	Description
`# /sbin/hwmgr view devices`	Get detailed information about the host hardware configuration
`# /sbin/hwmgr show scsi`	Get specific information about the host SCSI controllers and attached disks
`# /sbin/hwmgr view hierarchy`	Get information about the host controllers

Please refer to the Tru64 UNIX User's Guide for more details.

The source HP Alpha peripheral configuration in this example is:

Controller	Devices on controller	Description
KZPBA	-DKA0 (RZ28) -DKA100 (RZ22) -DKA200 (RZ23) -MKA600 (tape)	SCSI disk/tape controller
KGPSA-CA	-DGA0 (RZ24)	FC disk controller
OPA0		System console
TSSTcorpCDDVDW SH-222BB	-DQA0	IDE CD-ROM controller
EWA0		Network interface, MAC address: "F8-D1-11-00-67-E6"

Now collect some general information about the HP AlphaServer ES40 system:

```
>>>show cpu /full

System: PFCAXP, AlphaServer ES40 6/667

SMP execlet = 3 : Enabled : Streamlined.
Config tree = None
Primary CPU = 0
HWRPB CPUs = 4
Page Size = 8192
Revision Code =
Serial Number = SN01234567
Default CPU Capabilities:
System: QUORUM RUN
Default Process Capabilities:
System: QUORUM RUN

....

>>>
```

```
>>>show mem

System Memory Resources on 5-FEB-2018 09:29:16.42

Physical Memory Usage (pages): Total Free In Use Modified
Main Memory (512.00MB) 65536 56496 8610 430

...

>>>
```

So the collected information about the HP AlphaServer ES40 system is:

Component	Value
System Type	AlphaServer ES40 6/667
Serial Number	SN01234567
Number of CPUs	4
System memory	512 Mb

In some particular situations it is also important to know the exact placement of all the peripheral devices on the HP Alpha PCI bus. To do so, issue the "show config" command at the SRM prompt (>>>) on the HP Alpha console. For example:

```
>>>show config

...

PCI Bus

Bus 00 Slot 03: DECchip 21142 Network Controller
ewa0.0.0.3.0 00-00-F8-03-9A-6D

Bus 00 Slot 07: Cypress PCI Peripheral Controller

Bus 00 Slot 07: Function 1: PCI IDE

Bus 00 Slot 07: Function 2: PCI IDE

Bus 00 Slot 07: PCI USB

Bus 00 Slot 08: DECchip 21052 PCI to PCI Bridge

Bus 01 Slot 08: ISP1040 Scsi Controller
pka0.7.0.1008.0 SCSI Bus ID 7
dka0.0.0.1008.0 RZ2DD-KS
dka400.4.0.1008.0 RRD45

>>>
```

The "show config" command collects the following information of placement of peripheral devices on the PCI bus:

- Bus number
- Slot number
- Function number

To find out the exact types of controllers and other useful information refer to the source HP Alpha system documentation.

Creation of the CHARON-AXP configuration file

Using the above information, the following parameters and values can be set in the configuration file:

```
#
# HP AlphaServer model: AlphaServer ES40 6/667
#

set session hw_model = AlphaServer_ES40
set ace cpu_architecture = EV67
set rom dsrdb[0] = 1820 system_name = "AlphaServer ES40 6/667"

...

#
# Override default System Serial Number, set it to "SN01234567"
#

set rom system_serial_number = SN01234567

#
# Specify RAM size: 512 Mb
#

set ram size=512

#
# Map OPA0 console to "Putty" terminal emulator (included in CHARON-AXP kit)
#

set COM1 alias = OPA0 port = 10003 application = "putty -load OPA0 -P 10003"

#
# Đ¡onnect the emulator's DQA0 to the host's ATAPI CD/DVD-ROM drive.
#

set ide container="\\.\CdRom0"

#
# Load optional DE500BA PCI Ethernet Adapter (EWA0) and map it to the "Charon" host network interface
#

load DE500BA/dec21x4x EWA interface=EWA0
load packet_port/chnetwrk EWA0 interface="connection:Charon"

#
# Load DEC-KZPBA SCSI controller and map it to 3 disk containers and 1 tape container
#

load KZPBA PKA scsi_id = 7

set PKA container[0] = "C:\My disks\bootable.vdisk"
set PKA container[100] = "C:\My disks\RZ22.vdisk"
set PKA container[200] = "C:\My disks\RZ23.vdisk"

set PKA container[600] = "C:\My tapes\my_tape.vtape"

#
# Load DEC-KGPSA-CA PCI FC adapter and map it to a disk container
#

load KGPSA FGA

set FGA container[0] = "C:\My disks\RZ24.vdisk"

...
```

Making disk images

In our example, the mapping of the KZPBA SCSI controller include disk and tape images. The tape images have not to be manually created whereas the disk images have to be created as described below.

Our example creates disk images of the original physical type. In reality, this step is the best opportunity in the migration to provision larger disks to get extra storage space.

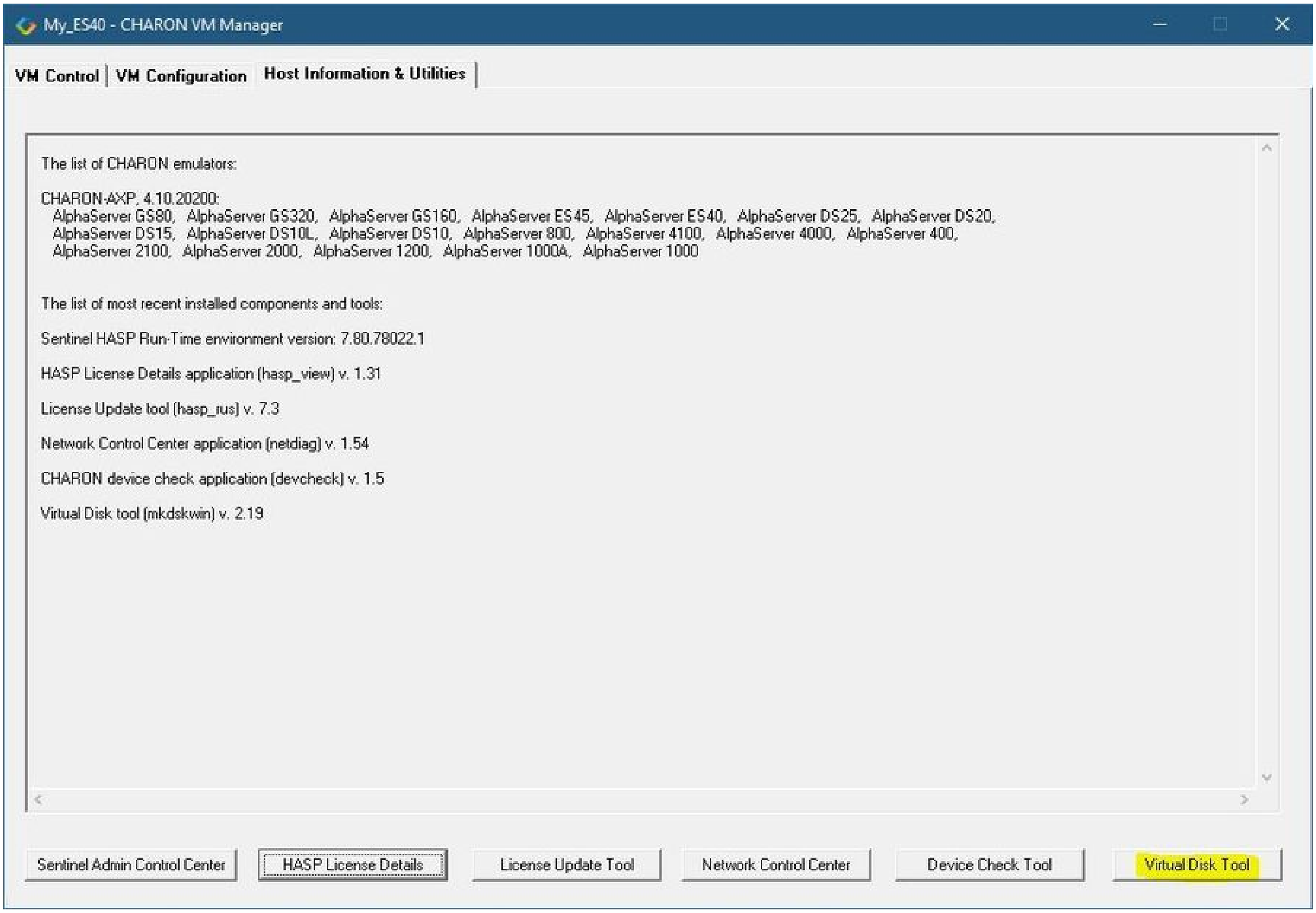
Create special directories for storing the disk and tape images. The created directories are referenced in the sample configuration file above.

```
...> cd C:\
C:\> mkdir "My disks"
C:\> mkdir "My tapes"
```

This operation can also be done using Windows Explorer.

Alternatively it is possible to put the tape and disk images in the CHARON VM Home Directory.

Start the "MkDisk" utility by pressing the "Virtual Disk Tool" button in the "Host Information & Utilities" tab of the CHARON Virtual Machines Manager:



The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
AlphaServer GS80, AlphaServer GS320, AlphaServer GS160, AlphaServer ES45, AlphaServer ES40, AlphaServer DS25, AlphaServer DS20, AlphaServer DS15, AlphaServer DS10L, AlphaServer DS10, AlphaServer 800, AlphaServer 4100, AlphaServer 4000, AlphaServer 400, AlphaServer 2100, AlphaServer 2000, AlphaServer 1200, AlphaServer 1000A, AlphaServer 1000

The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

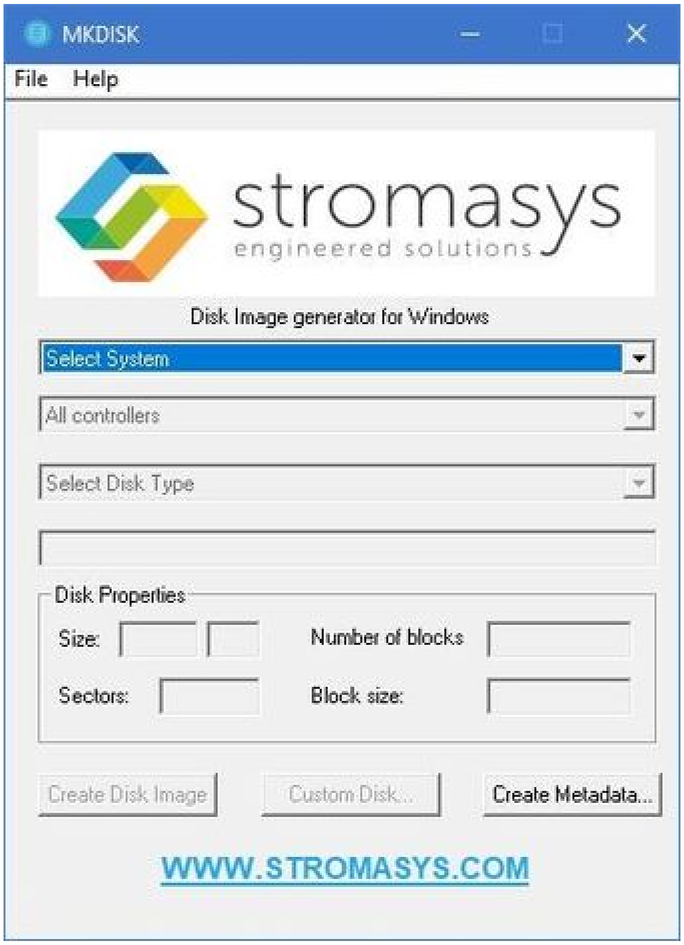
License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

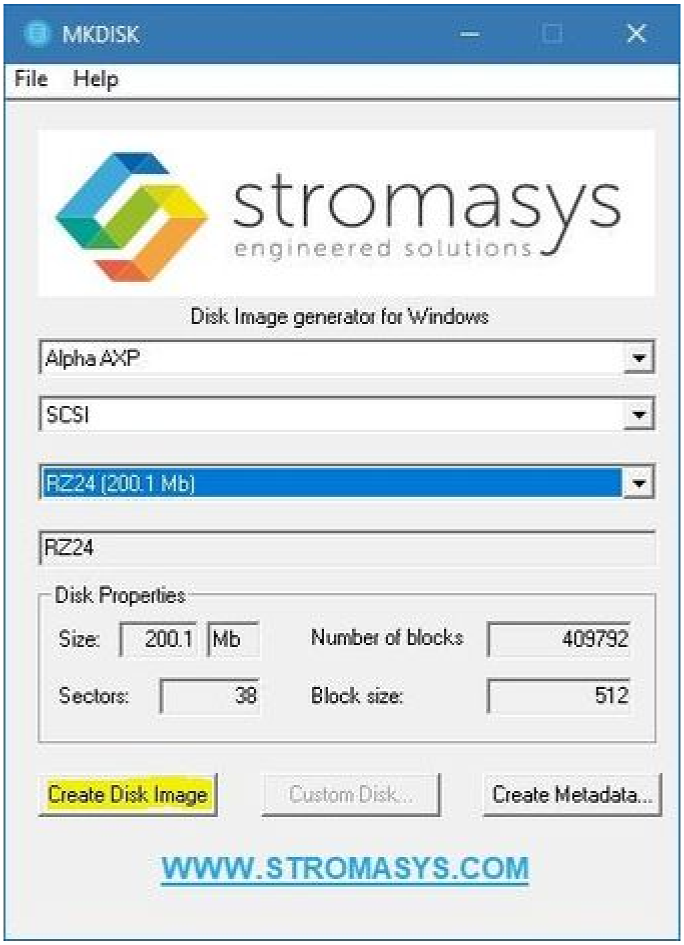
Virtual Disk tool (mkdskwin) v. 2.19

The following dialog will appear:



Select "Alpha AXP" in the "Select System" drop-down menu, "SCSI" in the "All Controllers" drop-down menu and "RZ24" (for example) in the "Select Disk Type" drop-down menu.

Press then the "Create Disk Image" button:



Alpha AXP

SCSI

RZ24 (200.1 Mb)

RZ24

Disk Properties

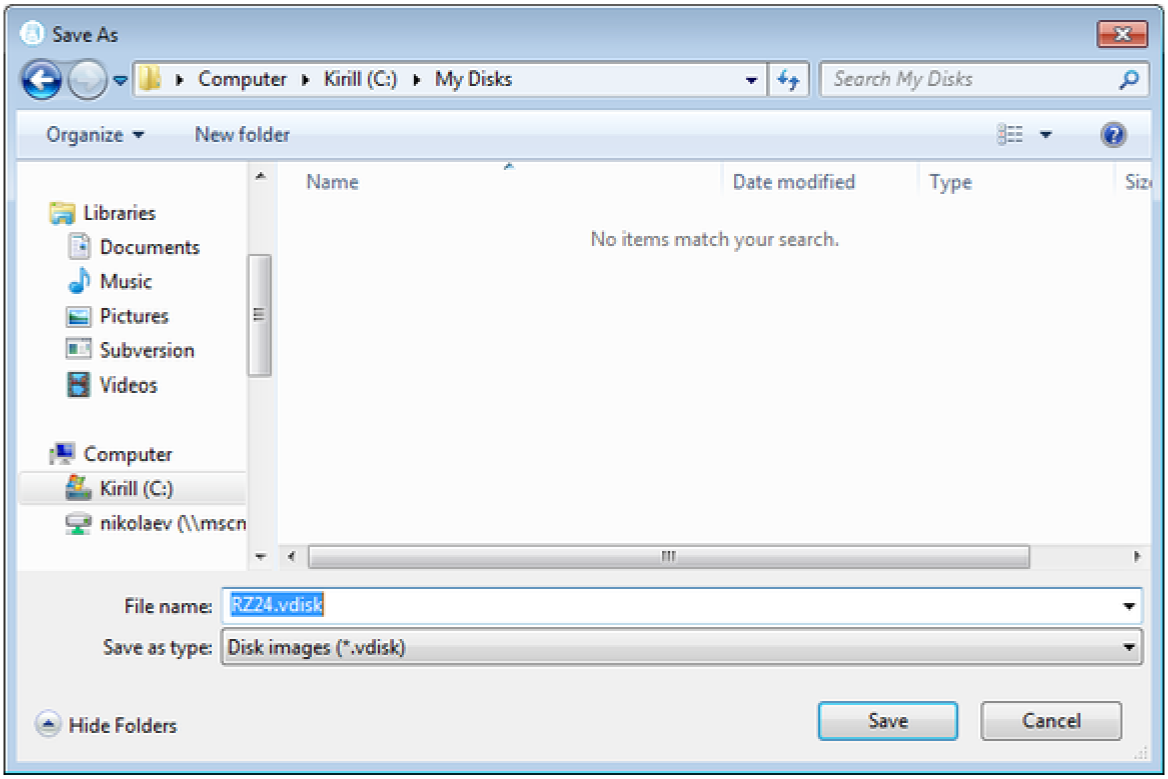
Size: 200.1 Mb

Number of blocks: 409792

Sectors: 38

Block size: 512

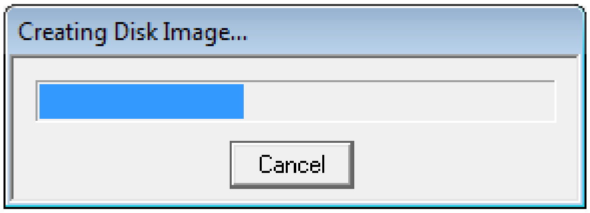
The utility will ask you to specify the output file name. Select the "C:\My disks" directory that has been created earlier, or create it directly in the dialog, and press the "Save" button:



File name: RZ24.vdisk

Save as type: Disk images (*.vdisk)

The "MkDisk" utility will create the requested disk image:



Repeat this sequence for the disks "RZ28.vdisk", "RZ22.vdisk" and "RZ23.vdisk". Place them in the same folder.

Installation of HP Alpha operating system

The next step is to transfer the data from the source HP Alpha system to CHARON-AXP. The easiest way to do this is via backup over the network but for this operation a bootable network-enabled operating system on a CHARON-AXP disk image or physical disk is needed.

The example configures the CHARON-AXP AlphaServer ES40 system for installation of HP OpenVMS from a distribution CD-ROM (usually it is "\\.\CdRom0" if the host has only one CD-ROM drive):

```
#
# DEC-KZPBA SCSI controller is mapped to 5 disk containers; one of them (DKA300) - for migration purposes;
# another one (DKA400) - for installation of fresh HP OpenVMS system from distributive
#

load KZPBA PKA scsi_id = 7

set PKA container[0] = "C:\My disks\bootable.vdisk"
set PKA container[100] = "C:\My disks\RZ22.vdisk"
set PKA container[200] = "C:\My disks\RZ23.vdisk"
set PKA container[300] = "C:\My disks\migration.vdisk"
set PKA container[400] = "C:\My disks\fresh_openvms.vdisk"

#
# CD-ROM for HP OpenVMS installation (DQA0)
#

set ide container="\\.\CdRom0"
```

⚠️ DKA300 will be the disk where all the source disks will be copied so its size needs to be large enough to store all the disk backup images.

Create an empty disk image for installation of HP OpenVMS and another one for storing the backups from the source HP Alpha system as it is shown in the section above.

Run the CHARON VM and boot from the CDROM named "dqa0" ("migration.cfg" is the configuration file we use in this example):

```
CHARON-AXP/ES40 for Windows x64 (AlphaServer ES40 6/667), Version 4.10.20200
(C) 2009-2019 STROMASYS SA.
All rights reserved.

P00>>>boot dqa0
```

Install HP Alpha/VMS including DECnet on "dka400". The DECnet address must belong to the same area as the source HP Alpha system.

Login to the newly installed OpenVMS system and initialize the disk that will be used to store the backups. Let's assume its prompt is "`newvms$` "

```
newvms$ INIT DKA300: SCRATCH
newvms$ MOUNT/SYSTEM/NOASSIST DKA300: SCRATCH
```

Making remote backups

Now we are ready to create the disk backups of the source HP Alpha system on the CHARON VM.

Boot the CHARON VM and make sure that the source HP Alpha system is available via DECnet.

Login to the source HP Alpha system. Stop all the batch queues, kick off the users, stop all the applications and close the databases if there are. The commands listed in SYS$MANAGER:SYSHUTDWN.COM may be helpful. The goal is to close as many files as possible. The system disk will have several files opened (pagefile, swapfile, etc.) and this is a normal situation.

ℹ The use of the "SHOW DEVICE /FILES" command would be of help to list opened files on a disk.

In this example, the CHARON VM system is node 1.400.

Issue the following commands from the source HP Alpha. Let's assume its prompt is "`source$` ":

```
source$ BACKUP/IMAGE/IGNORE=INTERLOCK DKA0: 1.400"username password"::DKA300:[000000]DKA0.BCK/SAVE
source$ BACKUP/IMAGE/IGNORE=INTERLOCK DKA100: 1.400"username password"::DKA300:[000000]DKA100.BCK/SAVE
source$ BACKUP/IMAGE/IGNORE=INTERLOCK DKA200: 1.400"username password"::DKA300:[000000]DKA200.BCK/SAVE
```

When the backup operation will be completed, the disk "DKA300" of the CHARON VM will contain 3 savesets: "DKA0.BCK", "DKA100.BCK" and "DKA200.BCK".

Restore backups to CHARON-AXP disks

The savesets have now to be restored on their corresponding virtual disks. Login to the CHARON VM guest OS and issue this sequence of commands:

```
newvms$ MOUNT/FOREIGN DKA0:

newvms$ BACKUP/IMAGE DKA300:[000000]DKA0.BCK/SAVE DKA0:

newvms$ DISMOUNT DKA0:

newvms$ MOUNT/FOREIGN DKA100:

newvms$ BACKUP/IMAGE DKA300:[000000]DKA100.BCK/SAVE DKA100:

newvms$ DISMOUNT DKA100:

newvms$ MOUNT/FOREIGN DKA200:

newvms$ BACKUP/IMAGE DKA300:[000000]DKA200.BCK/SAVE DKA200:

newvms$ DISMOUNT DKA200:
```

If you are going to have the CHARON VM and the original physical HP Alpha on the network at the same time, you must change the network identity of one system, usually the CHARON VM.

The easiest way is to boot the CHARON VM on the restored system disk with the network disabled and to configure new addresses then enable the network and reboot.

ℹ The NIC can be disabled with a `interface="(disabled)"` statement in the CHARON VM configuration file.

Alternative ways of data transfer

Some alternative methods of data transfer are also possible. For example:

- Connect a SCSI tape drive to the CHARON-AXP host via a PCI card
  - Map the tape drive in the CHARON VM configuration file
    a. Restore the source HP Alpha system backups from tape to disk images via OpenVMS running on the CHARON VM.
    b. Boot from standalone backups and restore the content to the CHARON VM virtual disks
  - Dump the source HP Alpha system backups to tape images using the "mtd" utility and:
    a. Boot from the freshly installed OpenVMS system and restore the tape images to the CHARON VM virtual disks
    b. Boot from the standalone backup and restore the content to the CHARON VM virtual disks
- Create a network cluster between the source HP Alpha system and the CHARON VM (it is possible to use the source system as a boot server); then perform simple backups from one disk to another:

  ```
  $ BACKUP/IMAGE/IGNORE=INTERLOCK REAL$DKA0: DKA0:
  ```

CHARON-AXP for Windows licensing

Table of Contents

General description

The CHARON-AXP product is protected by licenses issued on a customer basis by STROMASYS Inc. The CHARON-AXP license defines all the specifics of a particular CHARON-AXP distribution and its usage.

The license is implemented in the form of a hardware dongle (a Sentinel HASP key) or a software license bound to the hardware. Please be careful with your license key, in case of loss or damage, the CHARON Virtual Machines (VM) will not run or start until the license key is replaced. For redundancy, STROMASYS recommends to use a backup license key (purchased separately) that can replace the main license key for a restricted period of time. It is possible to specify the backup license in the CHARON VM configuration file to prevent CHARON VM from stopping in case the main license dongle is no longer available.

The CHARON-AXP license being checked upon the start of CHARON VM and at a specified interval (defined by the license) during the emulated system execution (default is 1 hour). If CHARON VM detects the absence (or malfunction) of the license key or software license, CHARON VM will try to use a backup license (if specified in the configuration file). If the license is not available or not specified, CHARON VM displays a warning message in the log file requesting the license key reconnection or software license reactivation. If the license is not reconnected or reactivated within 12 hours, CHARON-AXP exits. For more, see CHARON-AXP for Windows licensing#Emulator Behavior chapter.

The CHARON-AXP main license is time restricted or unlimited, the backup license is limited by the number of executions (1 execution = 1 interval check)

Note that if the time-restricted license is used and it expires, the CHARON VM tries to find its replacement automatically and, if found, proceeds using the replacement license.

The CHARON-AXP software license is not distributed for Proof-of-Concept and evaluation installations. Only hardware dongles are used in these cases.

It is important to keep the HASP license keys connected to a computer powered on even if the CHARON VM is not running because the keys contain a built-in battery that needs to be charged. If the battery is completely discharged, the license key can be irreparably damaged.

Update of the CHARON-AXP license can be performed on the fly without stopping the CHARON VM. The expiration date and execution counter can be updated, however the CHARON VM virtual hardware configuration should remain unchanged. At the next license check, the CHARON VM will use the updated license.

The following sections list all the main parameters of the CHARON-AXP licensing mechanism.

Parameters defined by CHARON-AXP license

The following table represents all the parameters defined by the CHARON-AXP license:

General	Products relevant	Optional
• Physical key ID • License Number • End user name • Master key ID • License release date and time • Update Number • Purchasing Company name. In most cases the company to which the key was issued originally	• Commercial product name • Commercial product code • Commercial product version and range of build numbers suitable for running • Range of CHARON-AXP virtual models available for running • Type of host CPU required • Host operating system required • Number of virtual CPUs enabled for virtual SMP systems • Minimum number of host CPU cores required • Minimum host memory required • Maximum memory emulated. If not present the value defaults to the maximum memory possible for the particular virtual system. Note that the maximum memory may not be available to the virtual system if the host computer has insufficient physical memory. • Maximum number of CHARON VMs that can be run concurrently • Whether or not CHAPI (CHARON API) can be used with this product • Product and Field Test expiration dates (if any) • Product and Field Test executions counter (if any) • Maximum number of hosts that may run CHARON VMs concurrently (in the case of a networking license) • Level of support (if any), end date of any support contract, the "First Line" Service Provider • Frequency of CHARON VM license checking during CHARON VM running	• Parameter that reduces the maximum speed of CHARON-AXP (might be required for synchronization with legacy hardware systems) • Parameter that enables the product to support additional serial lines through an option board from a company such as DIGI • Parameter that prohibits use of Advanced CPU Emulation. If not present the Advanced CPU Emulation is enabled

CHARON-AXP technical licensing models

CHARON-AXP licensing models are divided into 3 groups:

Regular Sentinel HASP keys

This is the most common way of CHARON-AXP licensing.

The CHARON-AXP license is embedded in a Sentinel HASP dongle. This license is available only on the host where the dongle is physically installed.

The CHARON-AXP installation procedure takes care of the Sentinel HASP run-time (driver) installation. Once the CHARON-AXP product has been installed, it is possible to plug in the regular license key and proceed with using CHARON-AXP without additional configuration steps.

> The number of CHARON VMs allowed to run on a particular host may be restricted by the license content (see above).

Network Sentinel HASP keys

The Network Sentinel HASP key (red dongle) can be shared between several hosts running CHARON virtual machines (including the host on which the network license is installed).

If CHARON-AXP is installed on the host where the network key is connected, no additional steps are required. The Sentinel driver is activated as part of the CHARON-AXP installation. If the host does not have CHARON-AXP installed, the host can still distribute the connected network license(s) to the CHARON virtual machines running on other hosts. In this case the Sentinel driver must be installed on the host manually.

The Sentinel run-time driver is distributed as a part of the CHARON-AXP kit. Please see the "License installation" section of this chapter for details.

Once the Sentinel run-time driver is installed and the network license is connected, the CHARON VM can be started on any appropriate host on the LAN network segment.

> CHARON-AXP/VAX version 4.7 build 171-01 introduced a change with respect to network licenses. In previous versions of CHARON-AXP/VAX a network license controlled the maximum number of client host systems and CHARON instances per host system (station/instance mode).
>
> In the current CHARON-AXP/VAX versions a network license controls the maximum overall number of active instances, which can be distributed across client host systems according to the preference of the customer.

Software licenses

The CHARON-AXP Software License (SL) is a "virtual" key with exactly the same functionality as the hardware dongle. It does not require any hardware but the installation of the Sentinel run-time environment is required.

> ⚠ The Software Licenses (SL) are best suited for stable environments because their correct function depends on certain characteristics of the host system. Changing any of these characteristics will invalidate the license.
>
> - If the CHARON host runs on real hardware, the software licenses are by default **tightly bound to the hardware** for which they were issued. If major hardware characteristics of the system are changed, the license will be disabled.
> - If the CHARON host runs in a **virtual environment** (e.g. VMware), software licenses are normally bound to the virtual machine ID and a set of additional characteristics of the virtual machine. If any of these parameters are changed, the license will be disabled.
>
> For a more detailed description of the restrictions, please refer to Software Licensing restrictions or contact your Stromasys representative.

Software licenses are always network-wide on Windows, so they behave the same way as Network HASP keys.

Multiple licenses configuration

For any type of licensing, a CHARON VM can use **only one valid ("active") license (of given vendor code) at a time**.

The "HASP License details" utility (it can be started from CHARON Virtual Machines Manager) displays a range of available licenses but note that, by default, a CHARON VM may use any of them as the "active" one - unless it is directly specified by the "license_key_id" parameter (see below). The utility provides the license numbers and ID / IP addresses of the hosts where the licenses are installed.

The general recommendation is to avoid the usage of multiple keys in one network segment. Use only one locally installed license per host or one network license per local network segment containing several CHARON hosts.

When needed, it is possible to use a special parameter in the CHARON VM configuration files to specify exactly which license must be used by each particular CHARON VM:

Parameter	license_key_id
Type	Text string
Value	A set of Sentinel Key IDs that specifies the license keys to be used by CHARON. It is also possibly to use a keyword "**any**" to force CHARON to look for a suitable license in all available keys if the license is not found in the specified keys. **Example**: `set session license_key_id = "1877752571,354850588,any"` Based on the presence of this parameter in the configuration file, CHARON behaves as follows: 1. **No keys are specified (the parameter is absent)** CHARON performs an unqualified search for any suitable key in unspecified order. If no key is found, CHARON exits. 2. **One or many keys are specified** CHARON performs a qualified search for a regular license key in the specified order. If it is not found, CHARON exits (if the keyword "any" is not set). If the keyword "any" is specified then if no valid license has been found in the keys with specified ID's all other available keys are examined for valid license as well. The order in which keys are specified is very important. If a valid license was found in the key which ID was not the first one specified in configuration file, then available keys are periodically re-scanned and if the key with the ID earlier in the list than the current one is found CHARON tries to find a valid license there and in case of success switches to that key.

License installation

Installation from scratch

Before installing the license make sure that the Sentinel run-time (driver) to be installed is collected from your CHARON kit or provided by STROMASYS on request for your particular product. Do not update the Sentinel run-time (driver) from online or any other sources, including the Sentinel web site.

In case of several CHARON kits containing different versions of Sentinel run-time (driver), the last one, having the most recent version, must be installed. The CHARON installation performs this operation automatically.

At the moment CHARON supports Sentinel HASP keys, Sentinel HL and Sentinel Software Licenses (SL).

Installation of a CHARON-AXP regular or network license consists of:

1. Installation of the Sentinel run-time environment on the CHARON-AXP host (regular and network keys) or on the host that will distribute CHARON-AXP licenses over a local network segment (network key only). The Sentinel software is installed automatically by CHARON-AXP for Windows.
2. Physical connection of the HASP license dongle to the CHARON-AXP host or to the host distributing the CHARON-AXP license over the local network segment.
3. Collecting the system fingerprint (*.c2v file), sending it to STROMASYS and applying the update (*.v2c file) in case of software license (and in case of updating HASP dongle license). See the details below.

When a manual installation of the Sentinel run-time is required (in the case of the network license server that does not have CHARON-AXP installed):

1. Login as Administrator
2. Open the CHARON-AXP kit folder
3. Switch to the "`hasp_install`" subfolder
4. Unzip the archive "`haspdinst.zip`" located in this folder
5. Open "cmd.exe" and switch to the folder where the files were unzipped
6. Execute the following commands:

```
...> haspdinst.exe -fr -kp -nomsg

...> haspdinst.exe -install -cm
```

7. Extract the contents of this archive "`hasplib.zip`" to the same directory.
8. Copy the file "`haspvlib_68704.dll`" to "`C:\Program Files (x86)\Common Files\Aladdin Shared\HASP`" (in case of x64 host) or "`C:\Program Files\Common Files\Aladdin Shared\HASP`" (in case of x86 host)

Note that the following operations have to be performed on installation phase for network licenses:

- *On the server side (where the network license will reside)*: open port 1947 for both TCP and UDP
- *On the client side*, if broadcast search for remote licenses is to be used, UDP traffic from port 1947 of the license server to ports 30000-65535 of the client must be permitted.
- *Both on server and client sides*: setup default gateway

Please consult with your Windows User's Guide on details.

If stricter firewall rules are required, it is possible to open the ports 30000-65535 and 1947 only for the "Sentinel HASP License Manager" (hasplms.exe) service (it will be installed by CHARON-AXP).

Replacement of currently installed Sentinel run-time

Replacement of the currently installed Sentinel Run-time can be needed in case of installation of specific run-time provided by STROMASYS.

To proceed, remove the current version of Sentinel run-time:

- Login as Administrator
- Extract the content of the unique ZIP file residing in “hasp_install” directory of the CHARON distribution to the same folder.
- Run “cmd.exe” from the “Start” menu of host computer
- “cd” to the “hasp_install” directory
- Issue the following command:

```
...> haspdinst.exe -fr -kp -nomsg
```

Install the other Sentinel run-time:

- “cd” to the directory where the target run-time resides
- Issue the following command:

```
...> haspdinst.exe -install -cm
```

- “cd” to the “hasp_install” directory
- Extract the contents of this archive "`hasplib.zip`" to the same directory.
- Copy the file "`haspvlib_68704.dll`" to "`C:\Program Files (x86)\Common Files\Aladdin Shared\HASP`" (in case of x64 host) or "`C:\Program Files\Common Files\Aladdin Shared\HASP`" (in case of x86 host)

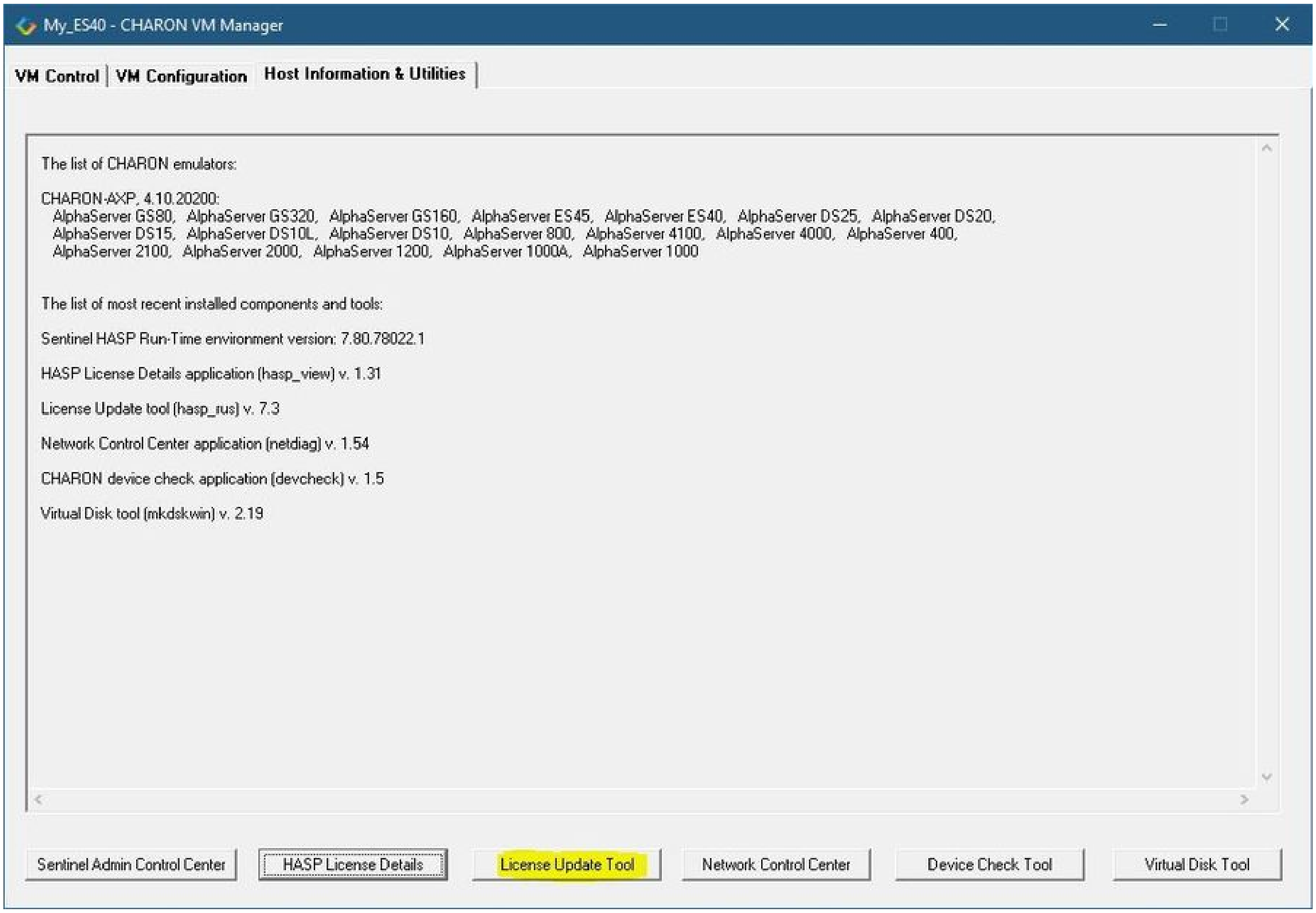
You do not need to perform this procedure for Sentinel HL keys - local and network ones (red dongle) used as local.

Installation and update of CHARON-AXP Software License or HASP dongle License

The CHARON-AXP software licenses can be installed / updated according to the procedure described below:

- Install CHARON-AXP together with Sentinel run-time (Sentinel run-time is an essential part of CHARON-AXP for Windows distribution)
- Reboot the host system
- Connect the HASP dongle to the host system (in case of update of a license located on a dongle)
- Collect the CHARON-AXP host fingerprint file ("*.c2v"):

  Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "License Update tool" button to envoke the "License Update Service" utility:



The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
AlphaServer GS80, AlphaServer GS320, AlphaServer GS160, AlphaServer ES45, AlphaServer ES40, AlphaServer DS25, AlphaServer DS20, AlphaServer DS15, AlphaServer DS10L, AlphaServer DS10, AlphaServer 800, AlphaServer 4100, AlphaServer 4000, AlphaServer 400, AlphaServer 2100, AlphaServer 2000, AlphaServer 1200, AlphaServer 1000A, AlphaServer 1000

The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

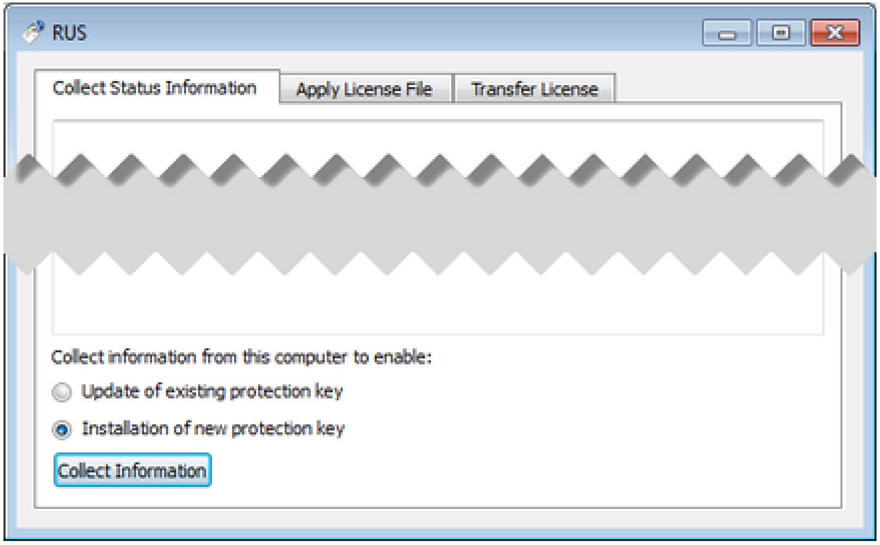
CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19

In the utility dialog popup switch to the "Collect Status Information" tab (opened by default) then select:

- "Installation of new protection key" in case of Software License if no Software License has been already installed on the host.

  Example:

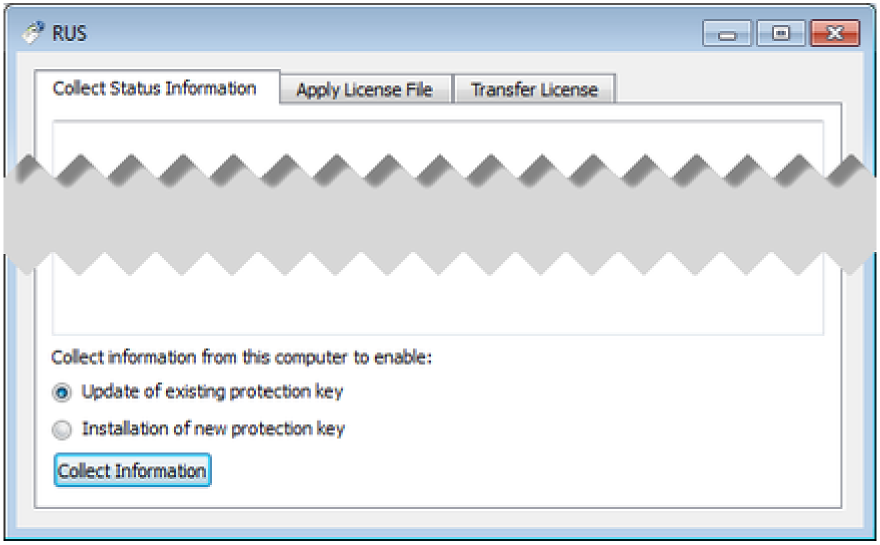
  Collect information from this computer to enable:

  ○ Update of existing protection key

  ● Installation of new protection key

- "Update of existing protection key" in case of HL/HASP dongle or Software License that has been already installed on the host and needs updating.

  Example:

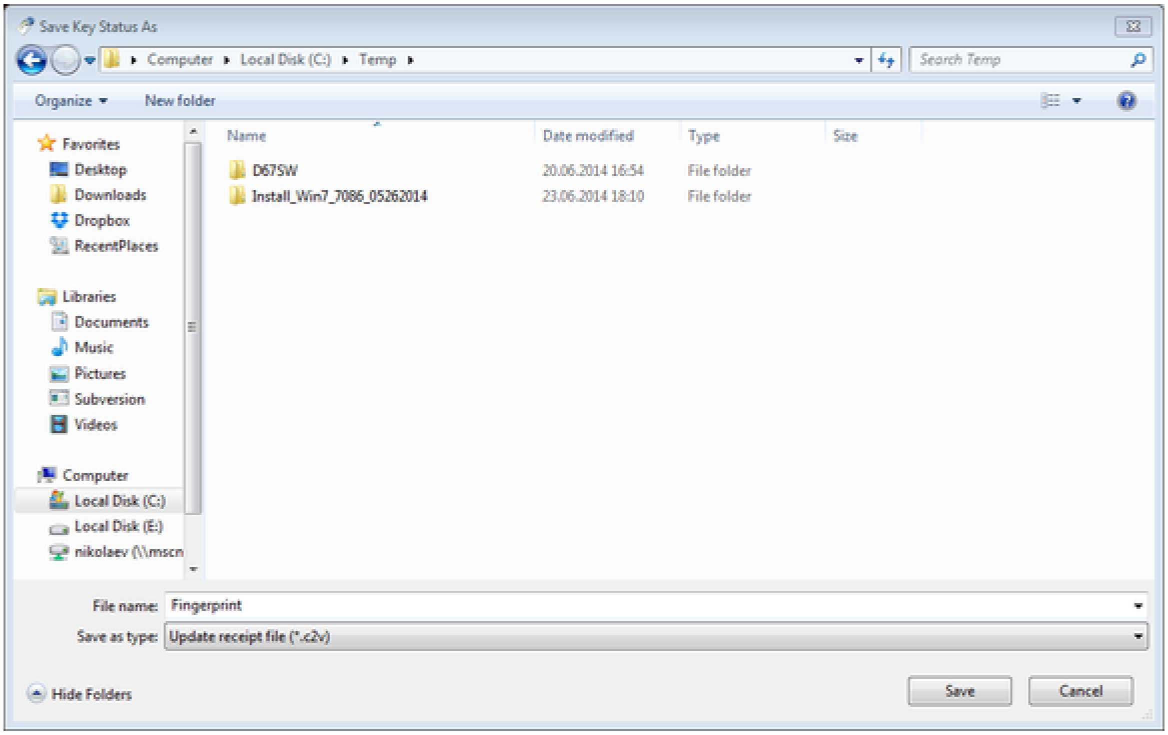
  Collect information from this computer to enable:

  ● Update of existing protection key

  ○ Installation of new protection key

> ⚠ When using HASP dongles, select only the "Update of existing protection key" option.
>
> In case of Software License use the "Installation of new protection key" option if the host does not have any Software License installed and the "Update of existing protection key" option if an already installed Software License has to be updated.

- Press the "Collect Information" button. In the popup dialog choose the place to store the "Fingerprint.c2v" file and press the "Save" button:

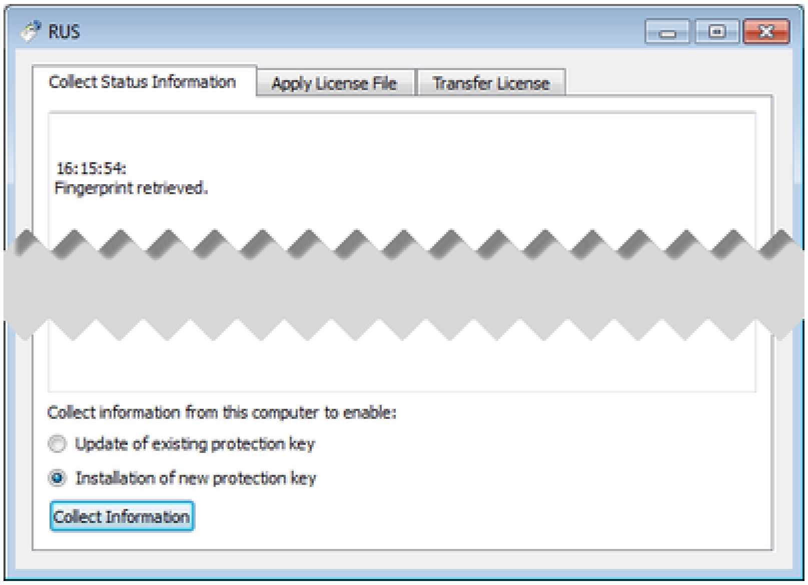


Name	Date modified	Type	Size
D67SW	20.06.2014 16:54	File folder	
Install_Win7_7086_05262014	23.06.2014 18:10	File folder	

File name: Fingerprint

Save as type: Update receipt file (*.c2v)

- A message should appear similar to this example, confirming the fingerprint has been collected successfully.



16:15:54:
Fingerprint retrieved.

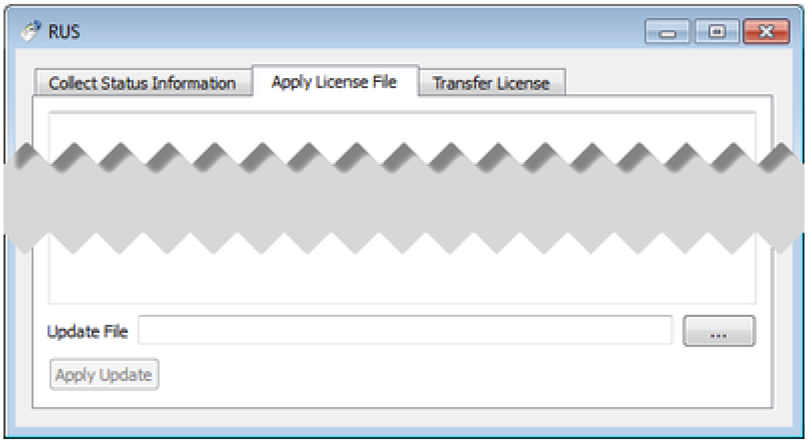
Collect information from this computer to enable:

○ Update of existing protection key

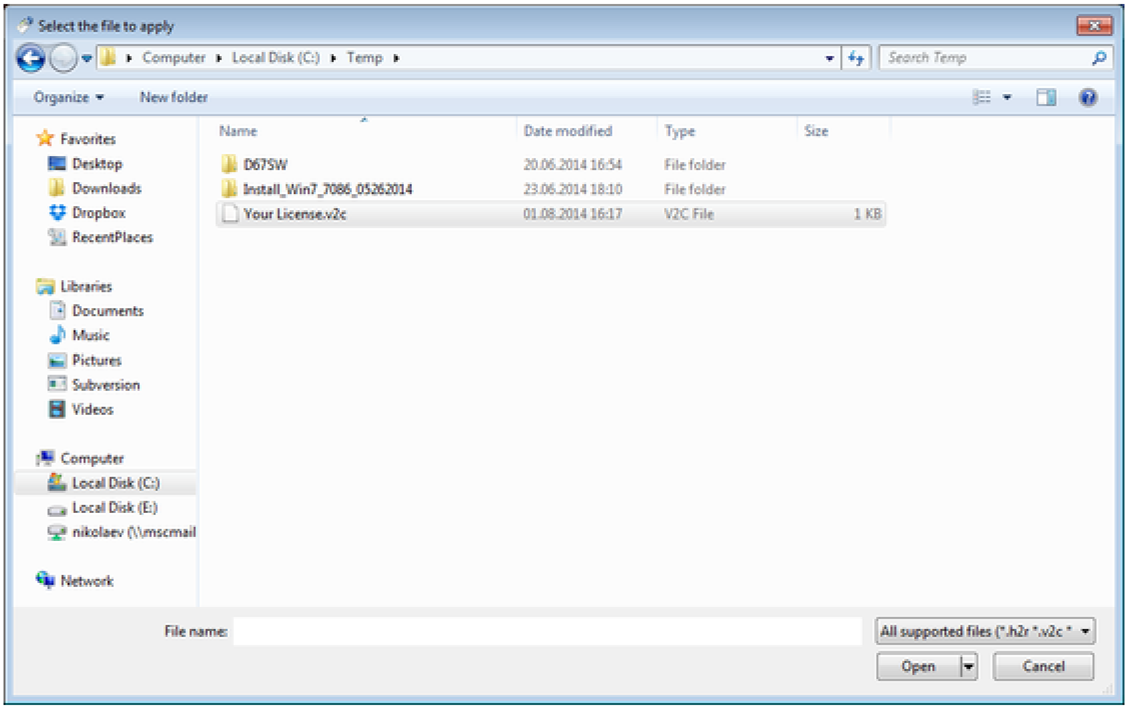
● Installation of new protection key

- Send the ".c2v" file ("*Fingerprint.c2v*" in the example above) to STROMASYS
- STROMASYS will send you a ".v2c" file in return. Put it somewhere on the CHARON-AXP host.

- Open up the "License Update Service" utility the way described above and open the "Apply License File" tab:



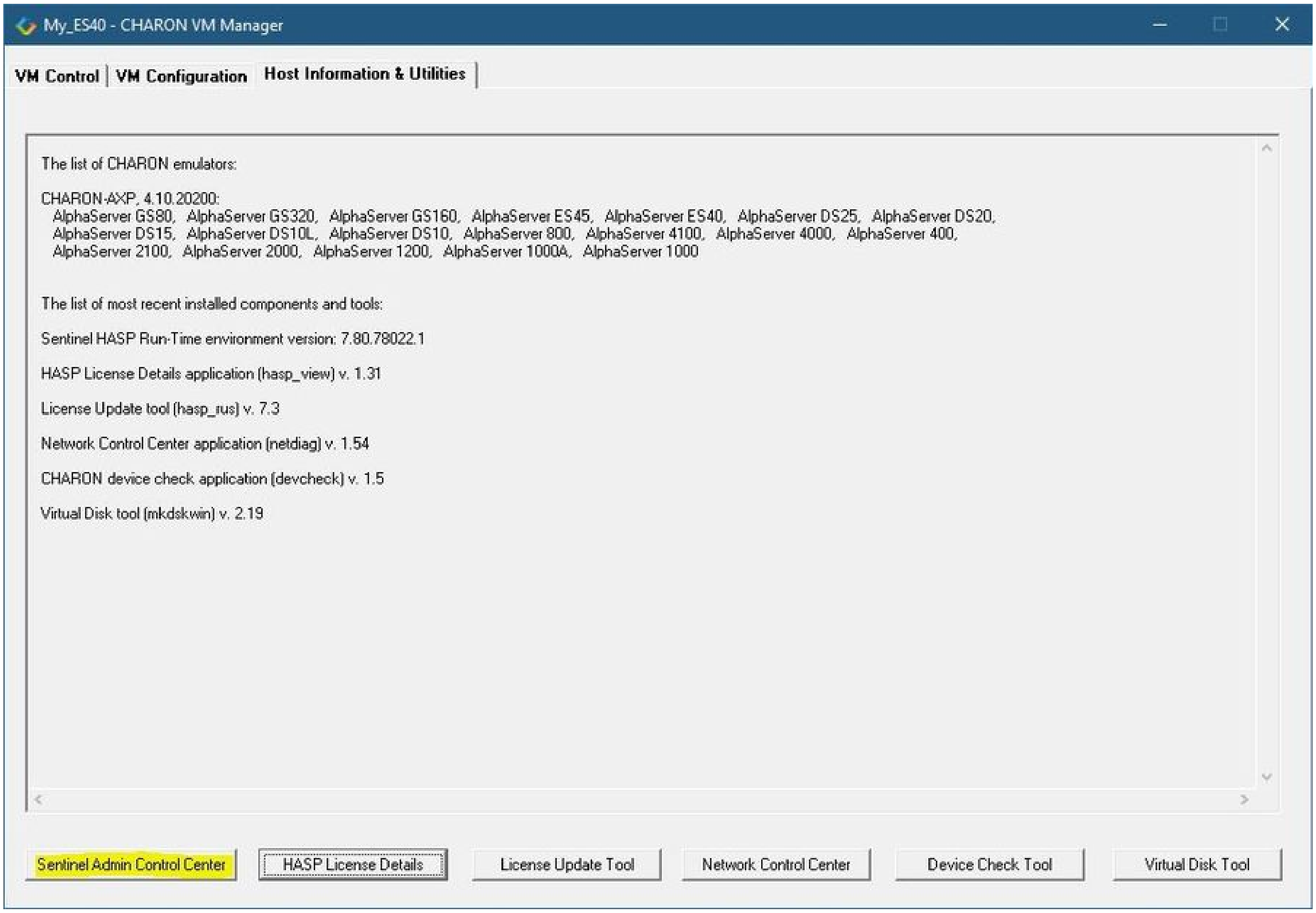
Press the "..." button beside the "Update File" edit-box. In the popup select the license file received from STROMASYS:


Select the file to apply

Name	Date modified	Type	Size
D67SW	20.06.2014 16:54	File folder	
Install_Win7_7086_05262014	23.06.2014 18:10	File folder	
Your License.v2c	01.08.2014 16:17	V2C File	1 KB

Press the "Open" button and apply the license.

- Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "Sentinel Admin Control Center" button:



The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
AlphaServer GS80, AlphaServer GS320, AlphaServer GS160, AlphaServer ES45, AlphaServer ES40, AlphaServer DS25, AlphaServer DS20, AlphaServer DS15, AlphaServer DS10L, AlphaServer DS10, AlphaServer 800, AlphaServer 4100, AlphaServer 4000, AlphaServer 400, AlphaServer 2100, AlphaServer 2000, AlphaServer 1200, AlphaServer 1000A, AlphaServer 1000

The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

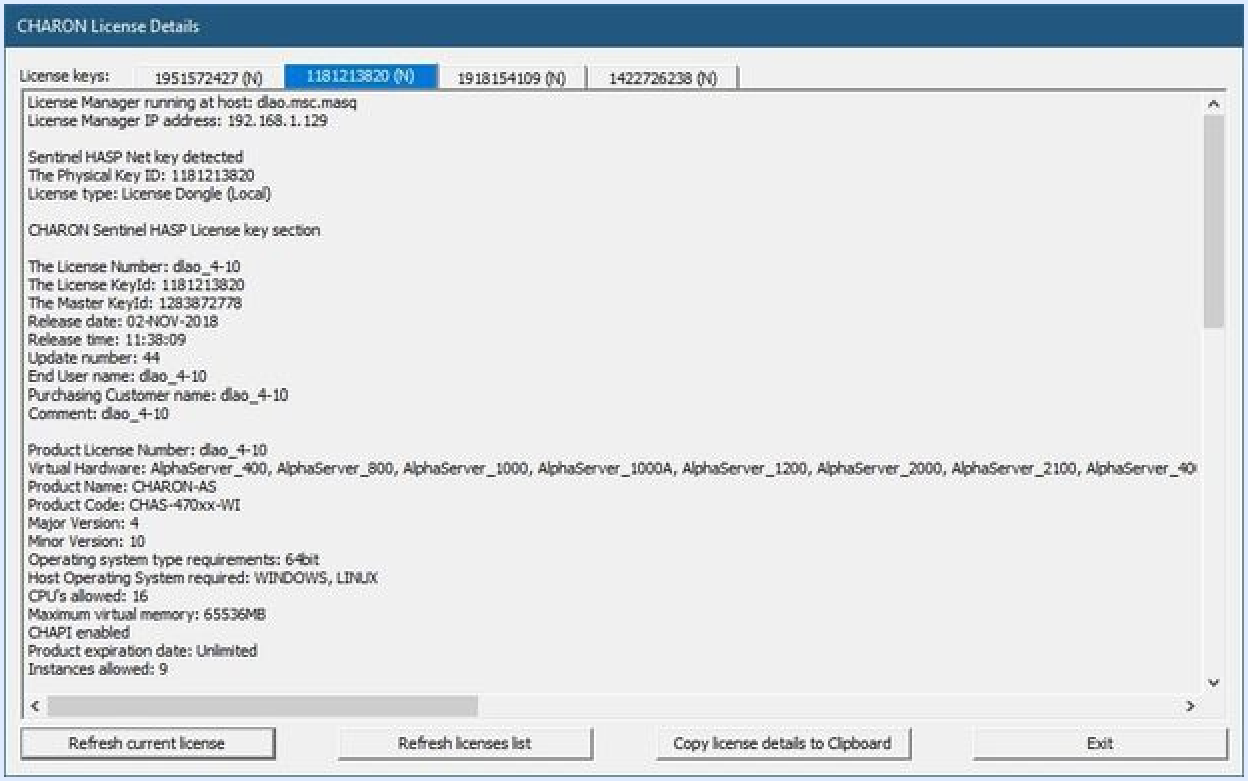
CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19

or - alternatively - start any web browser on this system and go to the http://localhost:1947 page to access the "Sentinel HASP Admin Control Center" (ACC).

- Ensure that the license appears in the “Sentinel Keys” menu.

As the content of the installed software or HL/HASP license is not shown by the Sentinel HASP Admin Control Center, press the "HASP License Details" button in the "Host Information & Utilities" section of the CHARON Virtual Machines Manager (see above) to display it:



```
License Manager running at host: dlao.msc.masq
License Manager IP address: 192.168.1.129

Sentinel HASP Net key detected
The Physical Key ID: 1181213820
License type: License Dongle (Local)

CHARON Sentinel HASP License key section

The License Number: dlao_4-10
The License KeyId: 1181213820
The Master KeyId: 1283872778
Release date: 02-NOV-2018
Release time: 11:38:09
Update number: 44
End User name: dlao_4-10
Purchasing Customer name: dlao_4-10
Comment: dlao_4-10

Product License Number: dlao_4-10
Virtual Hardware: AlphaServer_400, AlphaServer_800, AlphaServer_1000, AlphaServer_1000A, AlphaServer_1200, AlphaServer_2000, AlphaServer_2100, AlphaServer_40
Product Name: CHARON-AS
Product Code: CHAS-470xx-WI
Major Version: 4
Minor Version: 10
Operating system type requirements: 64bit
Host Operating System required: WINDOWS, LINUX
CPU's allowed: 16
Maximum virtual memory: 65536MB
CHAPI enabled
Product expiration date: Unlimited
Instances allowed: 9
```

Note that the following operations have to be performed on installation phase for network-wide software licenses:

- *On the server side (where network license will reside)*: open port 1947 for both TCP and UDP
- *On the client side*, if broadcast search for remote licenses is to be used, UDP traffic from port 1947 of the license server to ports 30000-65535 of the client must be permitted.
- *Both on server and client sides*: setup default gateway

Please consult with your Windows User's Guide on details.

If stricter firewall rules are required, it is possible to open the ports 30000-65535 and 1947 only for the "Sentinel HASP License Manager" (hasplms.exe) service (it will be installed by CHARON-AXP).

License management

CHARON-AXP license management is performed by the Sentinel Admin Control Center and specific utilities.

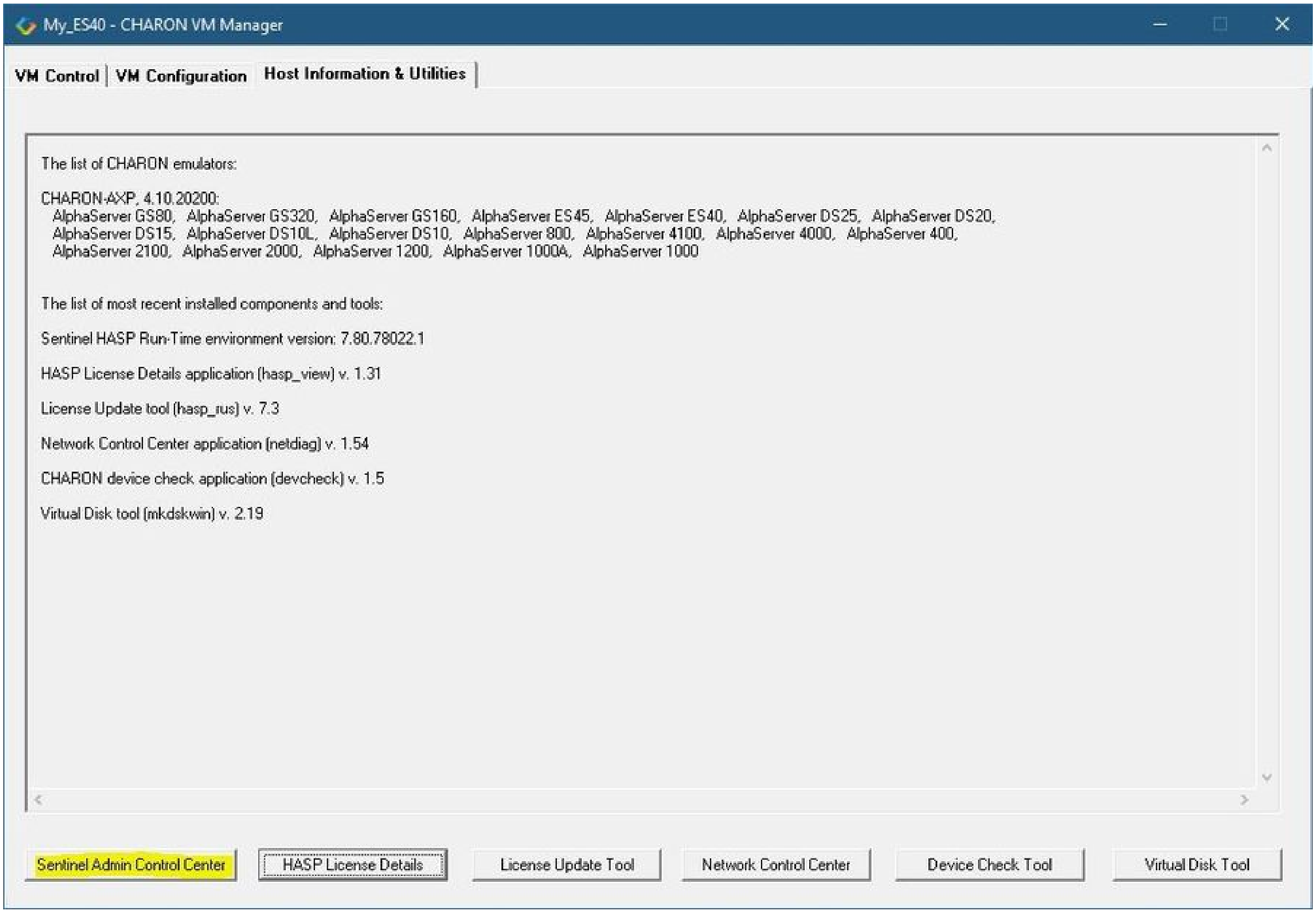
Sentinel Admin Control Center

General Description

The Sentinel Admin Control Center (ACC) is the web-interface to the Sentinel run-time environment. It allows the viewing and managing of any available keys, enabling and disabling them, controlling usage of remote keys etc.

> Sentinel Admin Control Center is not able to display CHARON-AXP licenses. To do this operation, open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "HASP License Details" button (see below).

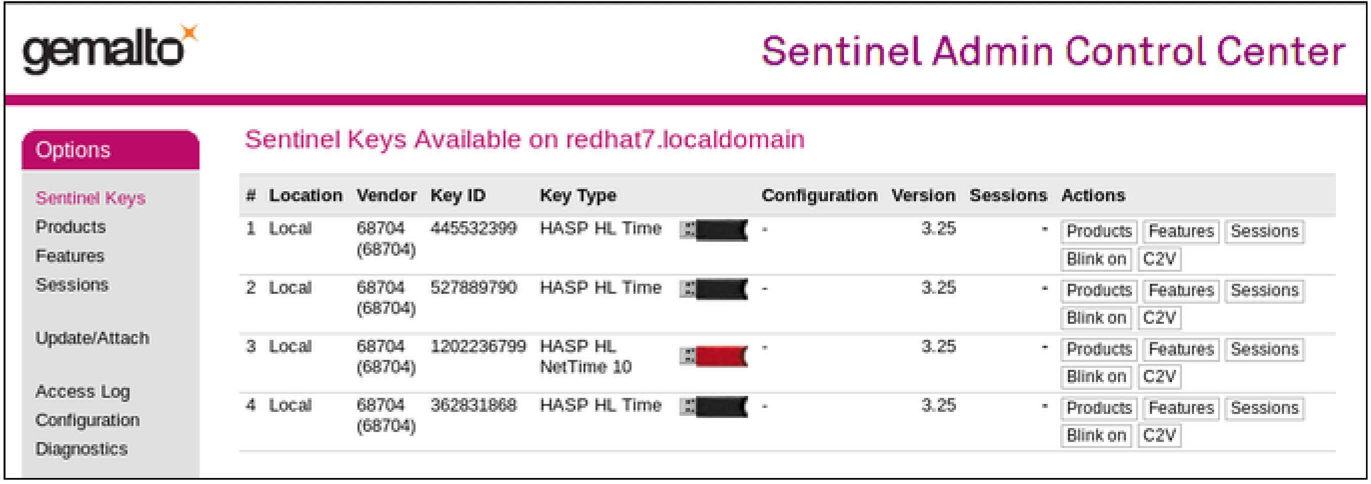
To access the Sentinel Admin Control Center, open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "Sentinel Admin Control Center" button:



```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

or - alternatively - start any web browser on this system and go to the http://localhost:1947 page.

Example:



Sentinel Keys Available on redhat7.localdomain

#	Location	Vendor	Key ID	Key Type	Configuration	Version	Sessions	Actions
1	Local	68704 (68704)	445532399	HASP HL Time	-	3.25	-	Products Features Sessions Blink on C2V
2	Local	68704 (68704)	527889790	HASP HL Time	-	3.25	-	Products Features Sessions Blink on C2V
3	Local	68704 (68704)	1202236799	HASP HL NetTime 10	-	3.25	-	Products Features Sessions Blink on C2V
4	Local	68704 (68704)	362831868	HASP HL Time	-	3.25	-	Products Features Sessions Blink on C2V

This example demonstrates that 4 license keys are available:

1. A network key ("*HASP-HL NetTime*") on the host "XEON4WAYW7"
2. A network key installed locally
3. An HASP-HL installed locally
4. A network-wide software license on the host "RH64"

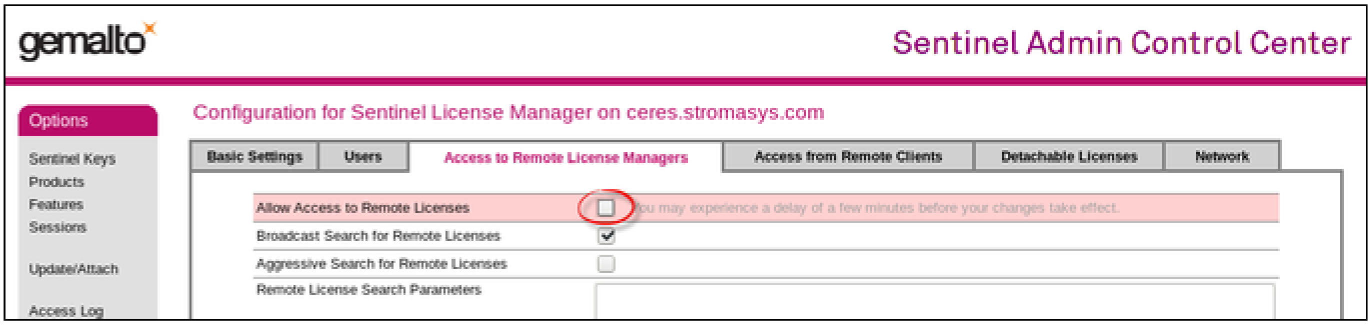
The Sentinel Admin Control Center reports that there is one opened session on key #4. The other keys are not being used at the moment.

For a more detailed description of the Sentinel Admin Control Center, please refer to its "Help" section.

Disable remote keys access

A helpful feature of the Sentinel Admin Control Center is the ability to disable access to remote keys. If the network key is installed locally, access to the key from remote hosts can be disabled. The following examples demonstrate how this can be done.

To disable access to remote keys, switch to the "Access to Remote License Managers" tab, uncheck the "Allow Access to Remote Licenses" check box then press the "Submit" button to apply this change:



Configuration for Sentinel License Manager on ceres.stromasys.com

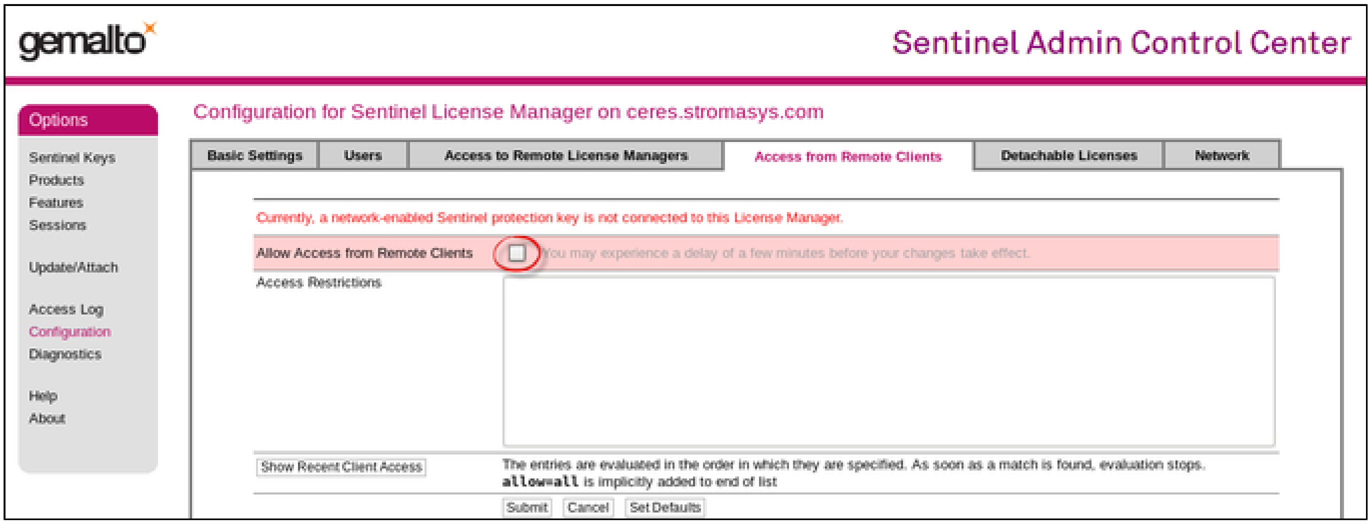
Allow Access to Remote Licenses ☐ You may experience a delay of a few minutes before your changes take effect.

Broadcast Search for Remote Licenses ☑

Aggressive Search for Remote Licenses ☐

Remote License Search Parameters

To disable access to the locally installed license key from remote hosts, switch to the "Access from Remote Clients" tab, uncheck the "Allow Access from Remote Clients" check box then press the "Submit" button to apply this setting:



Configuration for Sentinel License Manager on ceres.stromasys.com

Currently, a network-enabled Sentinel protection key is not connected to this License Manager.

Allow Access from Remote Clients □ You may experience a delay of a few minutes before your changes take effect.

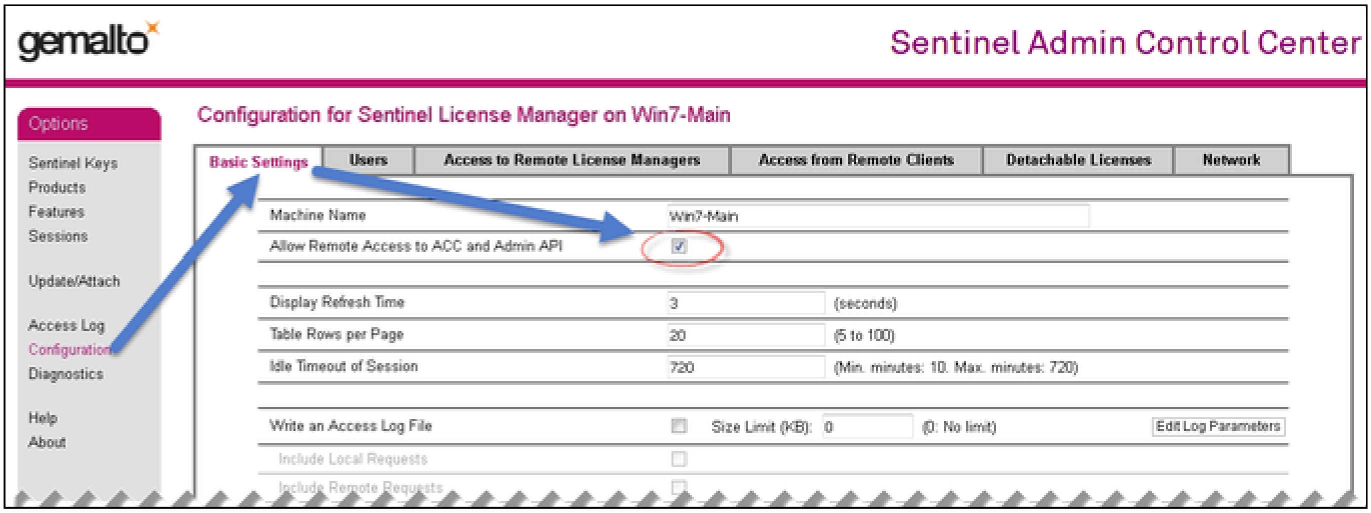
Access Restrictions

The entries are evaluated in the order in which they are specified. As soon as a match is found, evaluation stops.
`allow=all` is implicitly added to end of list

Accessing Sentinel Admin Control Center from remote hosts

By default, the Sentinel Admin Control Center forbids accessing its web interface from remote machines.

To allow access, configure the ACC for remote management:



Configuration for Sentinel License Manager on Win7-Main

Machine Name: Win7-Main

Allow Remote Access to ACC and Admin API ☑

Display Refresh Time: 3 (seconds)

Table Rows per Page: 20 (5 to 100)

Idle Timeout of Session: 720 (Min. minutes: 10. Max. minutes: 720)

Write an Access Log File □ Size Limit (KB): 0 (0: No limit)

Include Local Requests □

Include Remote Requests □

License management utility

CHARON-AXP for Windows provides two specific utilities for license management:

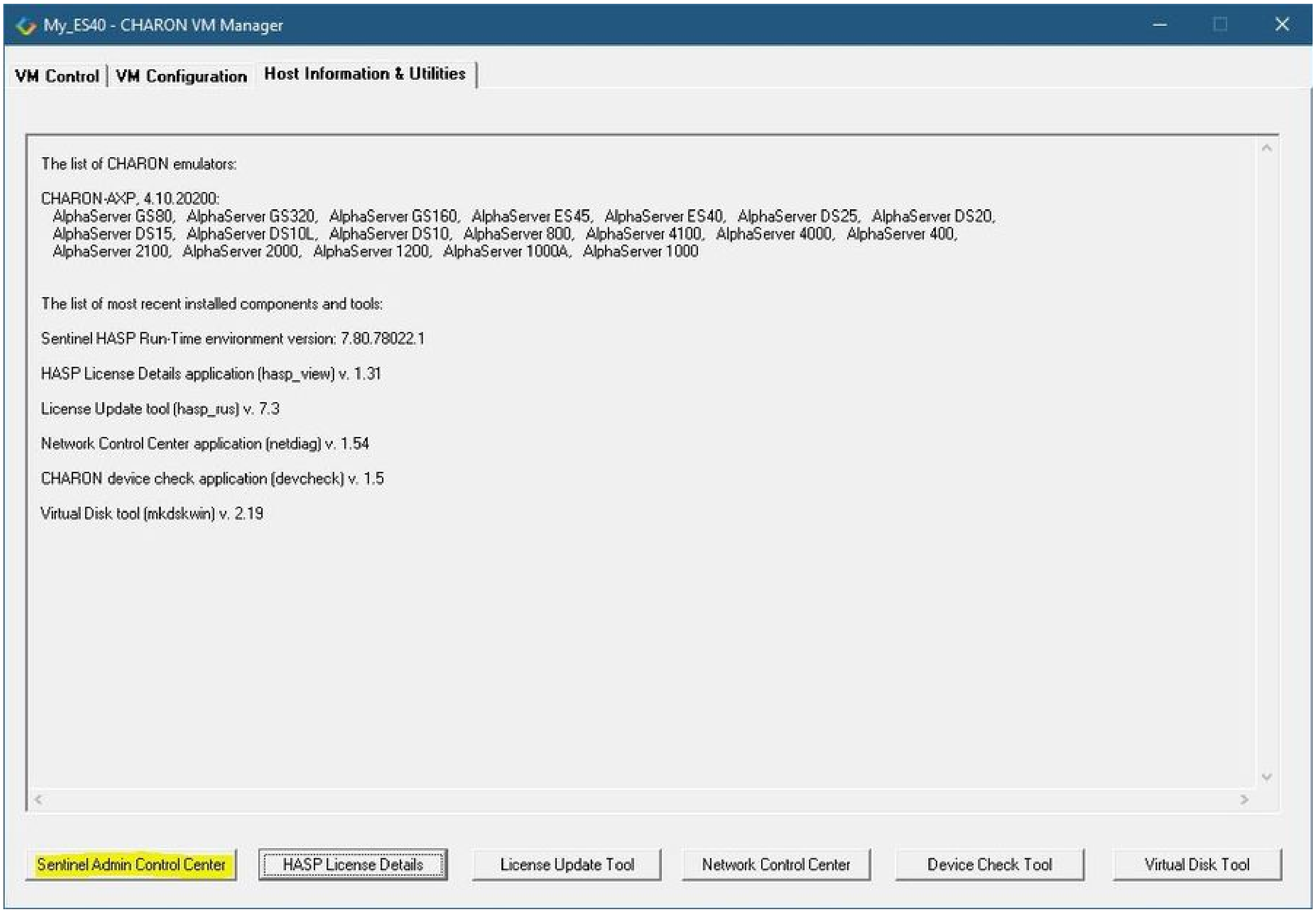
- "HASP View" - This utility is used to display the license(s) content.
- "License Update Service" - This utility is used to collect key status information and host fingerprint (C2V) files and to apply updates (".v2c" files).

Please refer to the "Utilities" section of this Guide for more details.

Removing CHARON-AXP software licenses

The following procedure must be applied to remove the software license (SL):

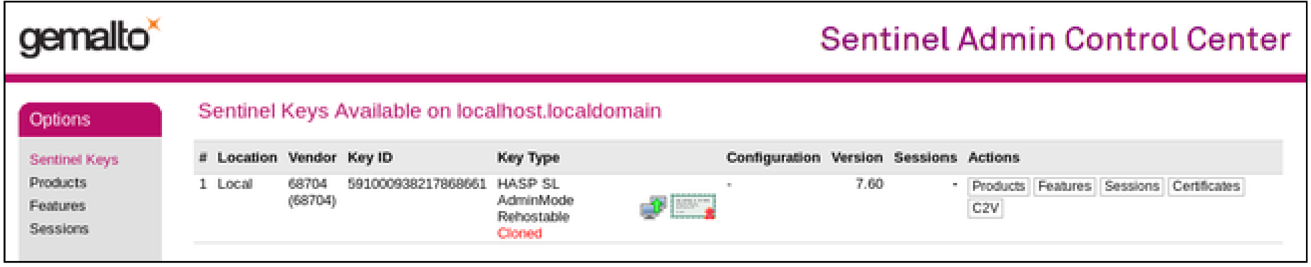
1. Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "Sentinel Admin Control Center" button:



```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

or - alternatively - start any web browser on this system and go to the http://localhost:1947 page.

2. In the "Sentinel HASP Admin Control Center" (ACC), select the "Sentinel Keys" option in the left pane and locate the target "Sentinel SL AdminMode" license.
3. Press the "Certificates" button at the right side of the SL description:



Sentinel Keys Available on localhost.localdomain

#	Location	Vendor	Key ID	Key Type	Configuration	Version	Sessions	Actions
1	Local	68704 (68704)	591000938217868661	HASP SL AdminMode Rehostable Cloned	-	7.60	-	Products Features Sessions Certificates C2V

4. Note the name of the correspondent certificate in the "Certificates" section. The name is in the form of `<KeyID>_base.v2c`
5. Remove the corresponding certificate file in the "`C:\Program Files\Common Files\SafeNet Sentinel\Sentinel LDK\installed\68704`" folder.
6. Restart the "Sentinel LDK License Manager" service (hasplms) either using the `services.msc` program or via a command line (as administrator) then enter the "**`sc stop hasplms`**" command followed by "**`sc start hasplms`**" or reboot the CHARON host.
7. Start the "Sentinel HASP Admin Control Center" (ACC) again to ensure the SL has been removed.

License deinstallation

To completely remove a CHARON-AXP license from a host, remove the Sentinel run-time driver using the following procedure:

- Login as Administrator
- Open the CHARON-AXP kit folder
- Switch to the "hasp_install" subfolder
- Unzip the archive located in this folder
- Open "cmd.exe" and switch to the folder where the files were unzipped
- Execute the following command:

```
...> haspdinst.exe -fr -kp -nomsg
```

Unplug the license dongle. Note that the Sentinel run-time driver is uninstalled automatically when a complete uninstallation of CHARON-AXP is performed.

Special "backup" license keys

Backup keys are provided by STROMASYS along with the standard license dongles. It is strongly recommended to order a backup key to recover immediately from damage or loss of the main license key. The backup keys use a counter (integer) value hardcoded inside the key, this integer value corresponds to a number of hours CHARON-AXP is allowed to run. Each time CHARON-AXP checks the license (every hour), the value is decreased (by 1 hour). Please note that the backup keys have restricted functionality:

- The run time is typically limited to 720 hours (30 days). This is the time alloted to get a replacement dongle from STROMASYS.
- A backup license may be valid only until a certain date.

Emulator Behavior

Charon products **check the availability of a valid license** under several conditions:

1. At startup:

- If no valid license is found, an error message will be written to the emulator log file and the emulator will not start.
- In some emulator products it is possible to configure the number of retries and the waiting time between them by adding parameters to the emulator configuration file. Please refer to chapter General Settings/license_key_lookup_retry the details.

2. At regular intervals during the runtime of the emulator (the default license check period of 1 hour can be changed by Stromasys using the appropriate license parameters):

- If the previously used valid license has been removed, has disappeared, is defect, or has become invalid, the emulator will report the loss of the license in the log file and continue operation for a limited amount of time as described below.
- If there is another valid license, for example a backup license defined in the configuration file, it will be used.
- Charon allows for a grace period of 12 hours during which the software checks for the presence of a valid license every 10 minutes until a valid license is found. If no valid license is found after the grace period has expired, the emulator will stop.
- If a time-restricted license is used and it expires, the Charon instance tries to find its replacement automatically and, if found, proceeds using the replacement license

CHARON-AXP for Windows utilities

General description

CHARON-AXP provides the following set of utilities:

Utility	Description
Host Device Check	Used to review system resources that can be mapped to CHARON.
Network Control Center	Used to configure a CHARON network.
MkDisk	GUI-based utility used to create custom or standard CHARON virtual disk containers.
MkDskCmd	Command line utility used to create custom or standard CHARON virtual disk containers. This utility also may be used to transfer virtual disks of one type to virtual disks of another type.
HASP View	Used to display the CHARON license content.
License Update Service	Used to manage CHARON licenses, collect the host system fingerprint and to transfer software licenses from one host to another.
License Expiration Check	Used to warn user about expiration of CHARON license
mtd	Used to create CHARON tape images from physical tapes and to write tape images back to physical tapes.
CHARON Log Monitor and Dispatcher	Used to trace CHARON log files and run a specific program on certain conditions.
HOSTPrint	Used to print CHARON output to Windows printers.
CHARON Guest Utilities for OpenVMS	Used to manage virtual tapes and CHARON performance.

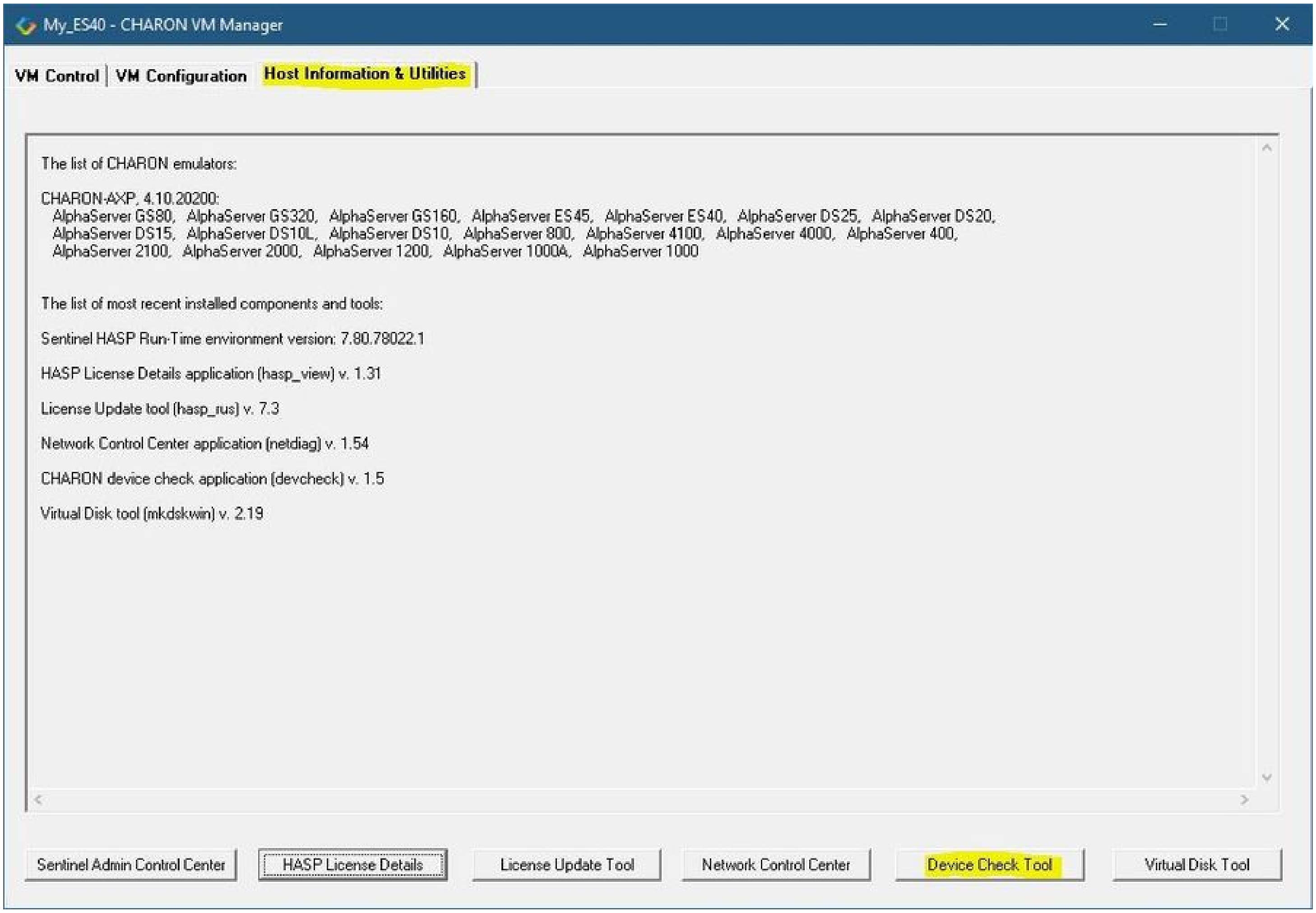
Host Device Check

Table of Contents

General Description

The "Host Device Check" utility is used to review system resources that can be mapped to CHARON.

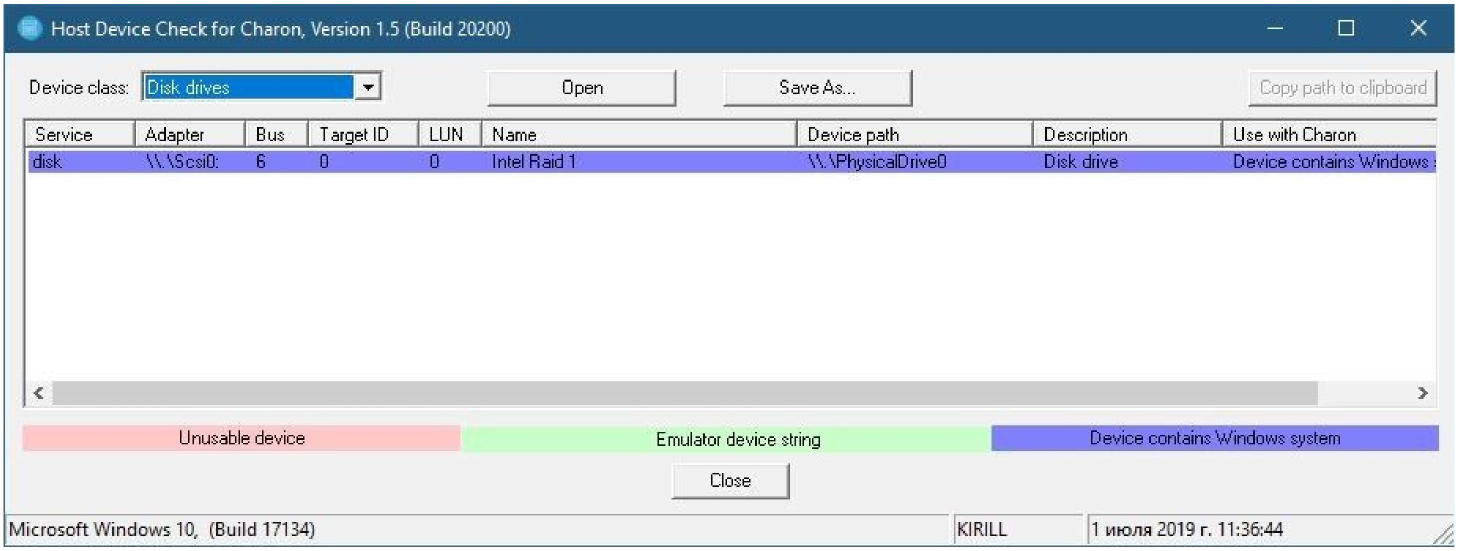
Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "Device Check Tool" button:



```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

Reviewing available physical disks

By default the "Host Device Check" utility reports the available physical disks:



Host Device Check for Charon, Version 1.5 (Build 20200)

Device class: Disk drives

Service	Adapter	Bus	Target ID	LUN	Name	Device path	Description	Use with Charon
disk	\\.\Scsi0:	6	0	0	Intel Raid 1	\\.\PhysicalDrive0	Disk drive	Device contains Windows :

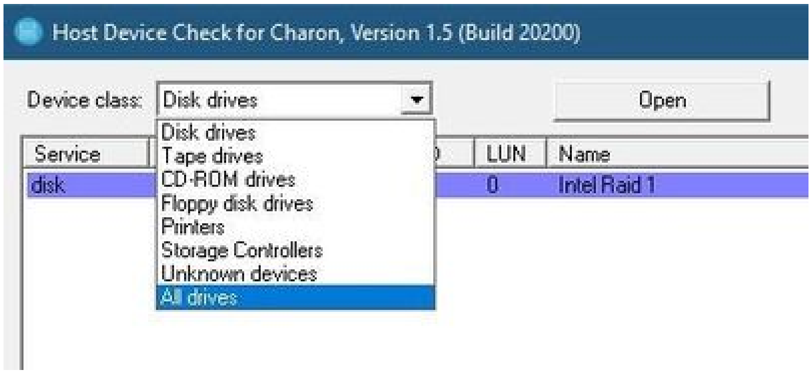
🟥 Unusable device 🟩 Emulator device string 🟦 Device contains Windows system

Microsoft Windows 10, (Build 17134) | KIRILL | 1 июля 2019 г. 11:36:44

⚠ Please note that the unusable devices and the devices containing Windows system (see corresponding colors above) **must not** be mapped to CHARON!

Reviewing all the available host resources

Select "All drives" in the "Device class" drop-down list:

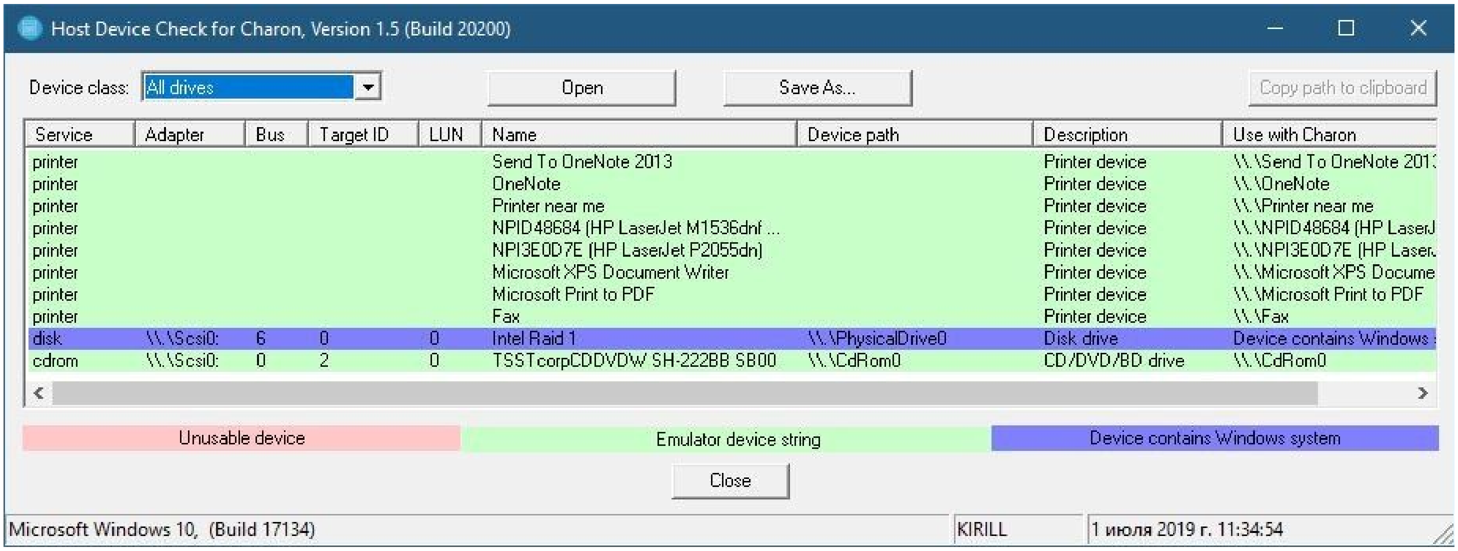


Host Device Check for Charon, Version 1.5 (Build 20200)

Device class: Disk drives

Service	LUN	Name
disk	0	Intel Raid 1

The "Host Device Check" utility will display all the host resources:



Device class: All drives

Service	Adapter	Bus	Target ID	LUN	Name	Device path	Description	Use with Charon
printer					Send To OneNote 2013		Printer device	\\.\Send To OneNote 201:
printer					OneNote		Printer device	\\.\OneNote
printer					Printer near me		Printer device	\\.\Printer near me
printer					NPID48684 (HP LaserJet M1536dnf ...		Printer device	\\.\NPID48684 (HP LaserJ
printer					NPI3E0D7E (HP LaserJet P2055dn)		Printer device	\\.\NPI3E0D7E (HP Laser.
printer					Microsoft XPS Document Writer		Printer device	\\.\Microsoft XPS Docume
printer					Microsoft Print to PDF		Printer device	\\.\Microsoft Print to PDF
printer					Fax		Printer device	\\.\Fax
disk	\\.\Scsi0:	6	0	0	Intel Raid 1	\\.\PhysicalDrive0	Disk drive	Device contains Windows :
cdrom	\\.\Scsi0:	0	2	0	TSSTcorpCDDVDW SH-222BB SB00	\\.\CdRom0	CD/DVD/BD drive	\\.\CdRom0

🟥 Unusable device 🟩 Emulator device string 🟦 Device contains Windows system

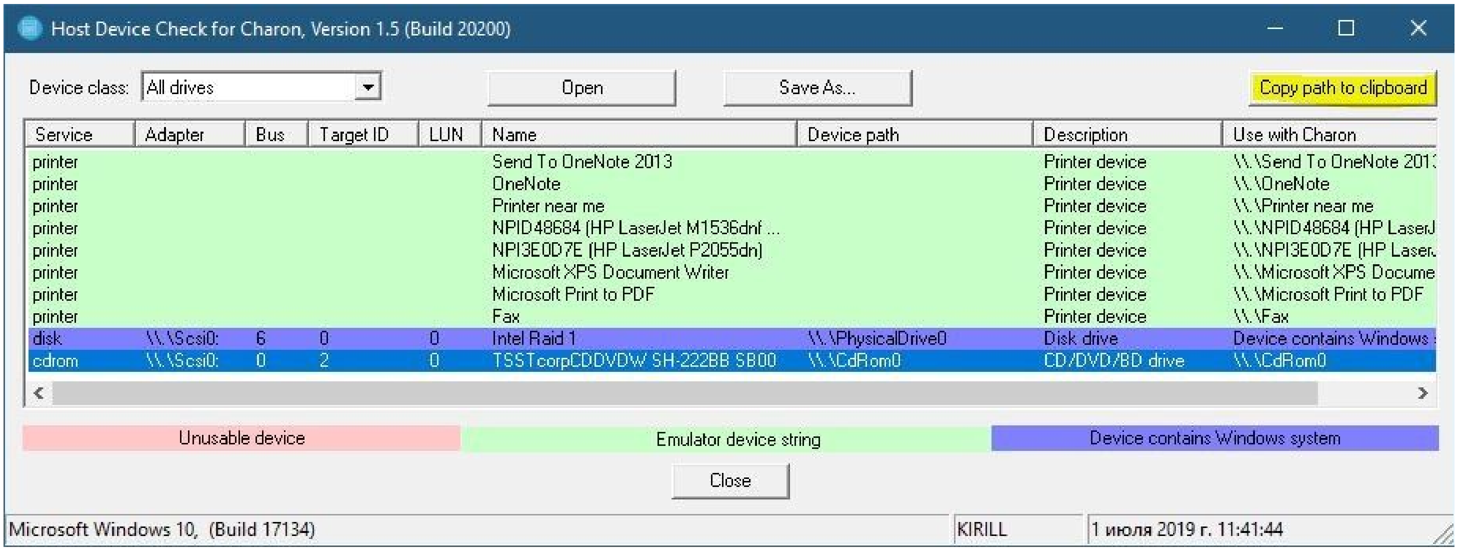
Microsoft Windows 10, (Build 17134) | KIRILL | 1 июля 2019 г. 11:34:54

It is also possible to choose all the other categories to narrow the possible mapping options list.

Note the "Use with CHARON" column contains the actual configuration options for each available device to be inserted, if needed, in the CHARON configuration file (see below).

Collecting the configuration strings

To collect the actual configuration strings to be used in the CHARON configuration file, select the target device and press the "Copy path to clipboard" button:



Device class: All drives

Service	Adapter	Bus	Target ID	LUN	Name	Device path	Description	Use with Charon
printer					Send To OneNote 2013		Printer device	\\.\Send To OneNote 201:
printer					OneNote		Printer device	\\.\OneNote
printer					Printer near me		Printer device	\\.\Printer near me
printer					NPID48684 (HP LaserJet M1536dnf ...		Printer device	\\.\NPID48684 (HP LaserJ
printer					NPI3E0D7E (HP LaserJet P2055dn)		Printer device	\\.\NPI3E0D7E (HP Laser.
printer					Microsoft XPS Document Writer		Printer device	\\.\Microsoft XPS Docume
printer					Microsoft Print to PDF		Printer device	\\.\Microsoft Print to PDF
printer					Fax		Printer device	\\.\Fax
disk	\\.\Scsi0:	6	0	0	Intel Raid 1	\\.\PhysicalDrive0	Disk drive	Device contains Windows :
cdrom	\\.\Scsi0:	0	2	0	TSSTcorpCDDVDW SH-222BB SB00	\\.\CdRom0	CD/DVD/BD drive	\\.\CdRom0

🟥 Unusable device 🟩 Emulator device string 🟦 Device contains Windows system

Microsoft Windows 10, (Build 17134) | KIRILL | 1 июля 2019 г. 11:41:44

The selected configuration string will be copied to the clipboard, it can then be pasted to the CHARON configuration file (using the "CTRL-V" keys combination for example).

The buttons "Open" and "Save As..." help to open up the displayed options in form of text file and save this text file under some given name.

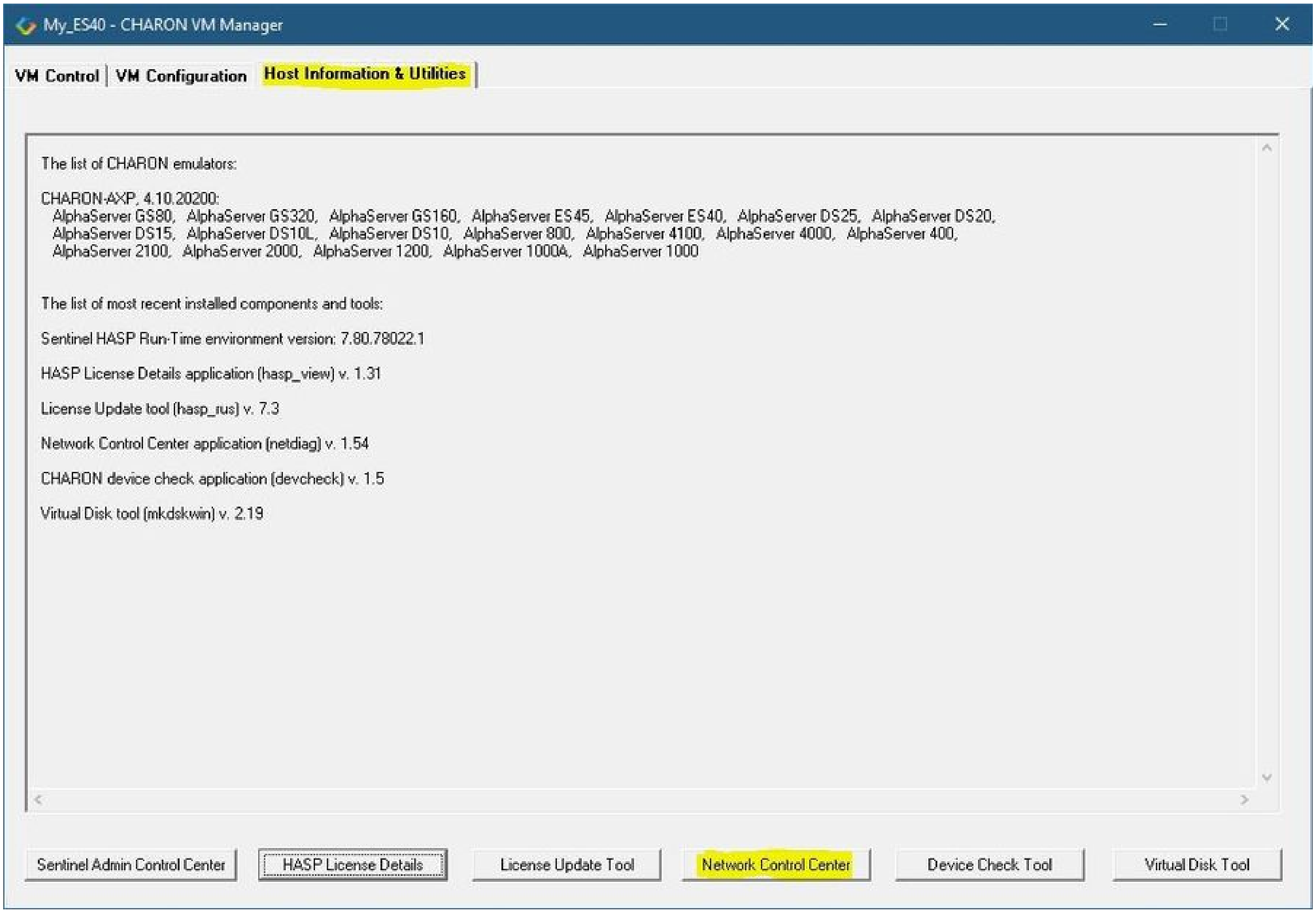
Network Control Center

Table of Contents

General Description

The "Network Control Center" utility is used to configure, verify dedicated network interfaces and trace the network activity for a CHARON network.

Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "Network Control Center" button:

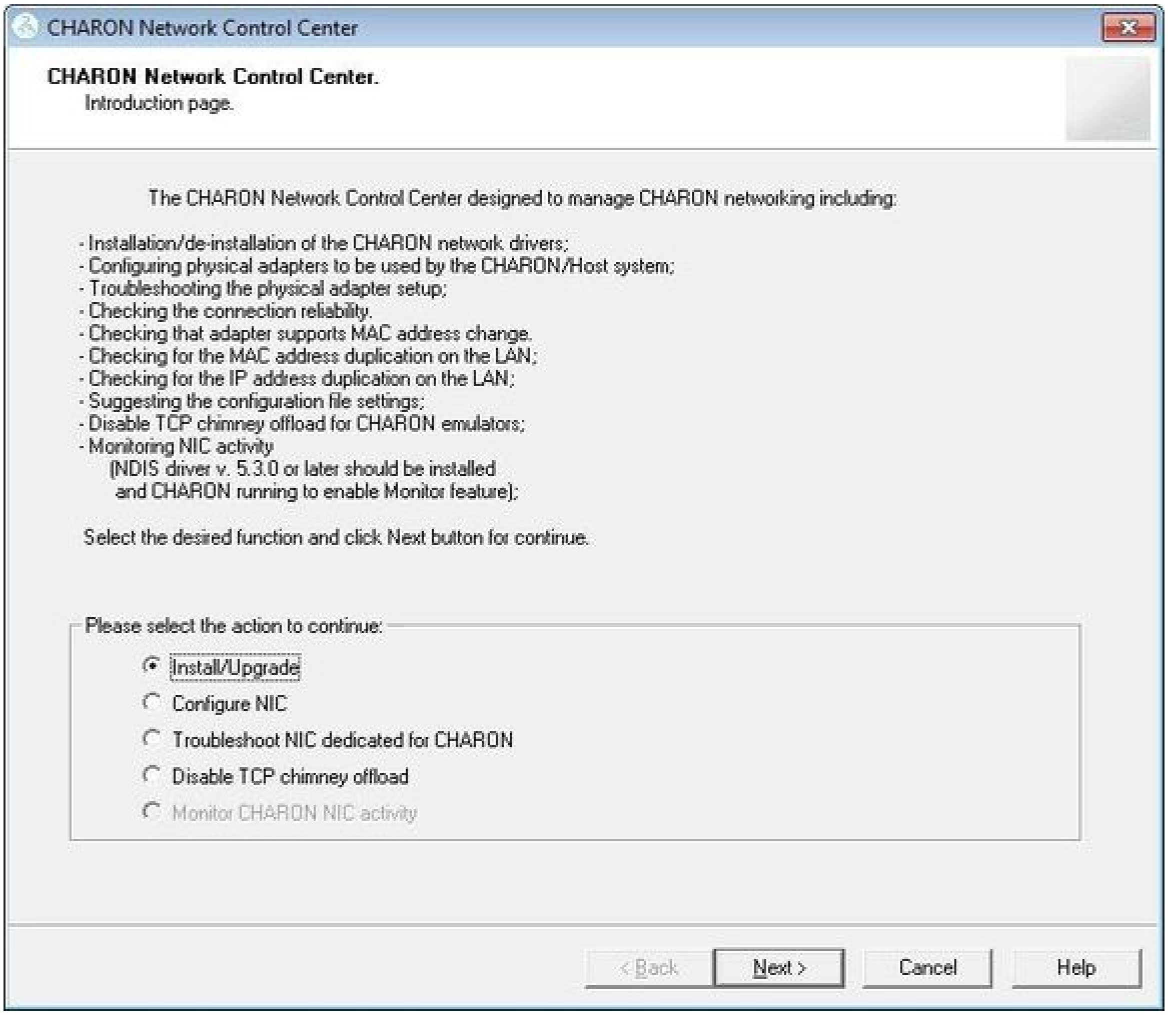


```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

Installation of CHARON network drivers

By default a CHARON network driver is automatically installed by the CHARON installation procedure.

When it is needed to install a modified driver, use the following procedure. Select "Install/Upgrade" and press the "Next" button:



CHARON Network Control Center.
Introduction page.

The CHARON Network Control Center designed to manage CHARON networking including:

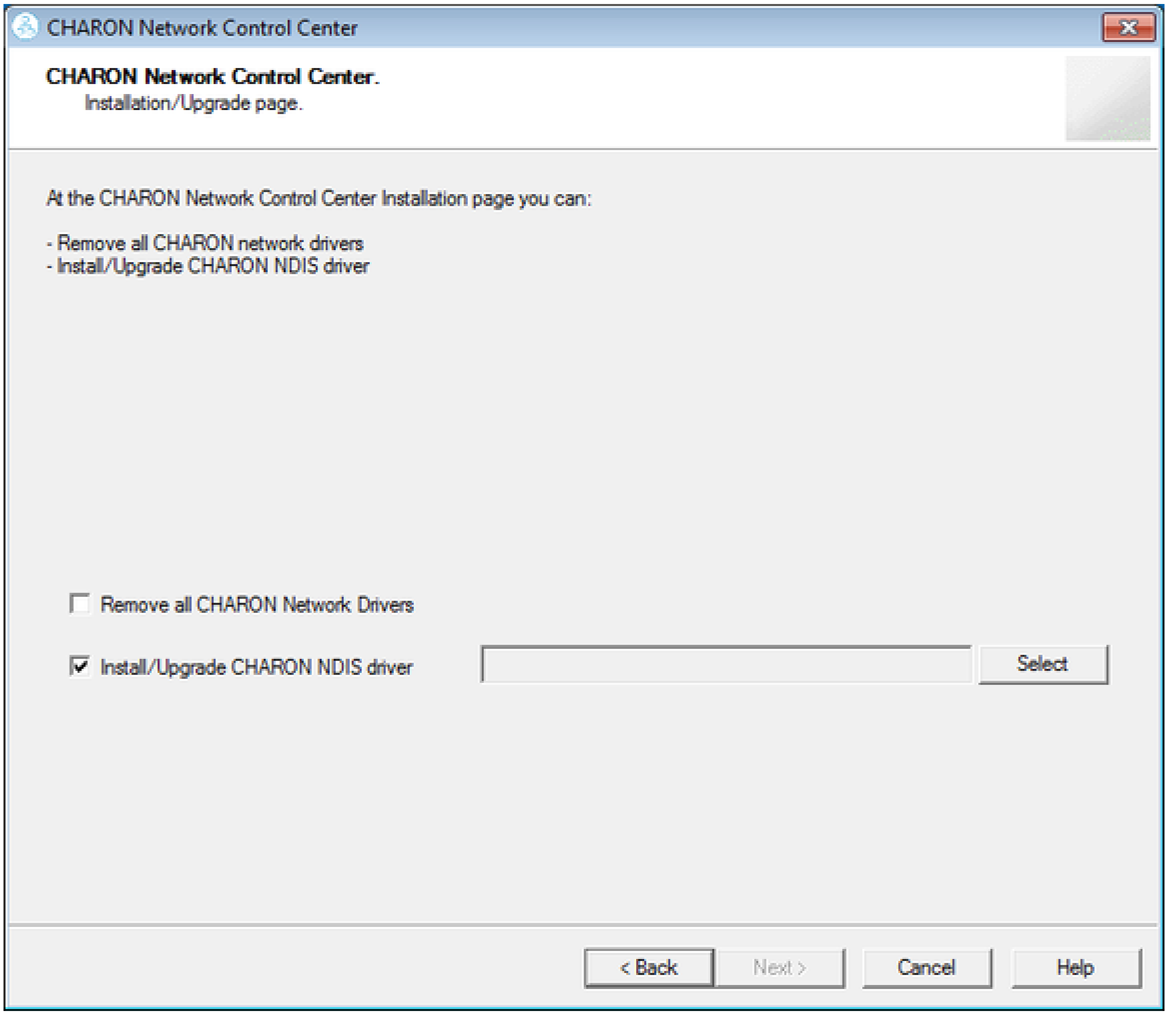
- Installation/de-installation of the CHARON network drivers;
- Configuring physical adapters to be used by the CHARON/Host system;
- Troubleshooting the physical adapter setup;
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

● Install/Upgrade
○ Configure NIC
○ Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload
○ Monitor CHARON NIC activity

Select "Install/Upgrade CHARON NDIS driver" checkbox and press the "Select" button:



CHARON Network Control Center

CHARON Network Control Center.
Installation/Upgrade page.

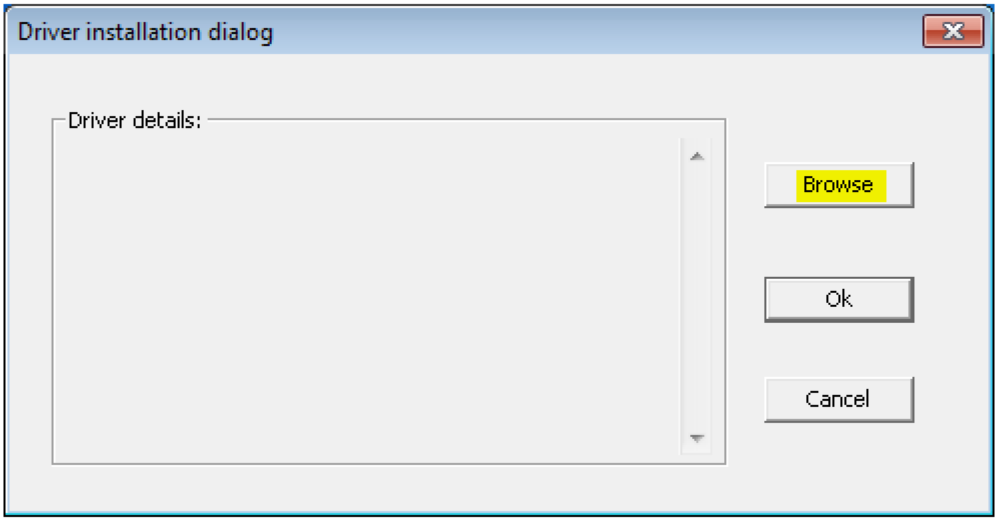
At the CHARON Network Control Center Installation page you can:

- Remove all CHARON network drivers
- Install/Upgrade CHARON NDIS driver

☐ Remove all CHARON Network Drivers

☑ Install/Upgrade CHARON NDIS driver

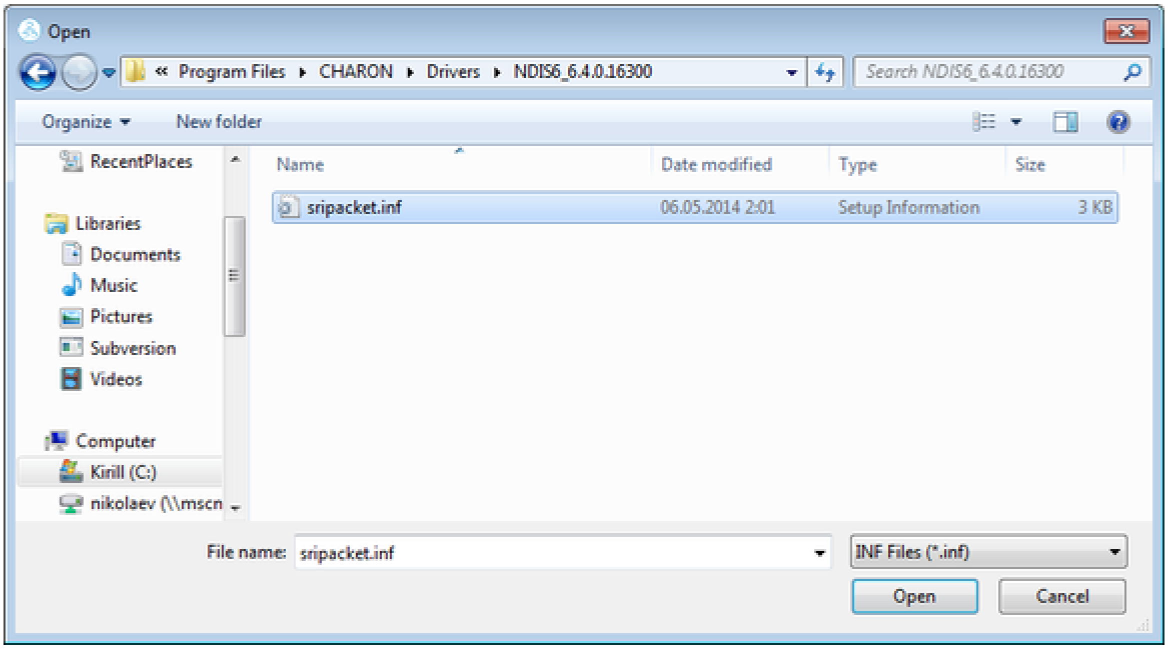
Press the "Browse" button:



Driver installation dialog

Driver details:

Browse for the target "`sripacket.inf`" file which is by default located in the "`C:\Program Files\CHARON\Drivers\NDIS6_`*`X.X.X.XXXXX`*" directory, select it and press the "Open" button:



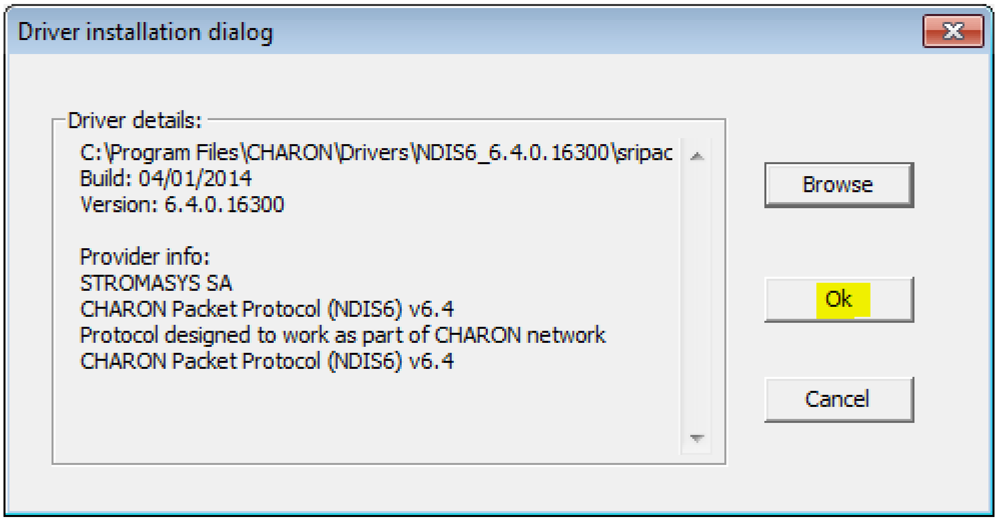
Name	Date modified	Type	Size
sripacket.inf	06.05.2014 2:01	Setup Information	3 KB

File name: sripacket.inf

INF Files (*.inf)

If the CHARON network driver has been acquired directly from STROMASYS, put it in a temporary directory and choose the "`sripacket.inf`" file from this directory in the dialog above.

Review the version of the driver and, if it is correct, press the "Ok" button:

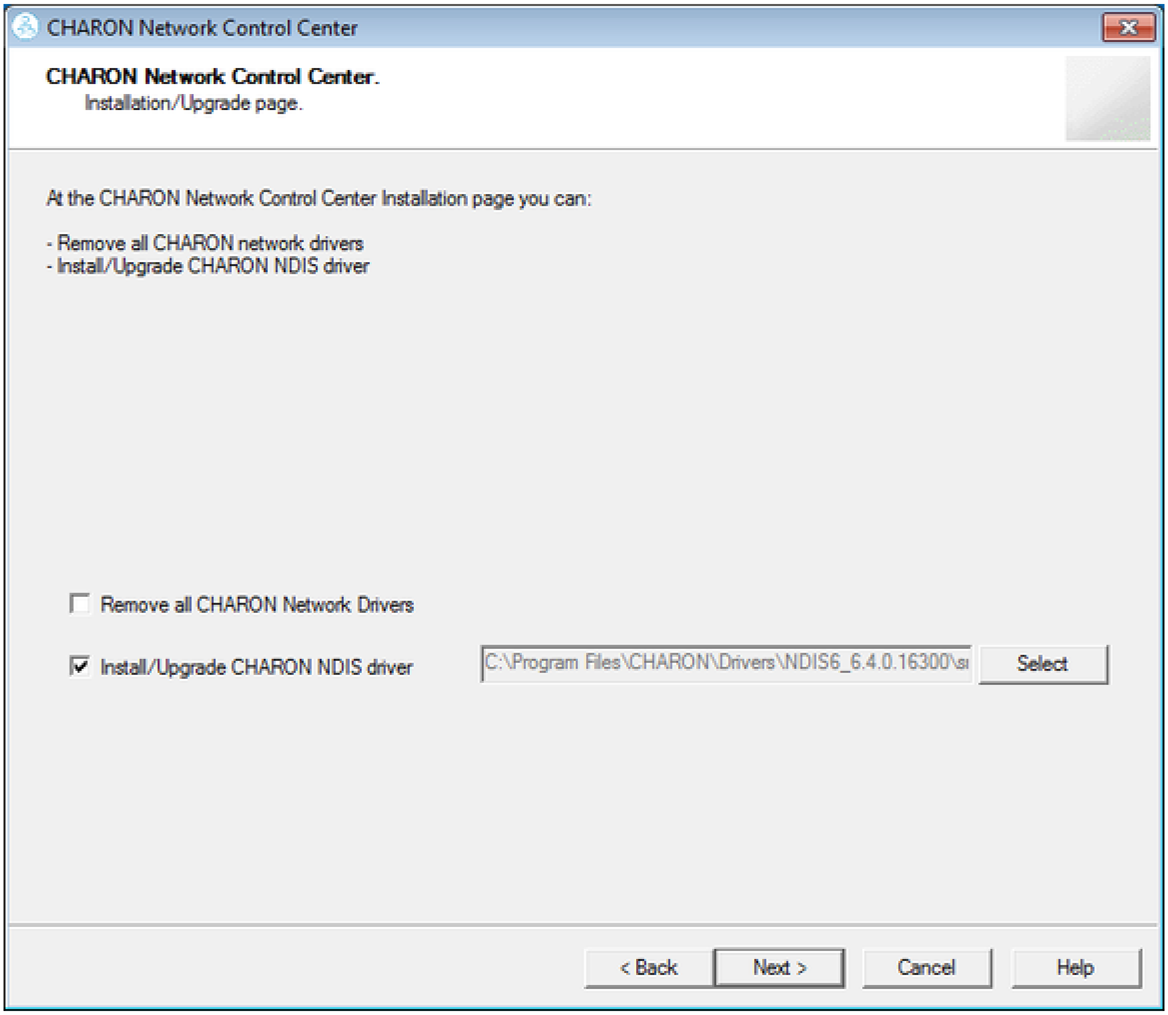


Driver details:

C:\Program Files\CHARON\Drivers\NDIS6_6.4.0.16300\sripac
Build: 04/01/2014
Version: 6.4.0.16300

Provider info:
STROMASYS SA
CHARON Packet Protocol (NDIS6) v6.4
Protocol designed to work as part of CHARON network
CHARON Packet Protocol (NDIS6) v6.4

The Network Control Center will display the previous dialog with the path to the CHARON network driver. Press the "Next" button in the popup below to continue:



CHARON Network Control Center

CHARON Network Control Center.
Installation/Upgrade page.

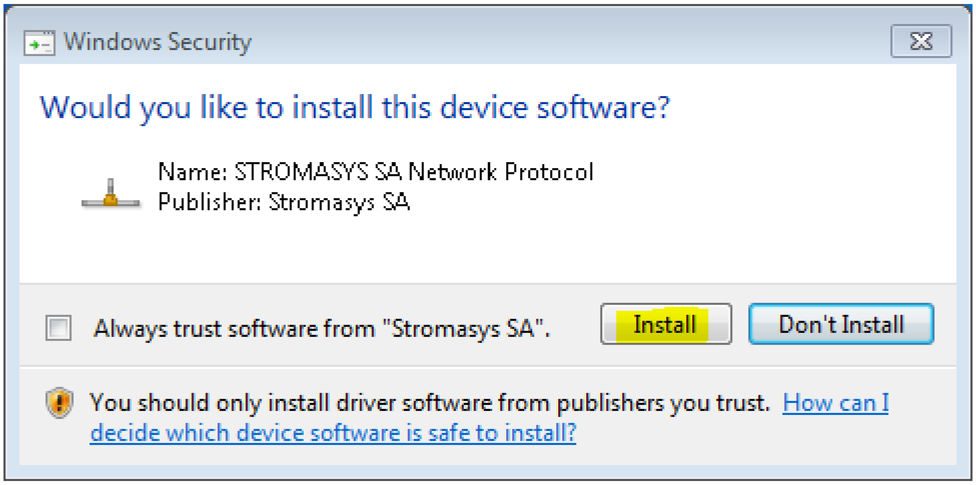
At the CHARON Network Control Center Installation page you can:

- Remove all CHARON network drivers
- Install/Upgrade CHARON NDIS driver

☐ Remove all CHARON Network Drivers

☑ Install/Upgrade CHARON NDIS driver   C:\Program Files\CHARON\Drivers\NDIS6_6.4.0.16300\s

The utility will begin the CHARON network driver installation. If Windows Security asks you to confirm the driver installation, press the "Install" button:



Windows Security

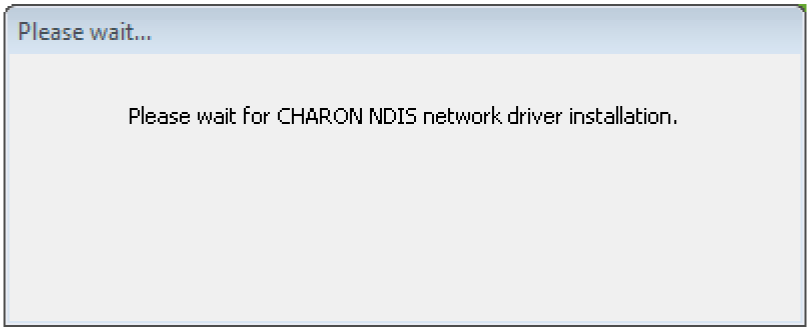
Would you like to install this device software?

Name: STROMASYS SA Network Protocol
Publisher: Stromasys SA

☐ Always trust software from "Stromasys SA".

You should only install driver software from publishers you trust. How can I decide which device software is safe to install?

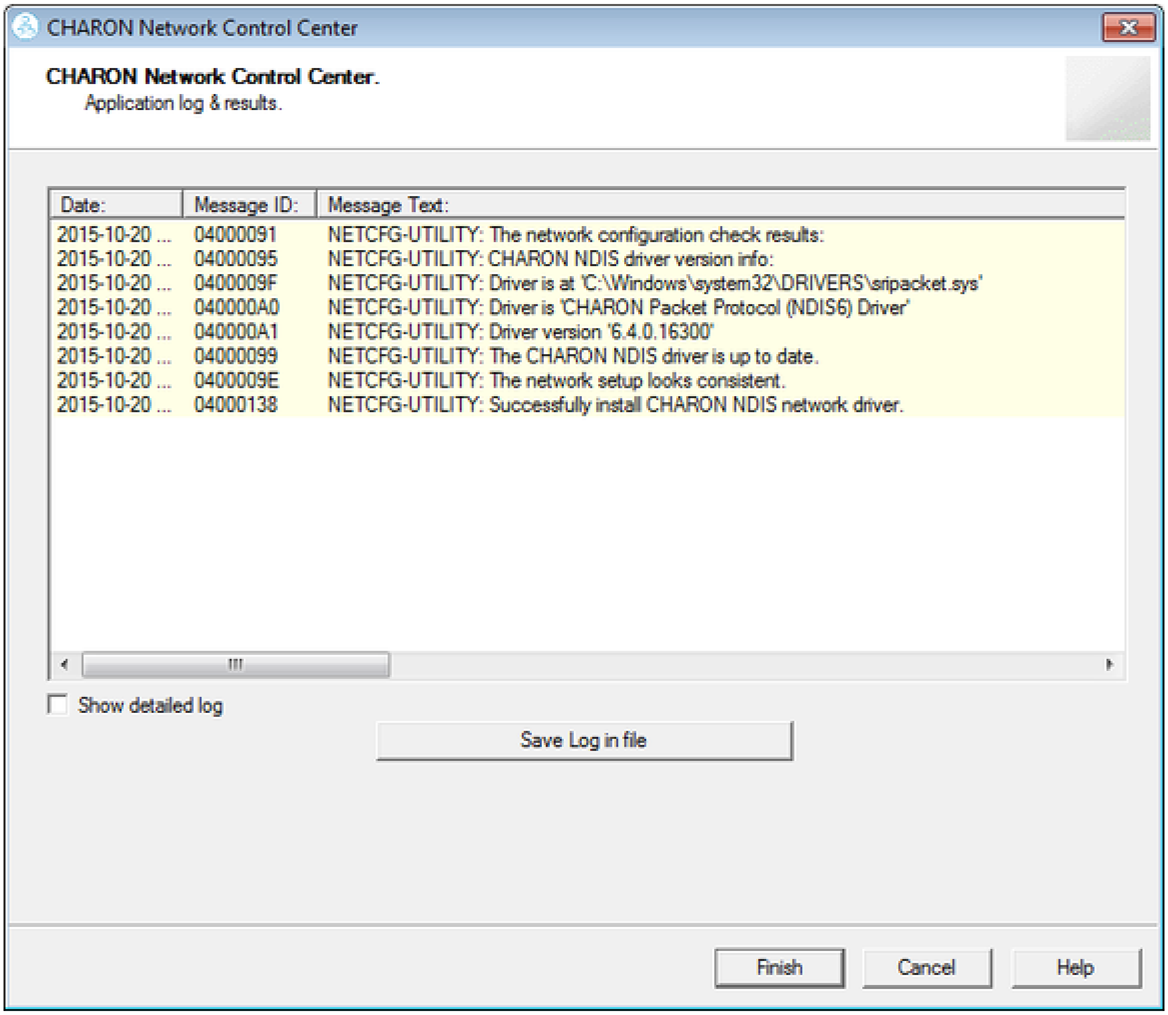
The driver installation will resume:



Please wait...

Please wait for CHARON NDIS network driver installation.

At the completion of the network installation procedure, the utility will display the following log:



CHARON Network Control Center

CHARON Network Control Center.
Application log & results.

```
Date:          Message ID:   Message Text:
2015-10-20 ... 04000091      NETCFG-UTILITY: The network configuration check results:
2015-10-20 ... 04000095      NETCFG-UTILITY: CHARON NDIS driver version info:
2015-10-20 ... 0400009F      NETCFG-UTILITY: Driver is at 'C:\Windows\system32\DRIVERS\sripacket.sys'
2015-10-20 ... 040000A0      NETCFG-UTILITY: Driver is 'CHARON Packet Protocol (NDIS6) Driver'
2015-10-20 ... 040000A1      NETCFG-UTILITY: Driver version '6.4.0.16300'
2015-10-20 ... 04000099      NETCFG-UTILITY: The CHARON NDIS driver is up to date.
2015-10-20 ... 0400009E      NETCFG-UTILITY: The network setup looks consistent.
2015-10-20 ... 04000138      NETCFG-UTILITY: Successfully install CHARON NDIS network driver.
```

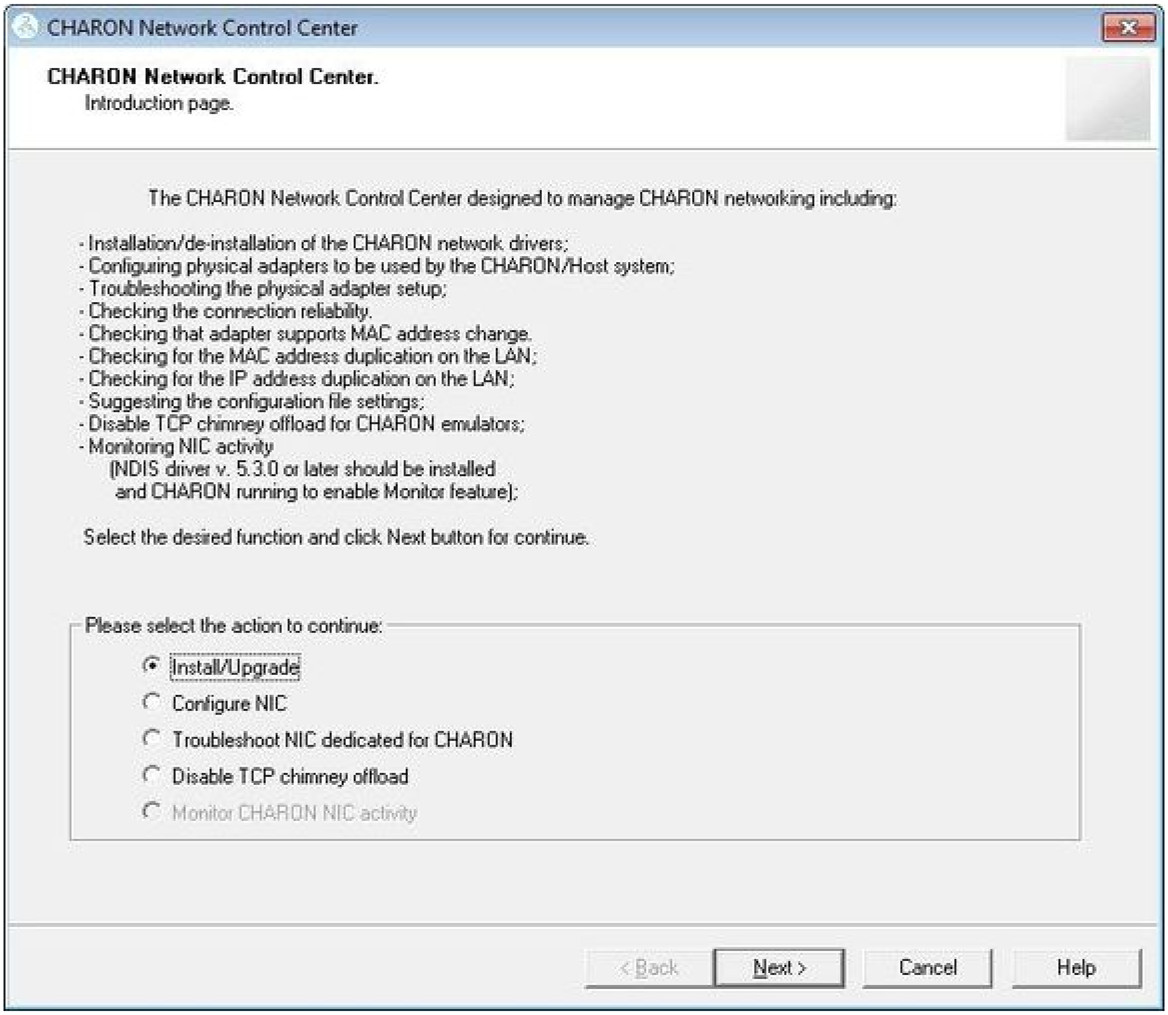
Review the log, make sure it is correct. You can save the log to a file by pressing the "Save Log in file" button in case the log file has to be sent to Stromasys Customer Support.

Select "Show detailed log" to display more detail.

Press the "Finish" button to exit.

Deinstallation of the CHARON network driver

Start the utility and select "Install/Upgrade"; press the "Next" button:



CHARON Network Control Center.
Introduction page.

The CHARON Network Control Center designed to manage CHARON networking including:

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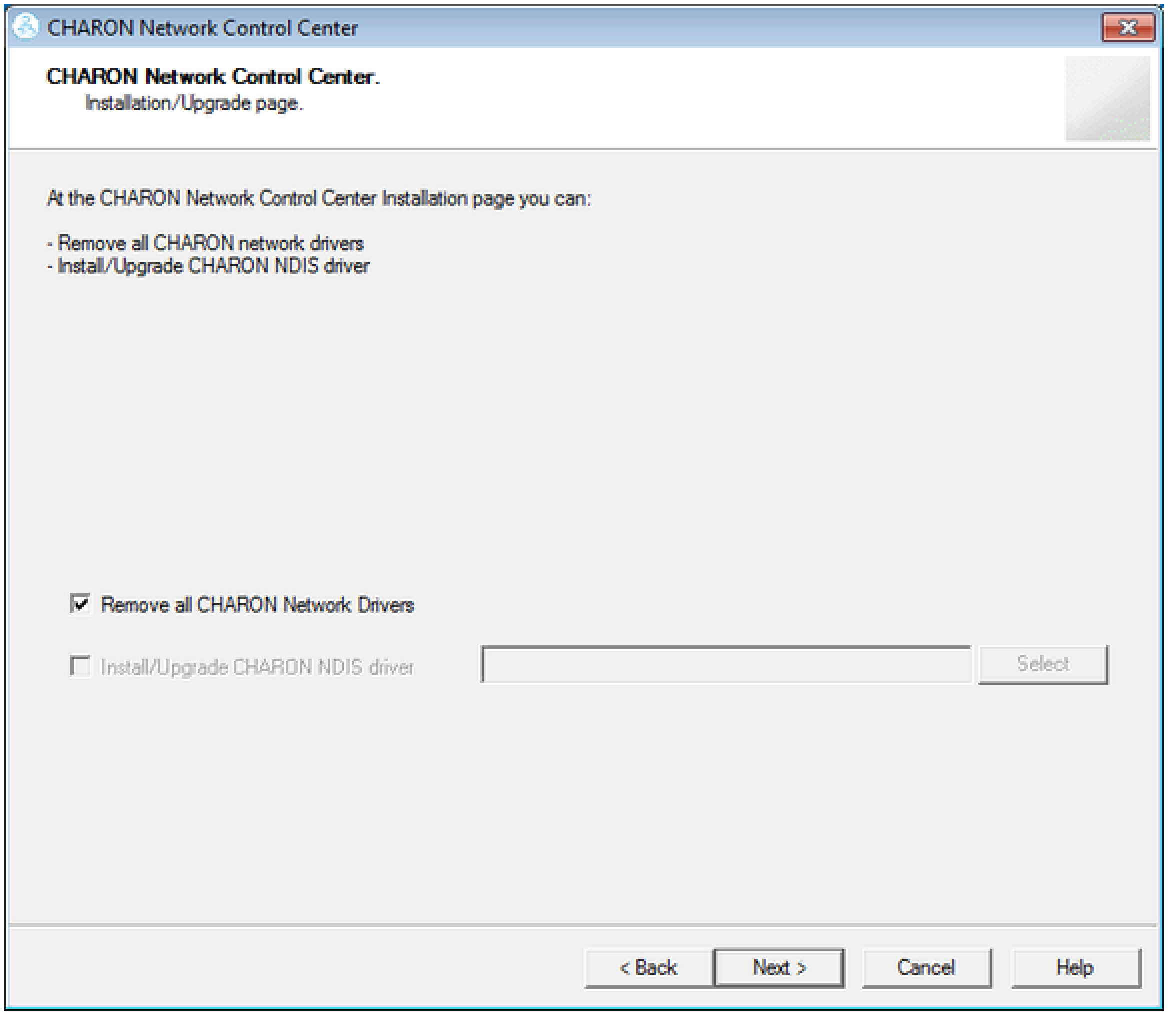
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

● Install/Upgrade
○ Configure NIC
○ Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload
○ Monitor CHARON NIC activity

Select "Remove all CHARON Network Drivers" and press the "Next" button:



CHARON Network Control Center

CHARON Network Control Center.
Installation/Upgrade page.

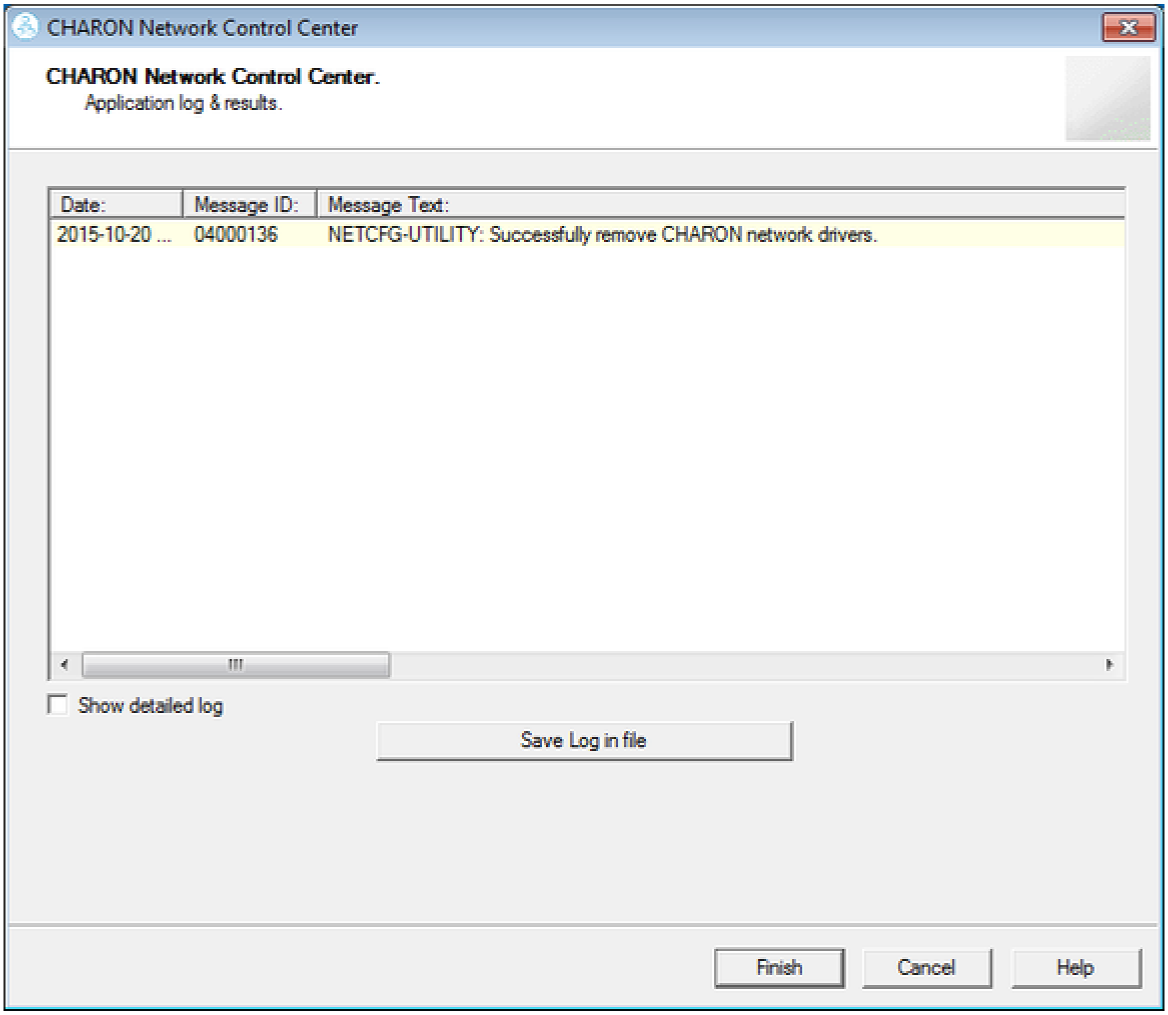
At the CHARON Network Control Center Installation page you can:

- Remove all CHARON network drivers
- Install/Upgrade CHARON NDIS driver

☑ Remove all CHARON Network Drivers

□ Install/Upgrade CHARON NDIS driver

The utility will report that the CHARON drivers have been removed:

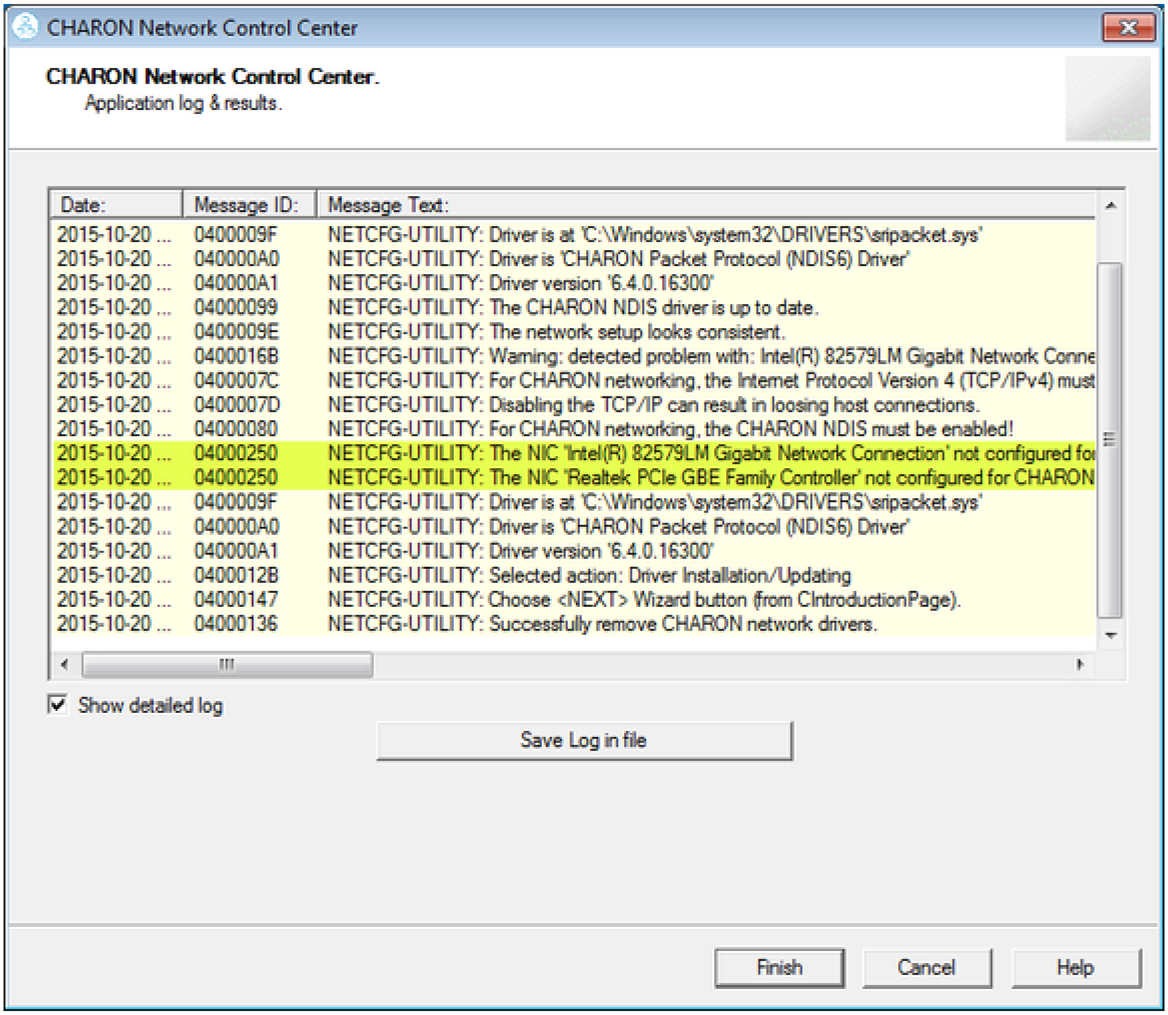

CHARON Network Control Center
CHARON Network Control Center.
Application log & results.
Show detailed log
Save Log in file
Finish
Cancel
Help

Date:	Message ID:	Message Text:
2015-10-20 ...	04000136	NETCFG-UTILITY: Successfully remove CHARON network drivers.

☐ Show detailed log

Review the log for errors. You can save the log to a file by pressing the "Save Log in file" button in case the log file has to be sent to Stromasys Customer Support.

Select "Show detailed log" to display more detail.



CHARON Network Control Center.
Application log & results.

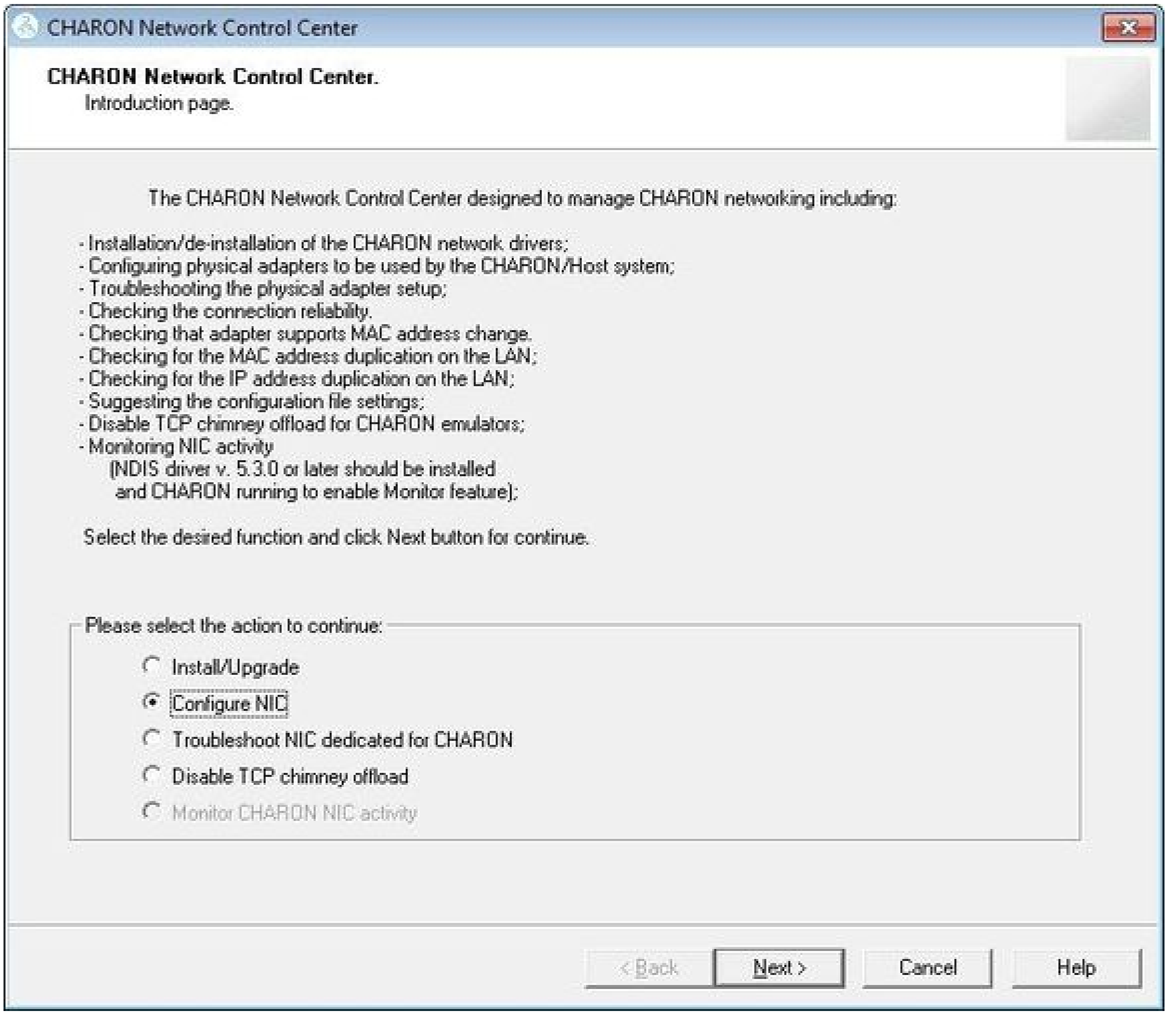
Date:	Message ID:	Message Text:
2015-10-20 ...	0400009F	NETCFG-UTILITY: Driver is at 'C:\Windows\system32\DRIVERS\sripacket.sys'
2015-10-20 ...	040000A0	NETCFG-UTILITY: Driver is 'CHARON Packet Protocol (NDIS6) Driver'
2015-10-20 ...	040000A1	NETCFG-UTILITY: Driver version '6.4.0.16300'
2015-10-20 ...	04000099	NETCFG-UTILITY: The CHARON NDIS driver is up to date.
2015-10-20 ...	0400009E	NETCFG-UTILITY: The network setup looks consistent.
2015-10-20 ...	0400016B	NETCFG-UTILITY: Warning: detected problem with: Intel(R) 82579LM Gigabit Network Conne
2015-10-20 ...	0400007C	NETCFG-UTILITY: For CHARON networking, the Internet Protocol Version 4 (TCP/IPv4) must
2015-10-20 ...	0400007D	NETCFG-UTILITY: Disabling the TCP/IP can result in loosing host connections.
2015-10-20 ...	04000080	NETCFG-UTILITY: For CHARON networking, the CHARON NDIS must be enabled!
2015-10-20 ...	04000250	NETCFG-UTILITY: The NIC 'Intel(R) 82579LM Gigabit Network Connection' not configured for
2015-10-20 ...	04000250	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' not configured for CHARON
2015-10-20 ...	0400009F	NETCFG-UTILITY: Driver is at 'C:\Windows\system32\DRIVERS\sripacket.sys'
2015-10-20 ...	040000A0	NETCFG-UTILITY: Driver is 'CHARON Packet Protocol (NDIS6) Driver'
2015-10-20 ...	040000A1	NETCFG-UTILITY: Driver version '6.4.0.16300'
2015-10-20 ...	0400012B	NETCFG-UTILITY: Selected action: Driver Installation/Updating
2015-10-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CIntroductionPage).
2015-10-20 ...	04000136	NETCFG-UTILITY: Successfully remove CHARON network drivers.

☑ Show detailed log

Press the "Finish" button to exit.

Configuring the host network interfaces for CHARON

Start the utility, select "Configure NIC" and press the "Next" button:



CHARON Network Control Center.
Introduction page.

The CHARON Network Control Center designed to manage CHARON networking including:

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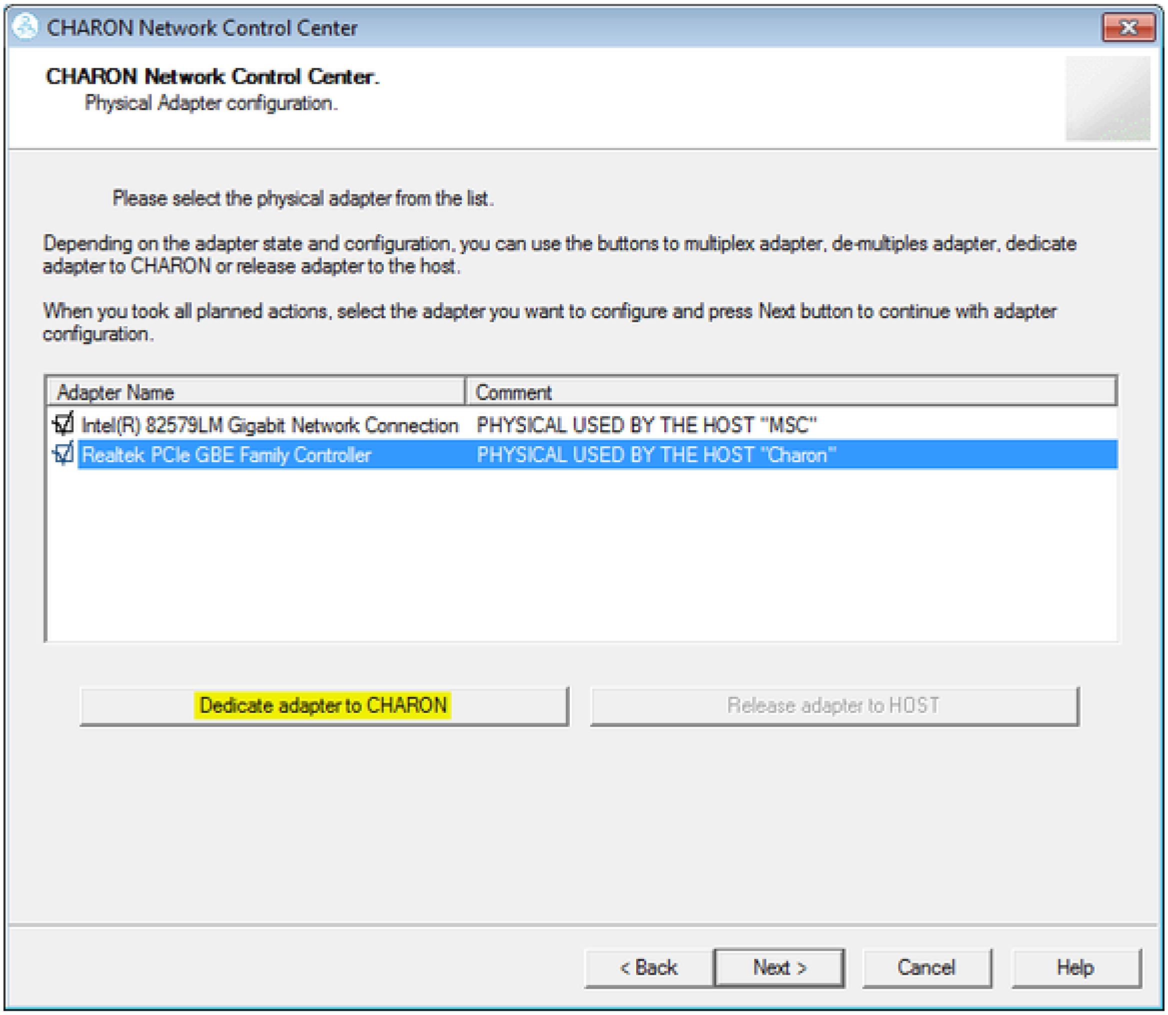
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

○ Install/Upgrade
● Configure NIC
○ Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload
○ Monitor CHARON NIC activity

Select the host interface to be dedicated to CHARON (in the example below its name is "Charon"), press the "Dedicate adapter to CHARON" button:



CHARON Network Control Center.
Physical Adapter configuration.

Please select the physical adapter from the list.

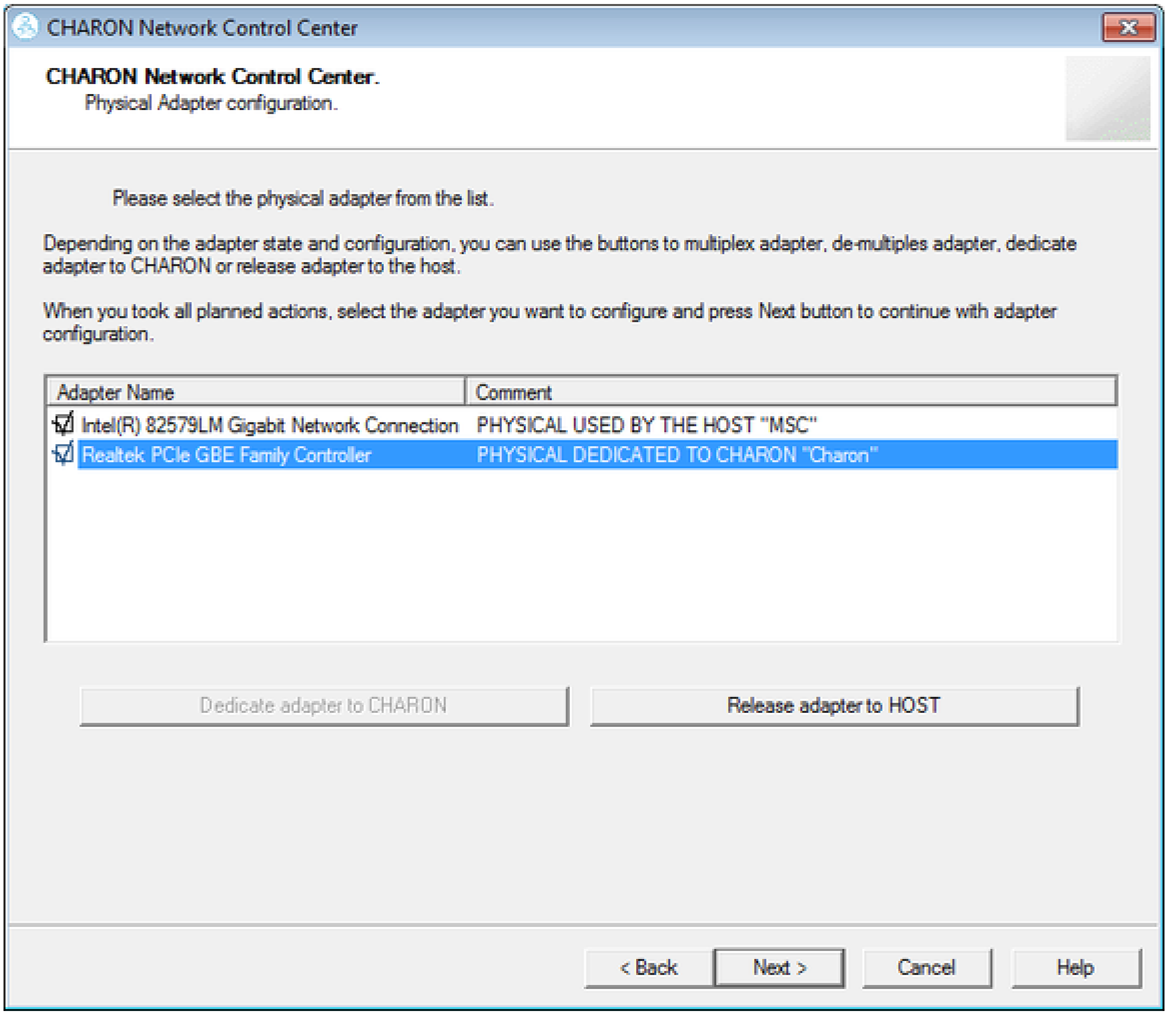
Depending on the adapter state and configuration, you can use the buttons to multiplex adapter, de-multiples adapter, dedicate adapter to CHARON or release adapter to the host.

When you took all planned actions, select the adapter you want to configure and press Next button to continue with adapter configuration.

Adapter Name	Comment
☑ Intel(R) 82579LM Gigabit Network Connection	PHYSICAL USED BY THE HOST "MSC"
☑ Realtek PCIe GBE Family Controller	PHYSICAL USED BY THE HOST "Charon"

Install and configure VLAN adapters, according to the vendor's User's Guide, if required. Select the VLAN adapter in the dialog box in the above example. A VLAN adapter is not configured differently, the same procedure should be followed.

The Network Control Center will dedicate the selected adapter to CHARON. Press the "Next" button.



CHARON Network Control Center

CHARON Network Control Center.
Physical Adapter configuration.

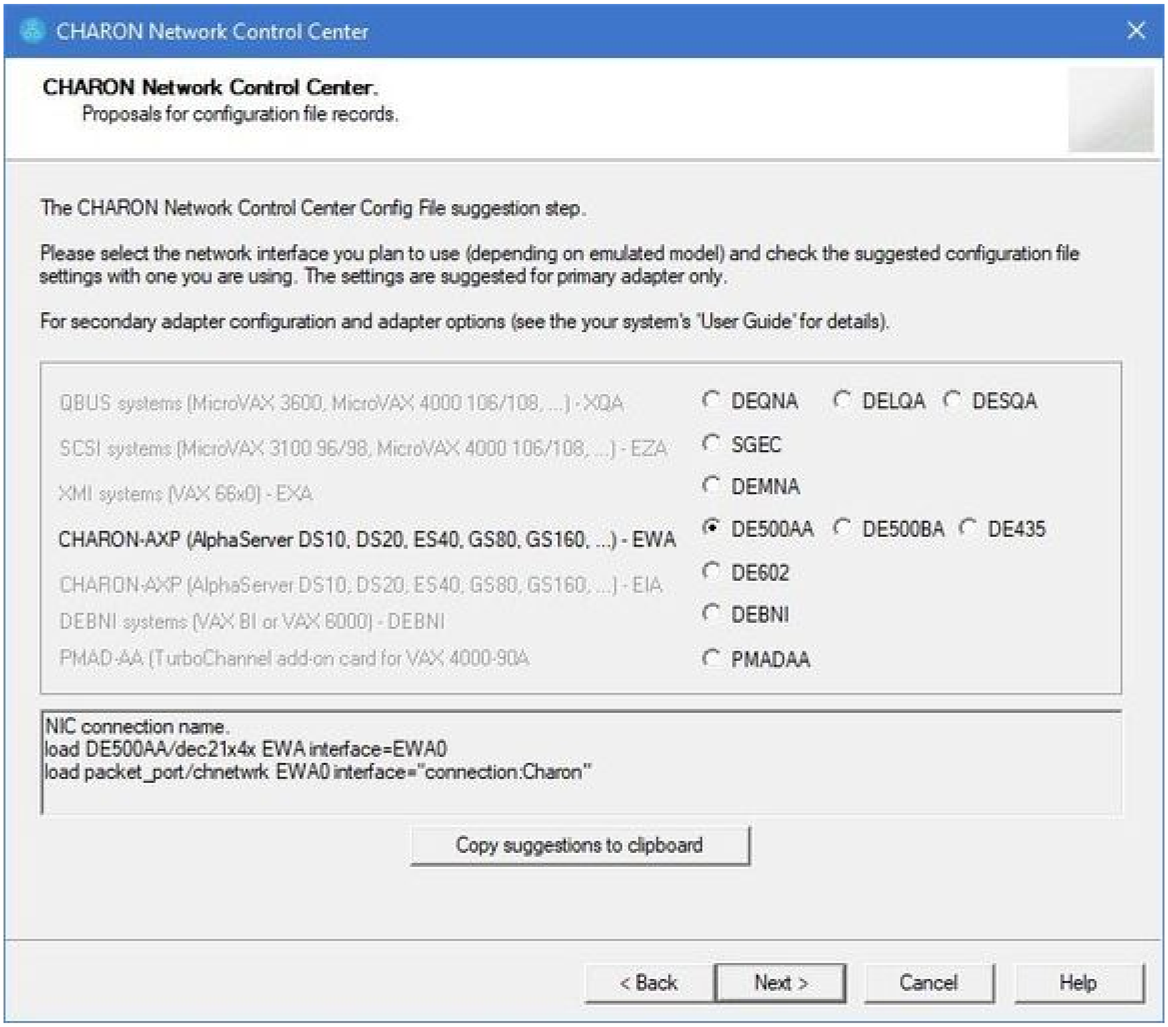
Please select the physical adapter from the list.

Depending on the adapter state and configuration, you can use the buttons to multiplex adapter, de-multiples adapter, dedicate adapter to CHARON or release adapter to the host.

When you took all planned actions, select the adapter you want to configure and press Next button to continue with adapter configuration.

Adapter Name	Comment
Intel(R) 82579LM Gigabit Network Connection	PHYSICAL USED BY THE HOST "MSC"
Realtek PCIe GBE Family Controller	PHYSICAL DEDICATED TO CHARON "Charon"

The next dialog helps to define the correct lines for the CHARON configuration file. Select the target emulated network adapter and press the "Copy suggestions to clipboard" button:



CHARON Network Control Center

CHARON Network Control Center.
Proposals for configuration file records.

The CHARON Network Control Center Config File suggestion step.

Please select the network interface you plan to use (depending on emulated model) and check the suggested configuration file settings with one you are using. The settings are suggested for primary adapter only.

For secondary adapter configuration and adapter options (see the your system's 'User Guide' for details).

QBUS systems (MicroVAX 3600, MicroVAX 4000 106/108, ...) - XQA	○ DEQNA ○ DELQA ○ DESQA
SCSI systems (MicroVAX 3100 96/98, MicroVAX 4000 106/108, ...) - EZA	○ SGEC
XMI systems (VAX 66x0) - EXA	○ DEMNA
CHARON-AXP (AlphaServer DS10, DS20, ES40, GS80, GS160, ...) - EWA	● DE500AA ○ DE500BA ○ DE435
CHARON-AXP (AlphaServer DS10, DS20, ES40, GS80, GS160, ...) - EIA	○ DE602
DEBNI systems (VAX BI or VAX 6000) - DEBNI	○ DEBNI
PMAD-AA (TurboChannel add-on card for VAX 4000-90A	○ PMADAA

```
NIC connection name.
load DE500AA/dec21x4x EWA interface=EWA0
load packet_port/chnetwrk EWA0 interface="connection:Charon"
```

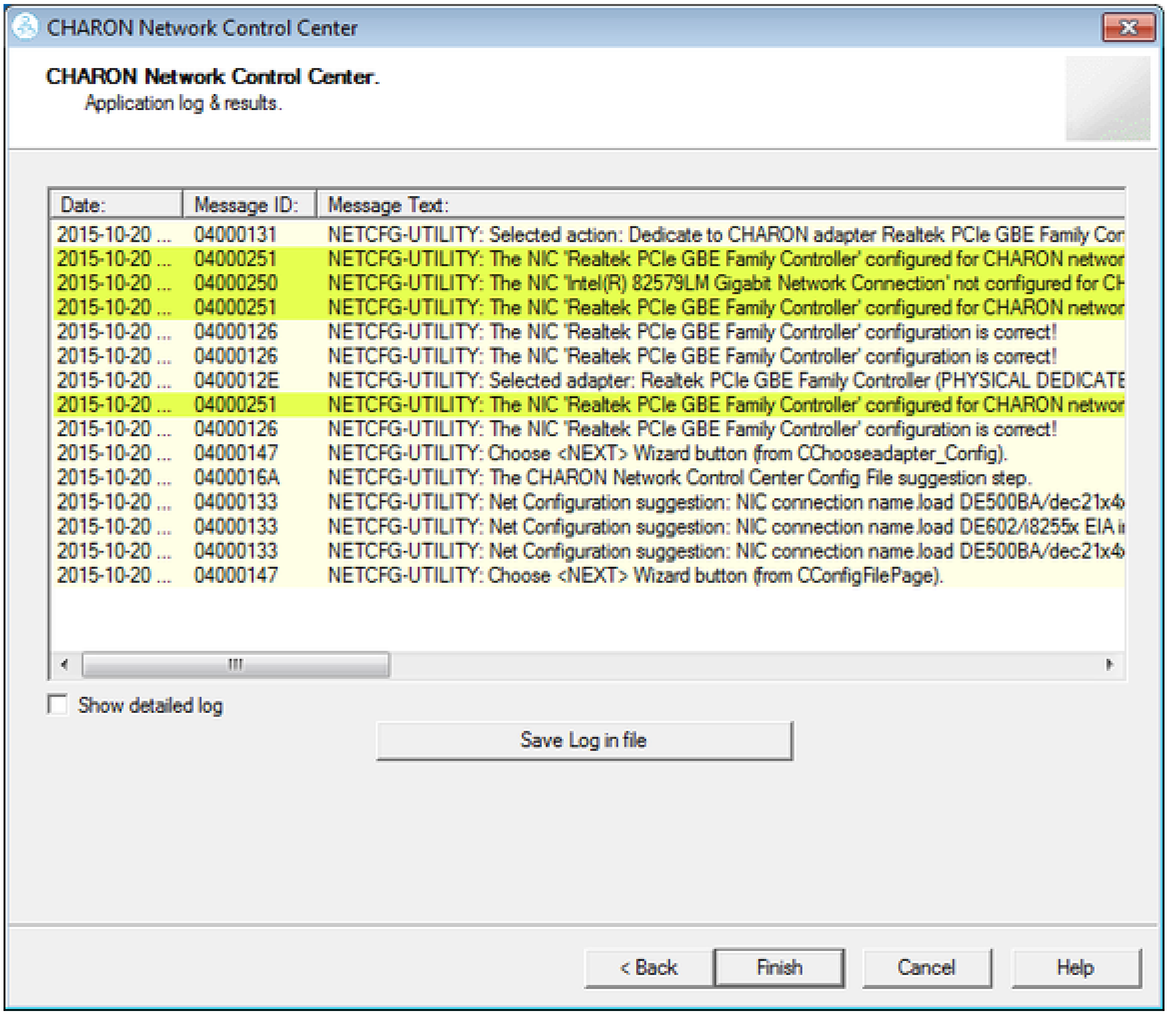
It is possible to paste the content of the clipboard to the CHARON configuration file as shown in the example below:

```
...

load DE500BA/dec21x4x EWA interface=EWA0
load packet_port/chnetwrk EWA0 interface="(disabled)"
load packet_port/chnetwrk EWA0 interface="connection:Charon"

...
```

Press the "Next" button to see the log file:


CHARON Network Control Center
CHARON Network Control Center.
Application log & results.
□ Show detailed log
Save Log in file
< Back
Finish
Cancel
Help

Date:	Message ID:	Message Text:
2015-10-20 ...	04000131	NETCFG-UTILITY: Selected action: Dedicate to CHARON adapter Realtek PCIe GBE Family Cor
2015-10-20 ...	04000251	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configured for CHARON networ
2015-10-20 ...	04000250	NETCFG-UTILITY: The NIC 'Intel(R) 82579LM Gigabit Network Connection' not configured for CH
2015-10-20 ...	04000251	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configured for CHARON networ
2015-10-20 ...	04000126	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configuration is correct!
2015-10-20 ...	04000126	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configuration is correct!
2015-10-20 ...	0400012E	NETCFG-UTILITY: Selected adapter: Realtek PCIe GBE Family Controller (PHYSICAL DEDICATE
2015-10-20 ...	04000251	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configured for CHARON networ
2015-10-20 ...	04000126	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configuration is correct!
2015-10-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CChooseadapter_Config).
2015-10-20 ...	0400016A	NETCFG-UTILITY: The CHARON Network Control Center Config File suggestion step.
2015-10-20 ...	04000133	NETCFG-UTILITY: Net Configuration suggestion: NIC connection name load DE500BA/dec21x4
2015-10-20 ...	04000133	NETCFG-UTILITY: Net Configuration suggestion: NIC connection name load DE602/i8255x EIA i
2015-10-20 ...	04000133	NETCFG-UTILITY: Net Configuration suggestion: NIC connection name load DE500BA/dec21x4
2015-10-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CConfigFilePage).

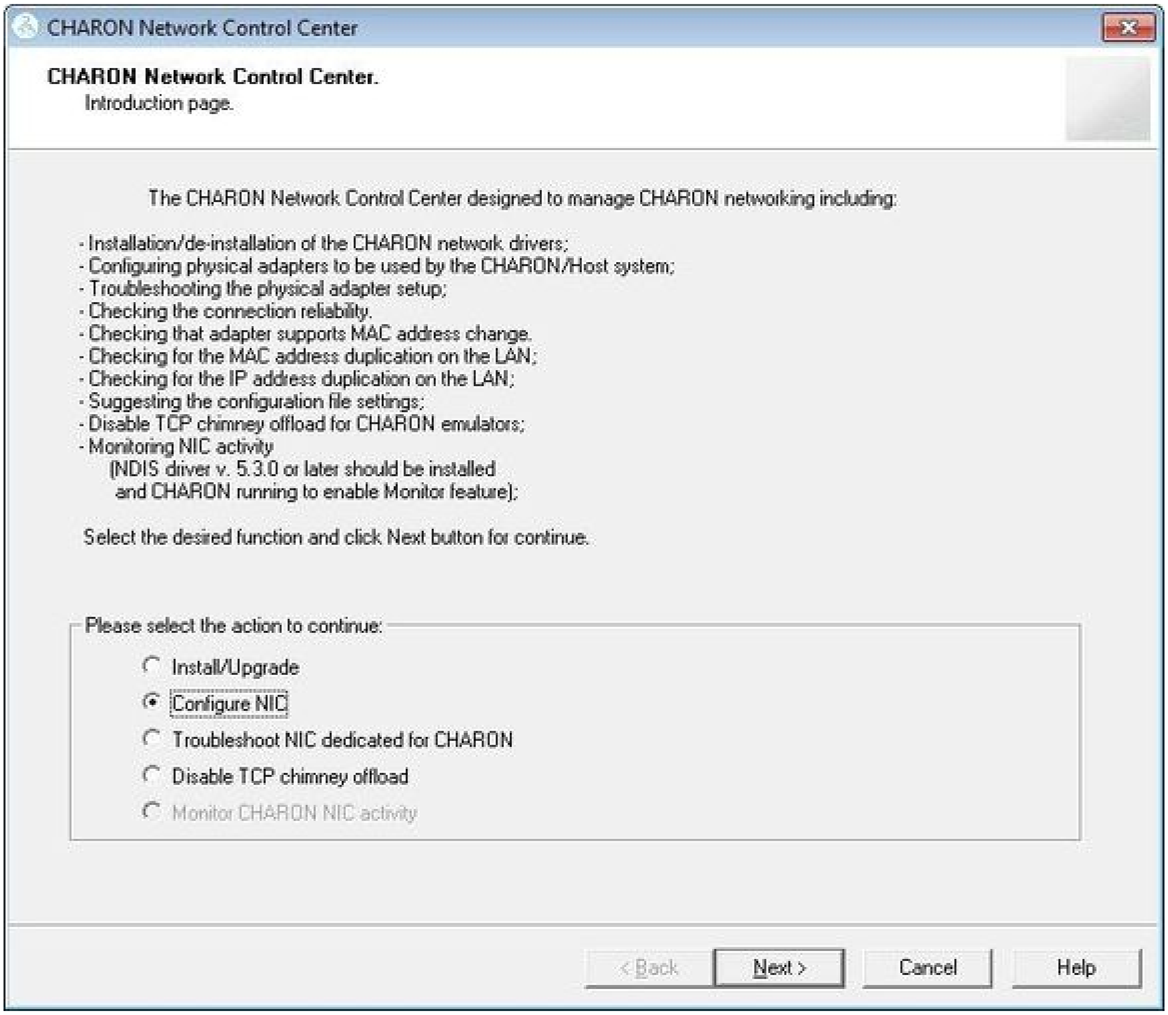
Review the log for errors. You can save the log to a file by pressing the "Save Log in file" button in case the log file has to be sent to Stromasys Customer Support.

Select "Show detailed log" to display more detail.

Press the "Finish" button to exit.

Release of the host network interfaces

Start the utility, select "Configure NIC" and press the "Next" button:



CHARON Network Control Center.
Introduction page.

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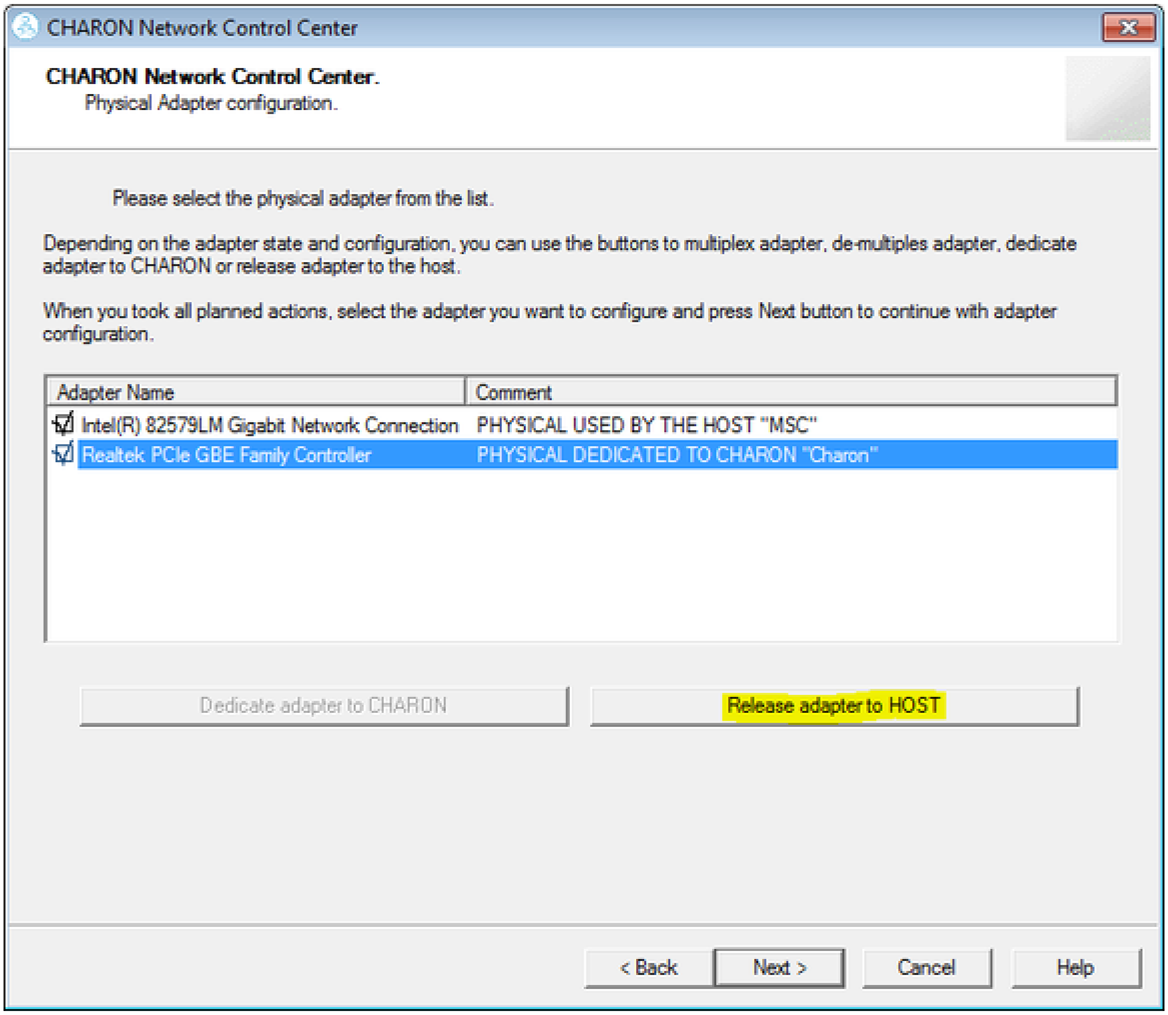
- Troubleshooting the physical adapter setup;
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

○ Install/Upgrade
● Configure NIC
○ Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload
○ Monitor CHARON NIC activity

Select the interface to be released back to the host (in the example below its name is "Charon"), press the "Release adapter to HOST" button:



CHARON Network Control Center

CHARON Network Control Center.
Physical Adapter configuration.

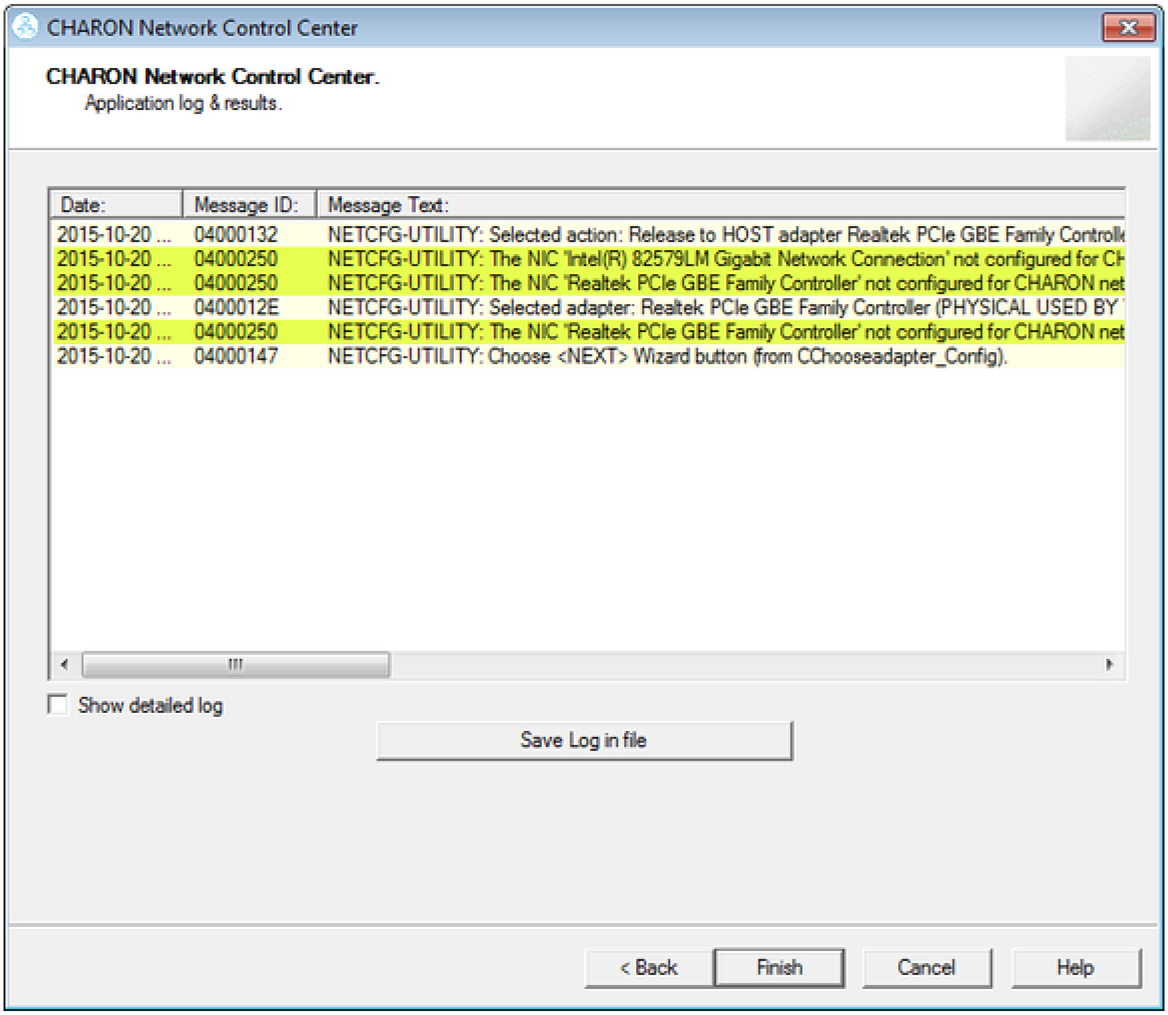
Please select the physical adapter from the list.

Depending on the adapter state and configuration, you can use the buttons to multiplex adapter, de-multiples adapter, dedicate adapter to CHARON or release adapter to the host.

When you took all planned actions, select the adapter you want to configure and press Next button to continue with adapter configuration.

Adapter Name	Comment
Intel(R) 82579LM Gigabit Network Connection	PHYSICAL USED BY THE HOST "MSC"
Realtek PCIe GBE Family Controller	PHYSICAL DEDICATED TO CHARON "Charon"

Press the "Next" button and review the log of this operation:


CHARON Network Control Center
CHARON Network Control Center.
Application log & results.
Show detailed log
Save Log in file
< Back
Finish
Cancel
Help

Date:	Message ID:	Message Text:
2015-10-20 ...	04000132	NETCFG-UTILITY: Selected action: Release to HOST adapter Realtek PCIe GBE Family Controlle
2015-10-20 ...	04000250	NETCFG-UTILITY: The NIC 'Intel(R) 82579LM Gigabit Network Connection' not configured for CH
2015-10-20 ...	04000250	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' not configured for CHARON net
2015-10-20 ...	0400012E	NETCFG-UTILITY: Selected adapter: Realtek PCIe GBE Family Controller (PHYSICAL USED BY '
2015-10-20 ...	04000250	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' not configured for CHARON net
2015-10-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CChooseadapter_Config).

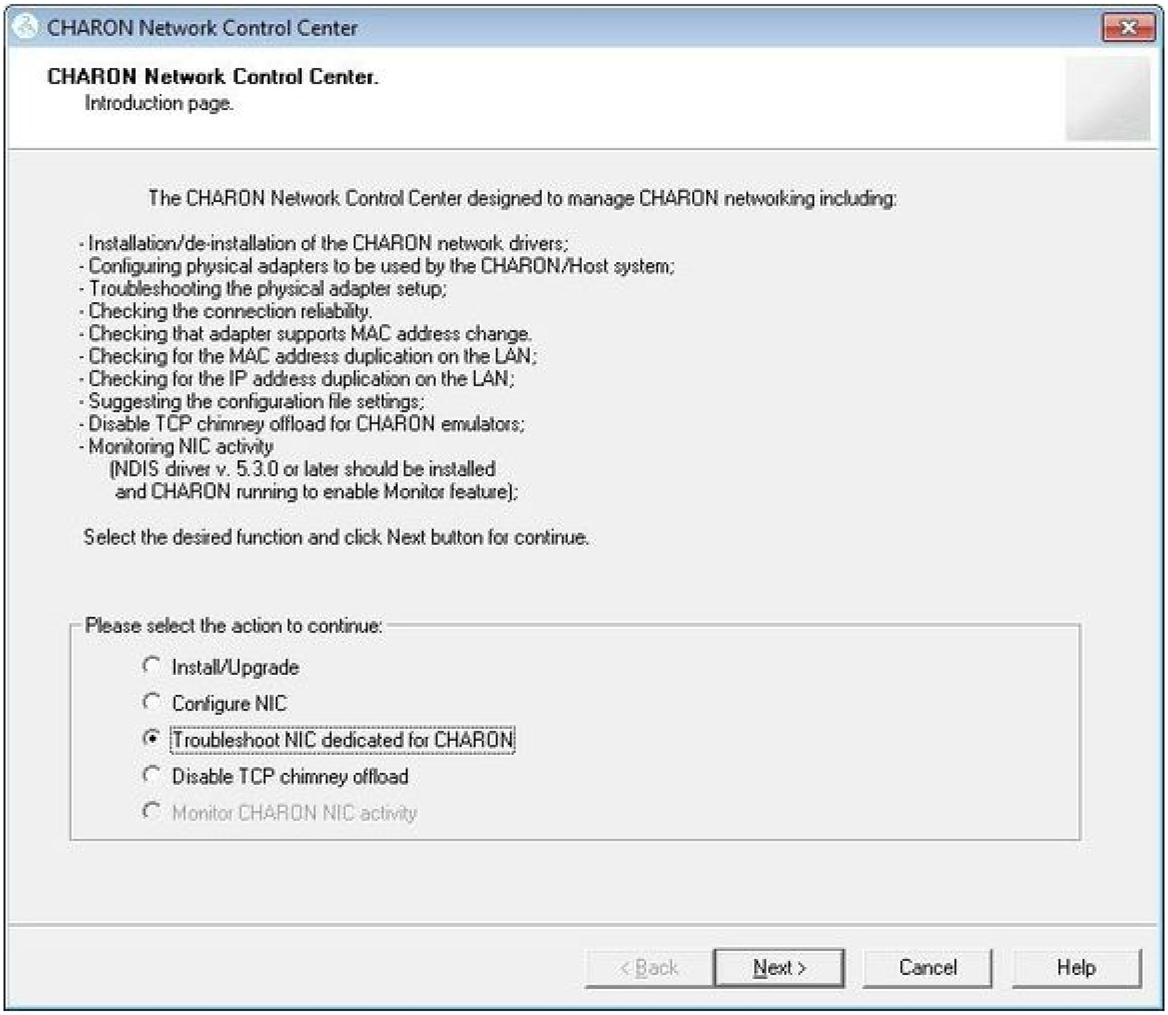
☐ Show detailed log

Select "Show detailed log" to display more detail.

Press the "Finish" button to exit.

Troubleshooting the CHARON network interfaces configuration

Start the utility, select "Troubleshoot NIC dedicated for CHARON" and press the "Next" button:



CHARON Network Control Center.

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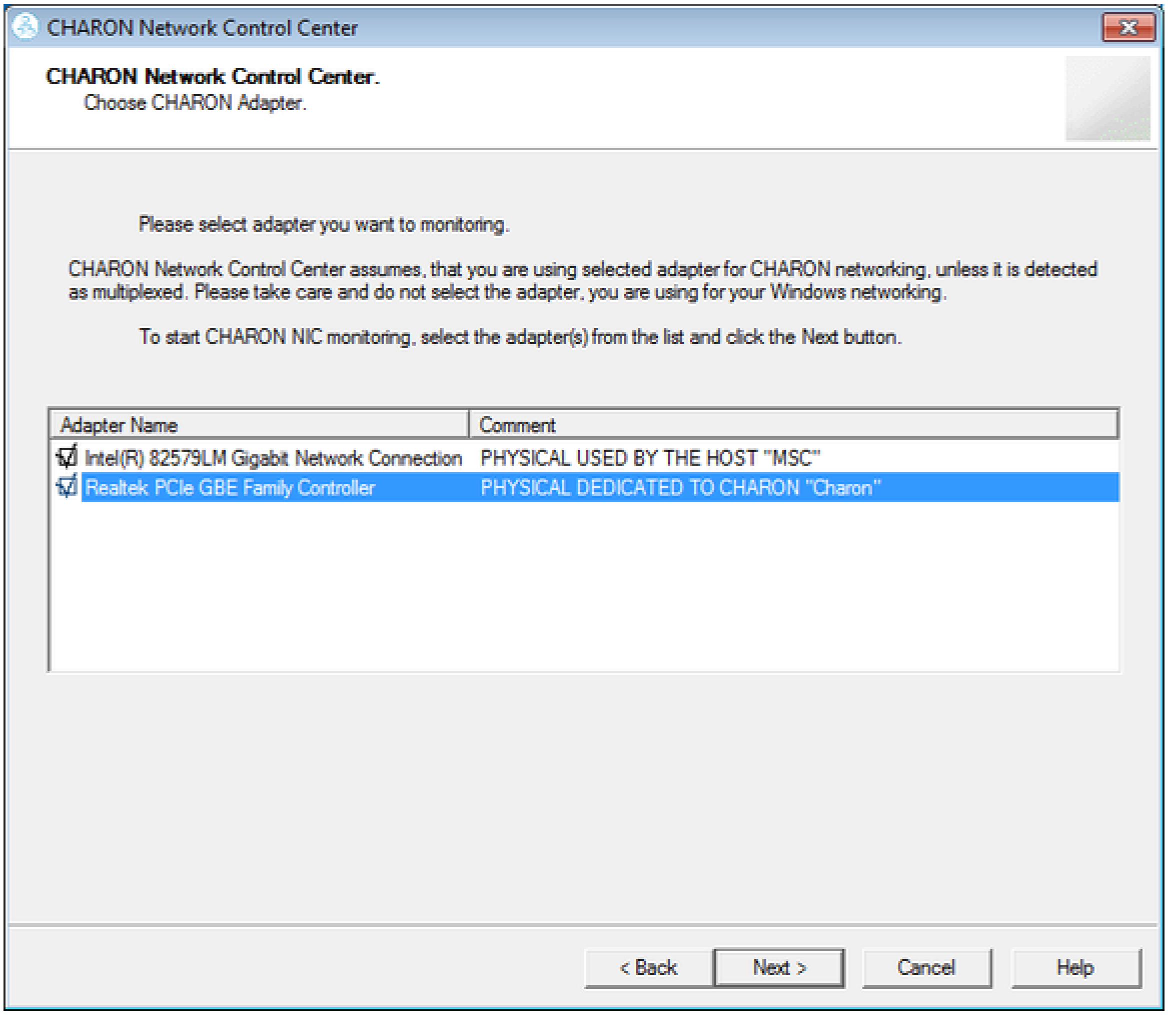
- Troubleshooting the physical adapter setup;
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

○ Install/Upgrade
○ Configure NIC
● Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload
○ Monitor CHARON NIC activity

Select the target interface and press the "Next" button:



CHARON Network Control Center.
Choose CHARON Adapter.

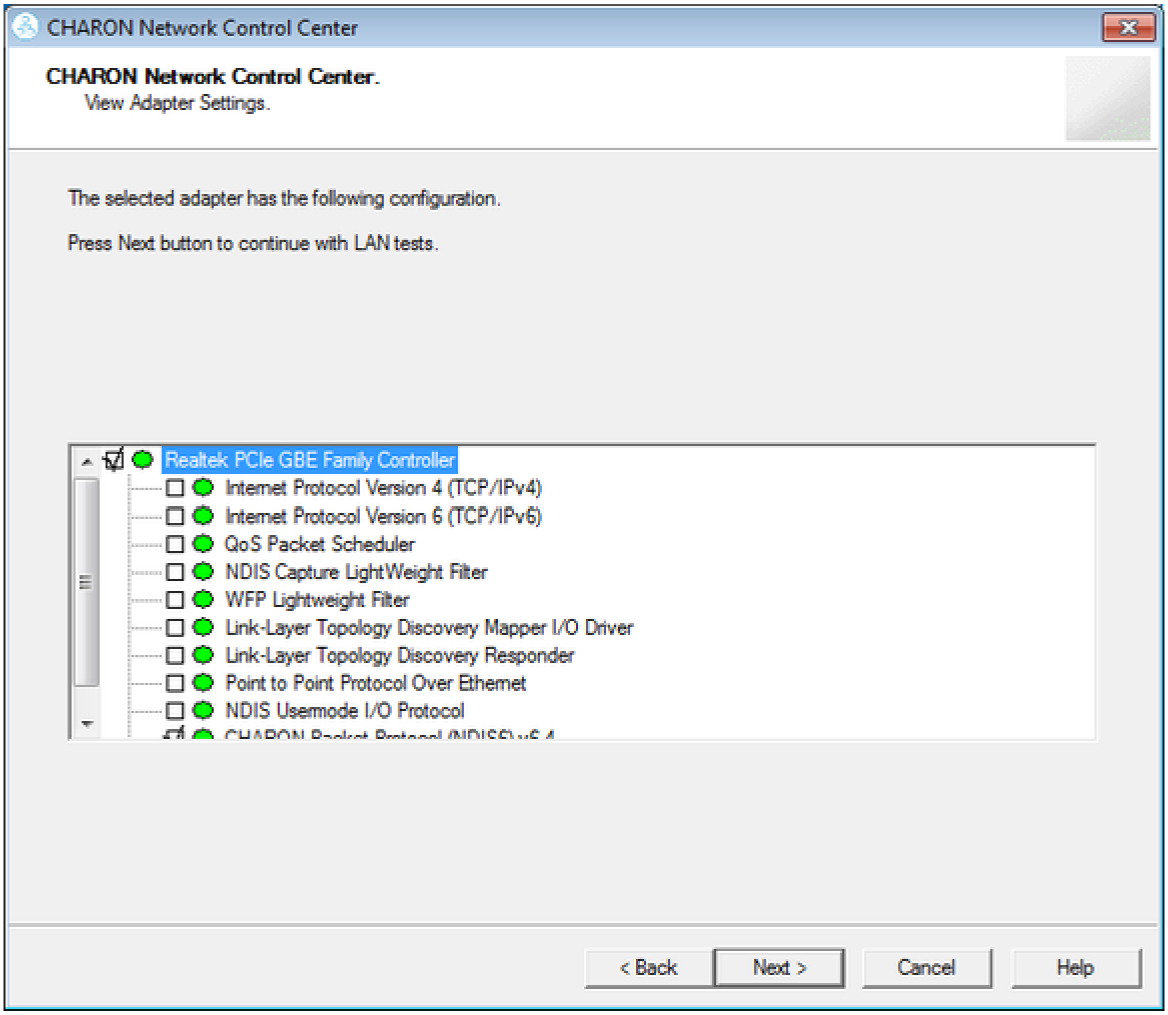
Please select adapter you want to monitoring.

CHARON Network Control Center assumes, that you are using selected adapter for CHARON networking, unless it is detected as multiplexed. Please take care and do not select the adapter, you are using for your Windows networking.

To start CHARON NIC monitoring, select the adapter(s) from the list and click the Next button.

Adapter Name	Comment
☑ Intel(R) 82579LM Gigabit Network Connection	PHYSICAL USED BY THE HOST "MSC"
☑ Realtek PCIe GBE Family Controller	PHYSICAL DEDICATED TO CHARON "Charon"

Review the status of the interface:



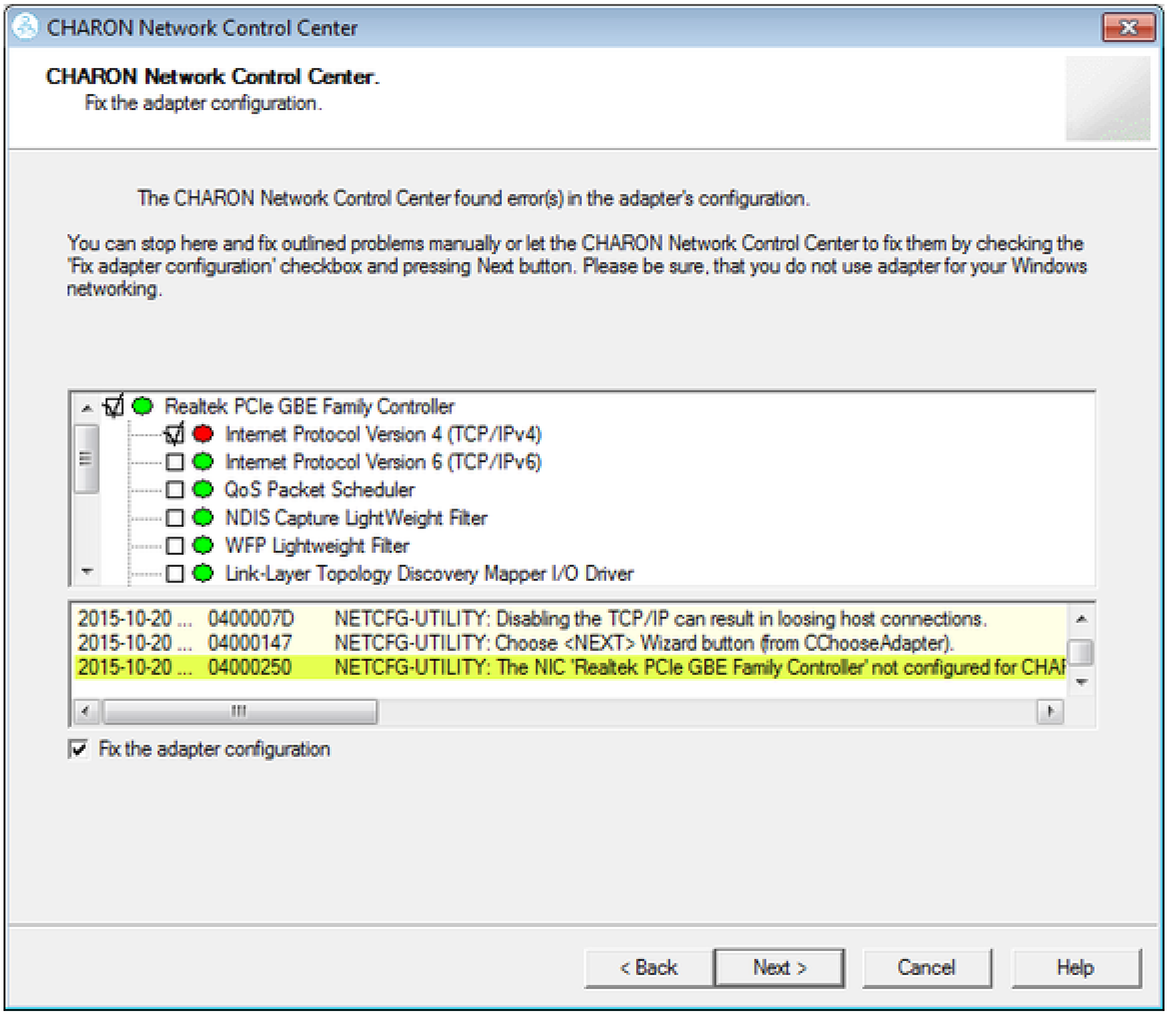
CHARON Network Control Center.
View Adapter Settings.

The selected adapter has the following configuration.

Press Next button to continue with LAN tests.

- ☑ ● Realtek PCIe GBE Family Controller
  - □ ● Internet Protocol Version 4 (TCP/IPv4)
  - □ ● Internet Protocol Version 6 (TCP/IPv6)
  - □ ● QoS Packet Scheduler
  - □ ● NDIS Capture LightWeight Filter
  - □ ● WFP Lightweight Filter
  - □ ● Link-Layer Topology Discovery Mapper I/O Driver
  - □ ● Link-Layer Topology Discovery Responder
  - □ ● Point to Point Protocol Over Ethernet
  - □ ● NDIS Usermode I/O Protocol
  - ☑ ● CHARON Packet Protocol (NDIS6) v6.4

In the example below, there is an issue with the host TCP/IP being enabled on the CHARON interface. Review the problem description, select "Fix the adapter configuration" then press the "Next" button.



CHARON Network Control Center.

Fix the adapter configuration.

The CHARON Network Control Center found error(s) in the adapter's configuration.

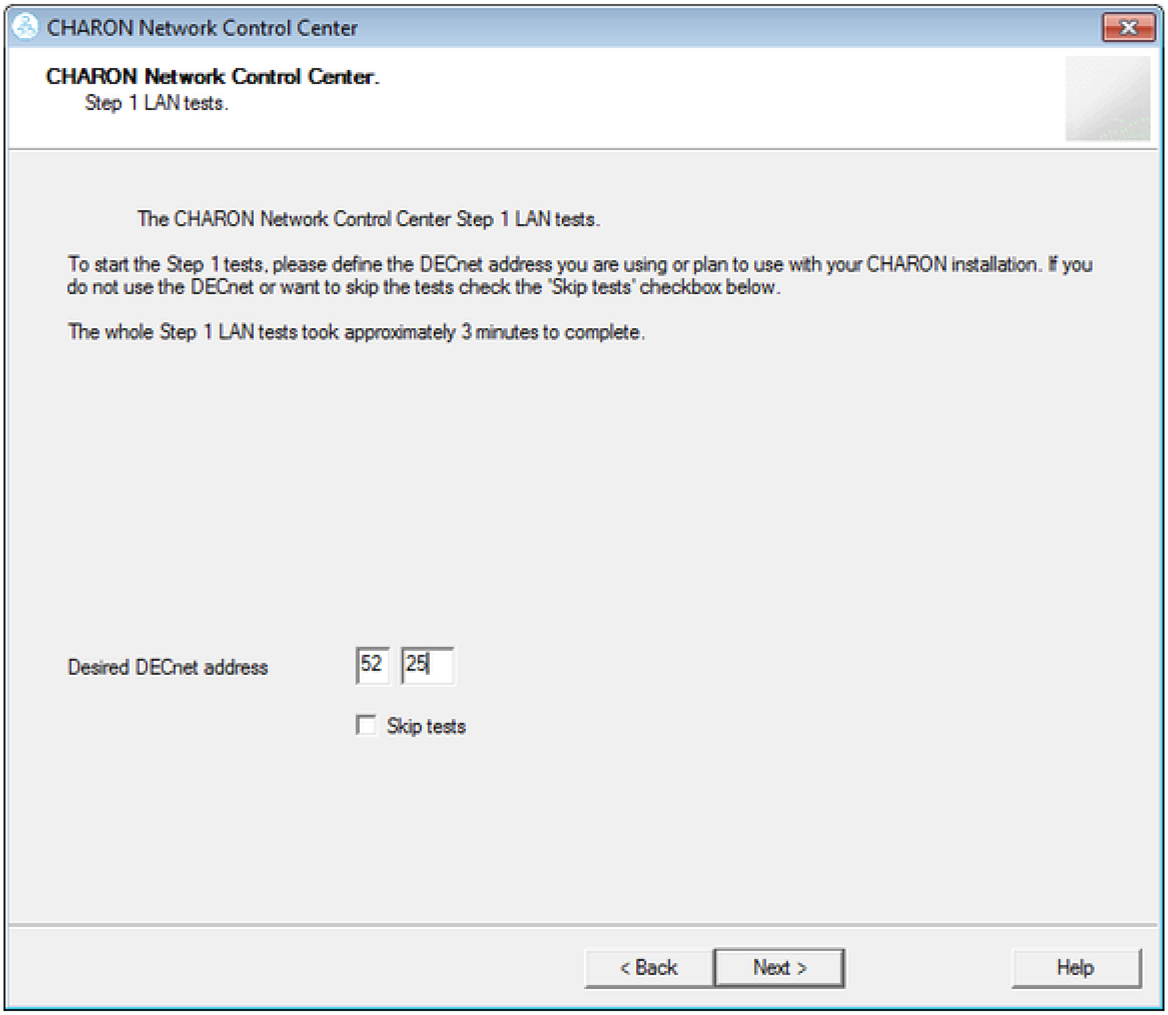
You can stop here and fix outlined problems manually or let the CHARON Network Control Center to fix them by checking the 'Fix adapter configuration' checkbox and pressing Next button. Please be sure, that you do not use adapter for your Windows networking.

- ☑ 🟢 Realtek PCIe GBE Family Controller
  - ☑ 🔴 Internet Protocol Version 4 (TCP/IPv4)
  - ☐ 🟢 Internet Protocol Version 6 (TCP/IPv6)
  - ☐ 🟢 QoS Packet Scheduler
  - ☐ 🟢 NDIS Capture LightWeight Filter
  - ☐ 🟢 WFP Lightweight Filter
  - ☐ 🟢 Link-Layer Topology Discovery Mapper I/O Driver

```
2015-10-20 ...   0400007D   NETCFG-UTILITY: Disabling the TCP/IP can result in loosing host connections.
2015-10-20 ...   04000147   NETCFG-UTILITY: Choose <NEXT> Wizard button (from CChooseAdapter).
2015-10-20 ...   04000250   NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' not configured for CHAF
```

☑ Fix the adapter configuration

The utility will fix issues and report a good status for the interface. Press the "Next" button, the following dialog will appear:



CHARON Network Control Center.
Step 1 LAN tests.

The CHARON Network Control Center Step 1 LAN tests.

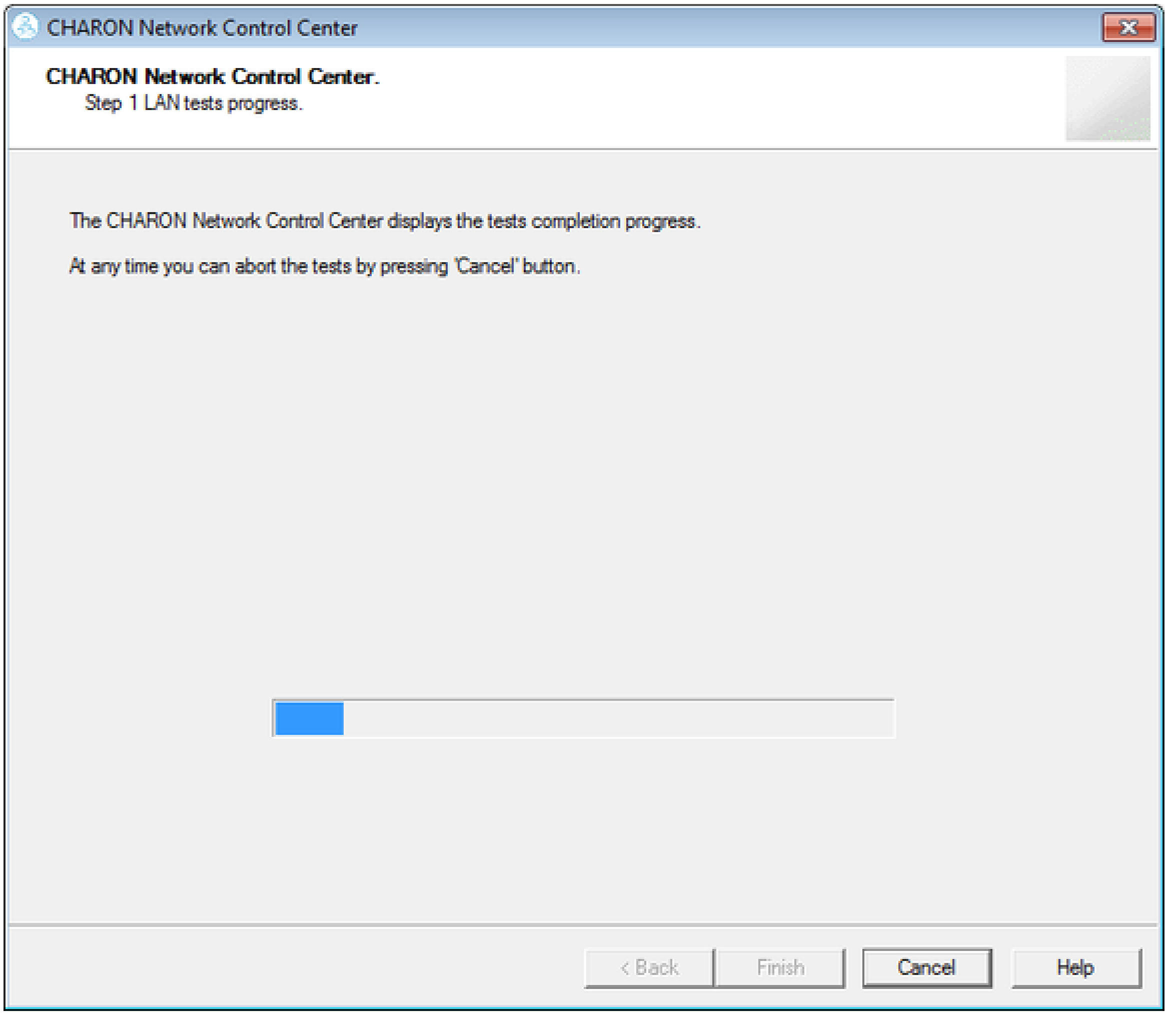
To start the Step 1 tests, please define the DECnet address you are using or plan to use with your CHARON installation. If you do not use the DECnet or want to skip the tests check the 'Skip tests' checkbox below.

The whole Step 1 LAN tests took approximately 3 minutes to complete.

Desired DECnet address 52 25

□ Skip tests

The Network Control Center offers to check whether the DECnet address, to be used by CHARON, is unique on the network in this step. Enter the desired DECnet address, for the CHARON guest, and press the "Next" button:



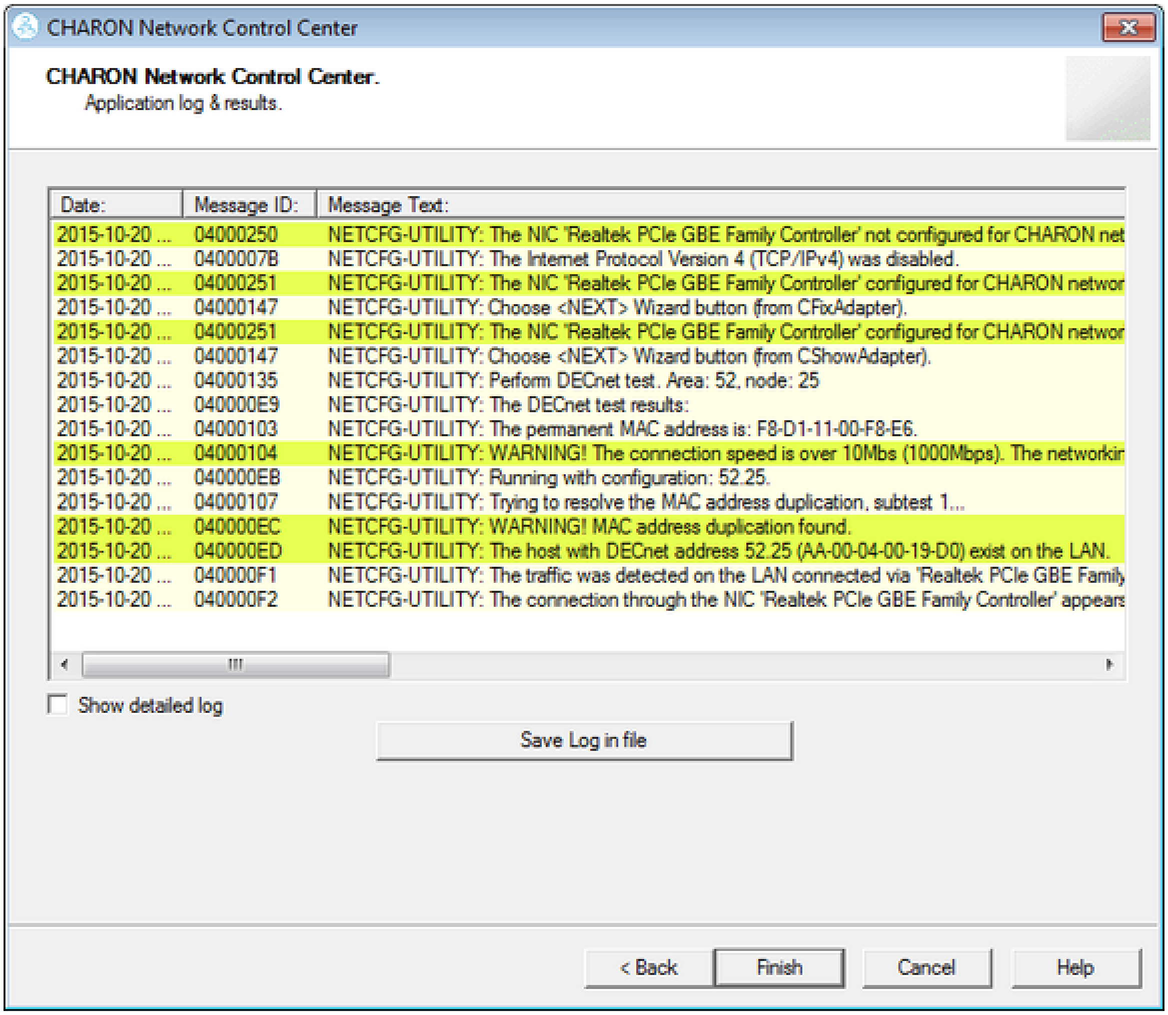
CHARON Network Control Center.

Step 1 LAN tests progress.

The CHARON Network Control Center displays the tests completion progress.

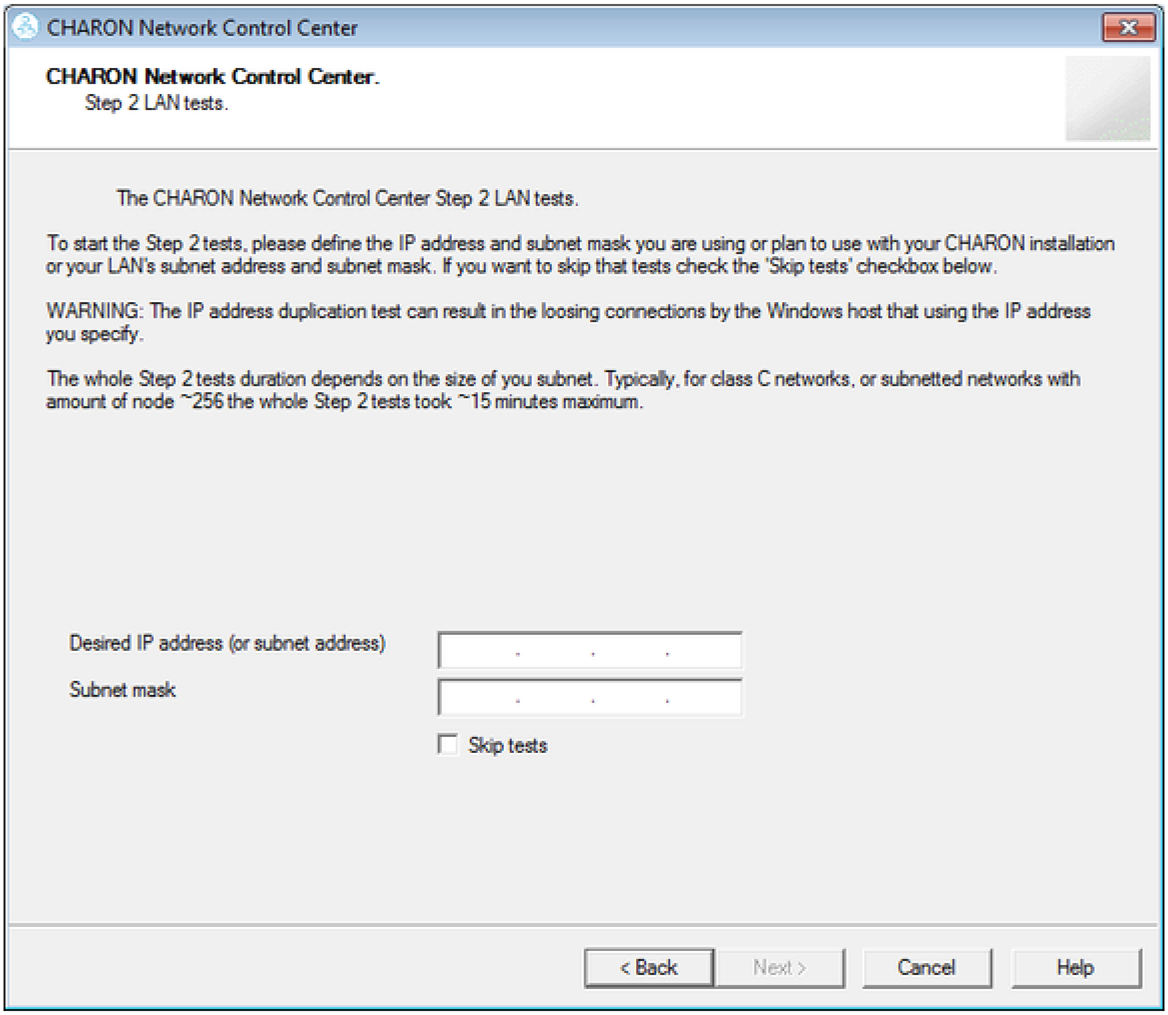
At any time you can abort the tests by pressing 'Cancel' button.

Once the check is completed, if there are issues, the utility will abort the test and display a log containing information about the issues found:


CHARON Network Control Center
CHARON Network Control Center.
Application log & results.
□ Show detailed log
Save Log in file
< Back
Finish
Cancel
Help

Date:	Message ID:	Message Text:
2015-10-20 ...	04000250	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' not configured for CHARON net
2015-10-20 ...	0400007B	NETCFG-UTILITY: The Internet Protocol Version 4 (TCP/IPv4) was disabled.
2015-10-20 ...	04000251	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configured for CHARON networ
2015-10-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CFixAdapter).
2015-10-20 ...	04000251	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configured for CHARON networ
2015-10-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CShowAdapter).
2015-10-20 ...	04000135	NETCFG-UTILITY: Perform DECnet test. Area: 52, node: 25
2015-10-20 ...	040000E9	NETCFG-UTILITY: The DECnet test results:
2015-10-20 ...	04000103	NETCFG-UTILITY: The permanent MAC address is: F8-D1-11-00-F8-E6.
2015-10-20 ...	04000104	NETCFG-UTILITY: WARNING! The connection speed is over 10Mbs (1000Mbps). The networkin
2015-10-20 ...	040000EB	NETCFG-UTILITY: Running with configuration: 52.25.
2015-10-20 ...	04000107	NETCFG-UTILITY: Trying to resolve the MAC address duplication, subtest 1...
2015-10-20 ...	040000EC	NETCFG-UTILITY: WARNING! MAC address duplication found.
2015-10-20 ...	040000ED	NETCFG-UTILITY: The host with DECnet address 52.25 (AA-00-04-00-19-D0) exist on the LAN.
2015-10-20 ...	040000F1	NETCFG-UTILITY: The traffic was detected on the LAN connected via 'Realtek PCIe GBE Family
2015-10-20 ...	040000F2	NETCFG-UTILITY: The connection through the NIC 'Realtek PCIe GBE Family Controller' appears

If no issues are found, the utility will offer to check the CHARON TCP/IP networking the same way:



CHARON Network Control Center.
Step 2 LAN tests.

The CHARON Network Control Center Step 2 LAN tests.

To start the Step 2 tests, please define the IP address and subnet mask you are using or plan to use with your CHARON installation or your LAN's subnet address and subnet mask. If you want to skip that tests check the 'Skip tests' checkbox below.

WARNING: The IP address duplication test can result in the loosing connections by the Windows host that using the IP address you specify.

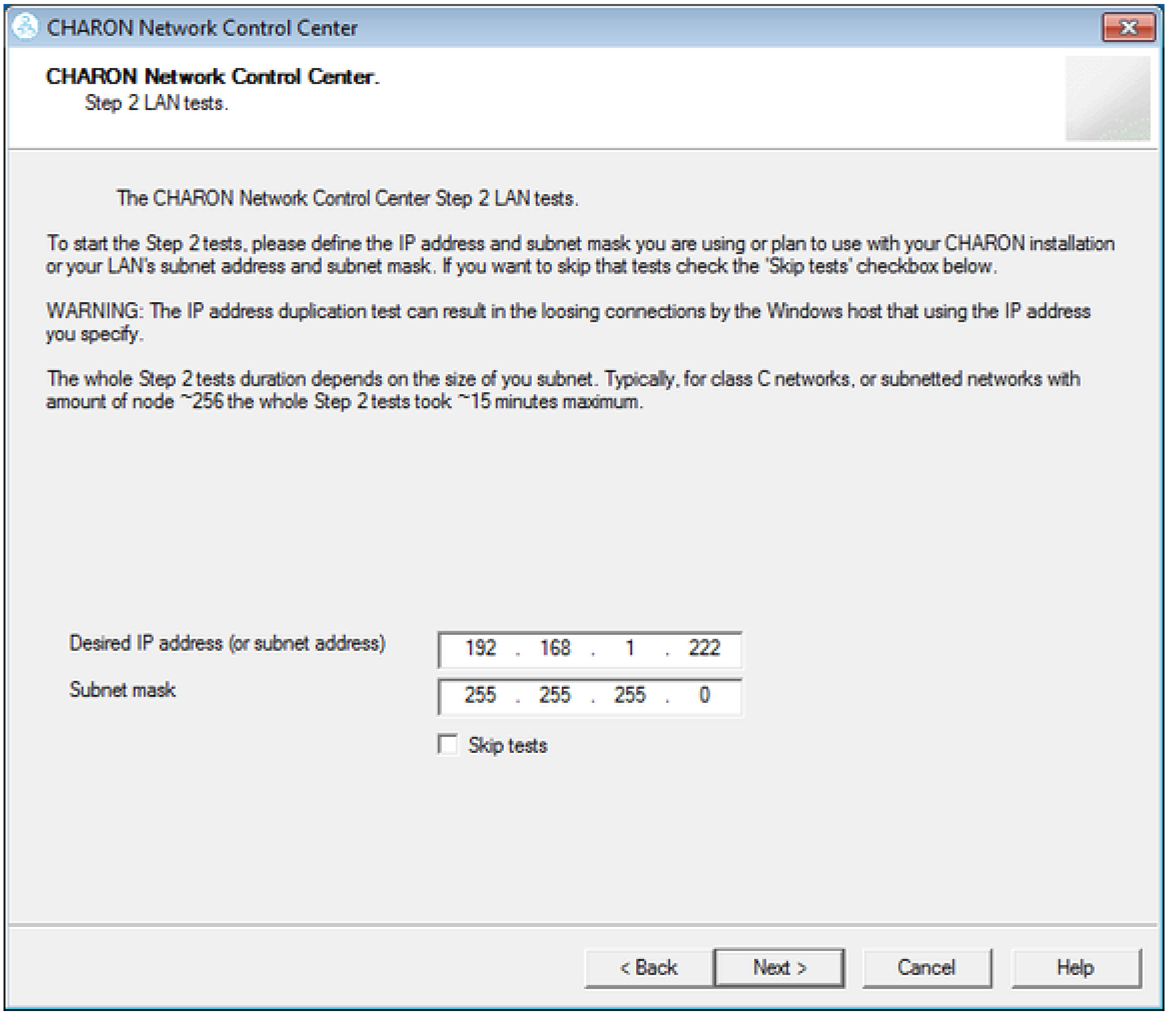
The whole Step 2 tests duration depends on the size of you subnet. Typically, for class C networks, or subnetted networks with amount of node ~256 the whole Step 2 tests took ~15 minutes maximum.

Desired IP address (or subnet address) . . .

Subnet mask . . .

□ Skip tests

Enter the IP address and subnet mask to be used by the CHARON guest then press the "Next" button:



CHARON Network Control Center

CHARON Network Control Center.
Step 2 LAN tests.

The CHARON Network Control Center Step 2 LAN tests.

To start the Step 2 tests, please define the IP address and subnet mask you are using or plan to use with your CHARON installation or your LAN's subnet address and subnet mask. If you want to skip that tests check the 'Skip tests' checkbox below.

WARNING: The IP address duplication test can result in the loosing connections by the Windows host that using the IP address you specify.

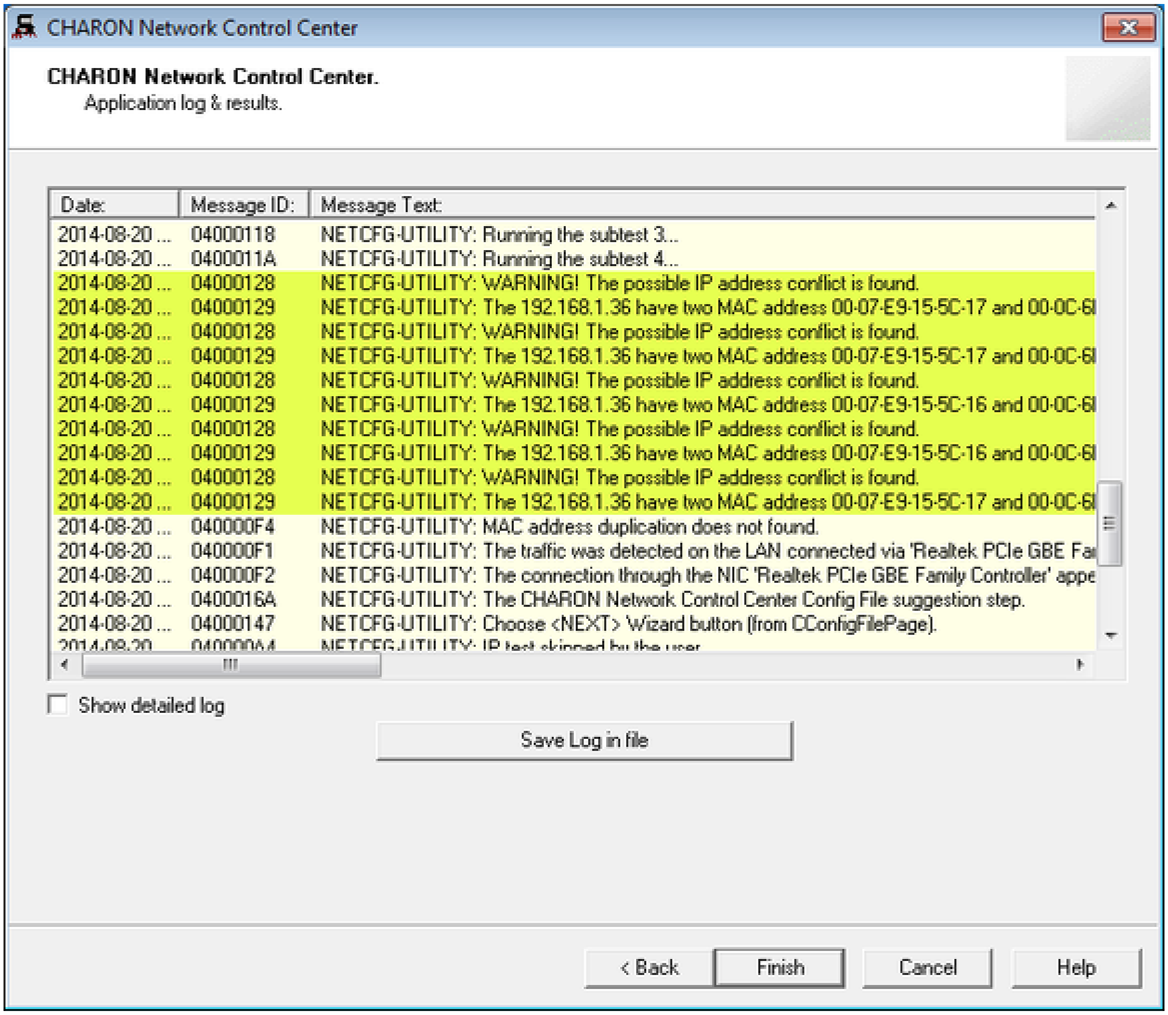
The whole Step 2 tests duration depends on the size of you subnet. Typically, for class C networks, or subnetted networks with amount of node ~256 the whole Step 2 tests took ~15 minutes maximum.

Desired IP address (or subnet address): 192 . 168 . 1 . 222

Subnet mask: 255 . 255 . 255 . 0

□ Skip tests

The Network Control Center will display the log of the performed operations:


CHARON Network Control Center
CHARON Network Control Center.
Application log & results.

Date:	Message ID:	Message Text:
2014-08-20 ...	04000118	NETCFG-UTILITY: Running the subtest 3...
2014-08-20 ...	0400011A	NETCFG-UTILITY: Running the subtest 4...
2014-08-20 ...	04000128	NETCFG-UTILITY: WARNING! The possible IP address conflict is found.
2014-08-20 ...	04000129	NETCFG-UTILITY: The 192.168.1.36 have two MAC address 00-07-E9-15-5C-17 and 00-0C-6I
2014-08-20 ...	04000128	NETCFG-UTILITY: WARNING! The possible IP address conflict is found.
2014-08-20 ...	04000129	NETCFG-UTILITY: The 192.168.1.36 have two MAC address 00-07-E9-15-5C-17 and 00-0C-6I
2014-08-20 ...	04000128	NETCFG-UTILITY: WARNING! The possible IP address conflict is found.
2014-08-20 ...	04000129	NETCFG-UTILITY: The 192.168.1.36 have two MAC address 00-07-E9-15-5C-16 and 00-0C-6I
2014-08-20 ...	04000128	NETCFG-UTILITY: WARNING! The possible IP address conflict is found.
2014-08-20 ...	04000129	NETCFG-UTILITY: The 192.168.1.36 have two MAC address 00-07-E9-15-5C-16 and 00-0C-6I
2014-08-20 ...	04000128	NETCFG-UTILITY: WARNING! The possible IP address conflict is found.
2014-08-20 ...	04000129	NETCFG-UTILITY: The 192.168.1.36 have two MAC address 00-07-E9-15-5C-17 and 00-0C-6I
2014-08-20 ...	040000F4	NETCFG-UTILITY: MAC address duplication does not found.
2014-08-20 ...	040000F1	NETCFG-UTILITY: The traffic was detected on the LAN connected via 'Realtek PCIe GBE Fa
2014-08-20 ...	040000F2	NETCFG-UTILITY: The connection through the NIC 'Realtek PCIe GBE Family Controller' appe
2014-08-20 ...	0400016A	NETCFG-UTILITY: The CHARON Network Control Center Config File suggestion step.
2014-08-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CConfigFilePage).
2014-08-20	040000A4	NETCFG-UTILITY: IP test skipped by the user

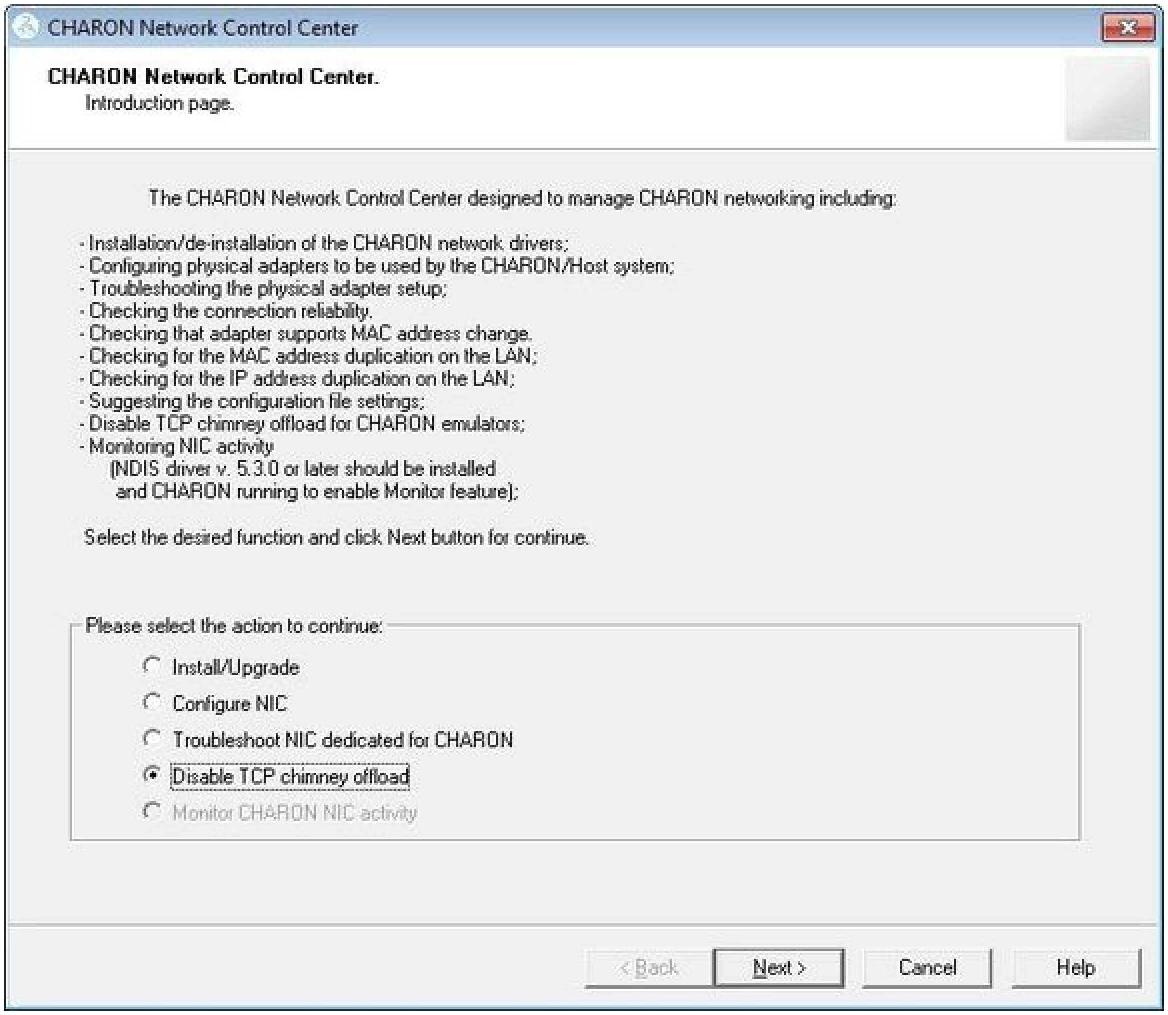
Select "Show detailed log" for more detail.

Press the "Finish" button to exit.

Disable "offload" parameters

The Network Control Center is able to disable "offload" parameters for CHARON. It is highly recommended to disable them to avoid problems with TCP /IP networking.

Start the utility, select "Disable TCP chimney offload for CHARON" and press the "Next" button:



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- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

○ Install/Upgrade
○ Configure NIC
○ Troubleshoot NIC dedicated for CHARON
● Disable TCP chimney offload
○ Monitor CHARON NIC activity

The "offload" parameters will be reset for all CHARON emulators (executable files).

Press the "Finish" button to exit.

⚠ Please note to restart the CHARON host to enable this settings.

More information on details of disabling TCP chimney offload is available

<table>
<tr><th>Operating system</th><th>Notes</th><th>Charon version</th><th>Configuration steps</th></tr>
<tr><td><b>Windows Server 2019</b></td><td>TCP Chimney offload is disabled by default (deprecated technology)</td><td><ul><li><b>Charon-AXP/PDP/VAX V4.11 Build 204-03 and above</b></li></ul></td><td>None</td></tr>
<tr><td rowspan="2"><b>Windows Server 2008 R2</b>

<b>Windows Server 2012 R2</b>

<b>Windows Server 2016</b>

<b>Windows 7</b>

<b>Windows 8 &amp; 8.1</b>

<b>Windows 10</b></td><td rowspan="2">TCP Chimney offload must be disabled.

<b>Note</b>: TCP Chimney Offload is a networking technology that helps transfer the workload from the CPU to a network adapter during network data transfer.

⊗ <b>Warning</b>
The commands to enable and disable TCP Chimney Offload for specific applications and ports require that the Windows Firewall service and Base Filtering Engine (BFE) services are running. Before using these commands or the Network Control Center Utility, ensure that the Windows Firewall service and BFE service are running.

⚠ Running guests will have to be powered off/on for the new settings to be taken into account.

💡 To check TCP Chimney offload is disabled, use the following commands:<pre>
C:\Windows\system32>netsh int tcp show global
Querying active state...

TCP Global Parameters

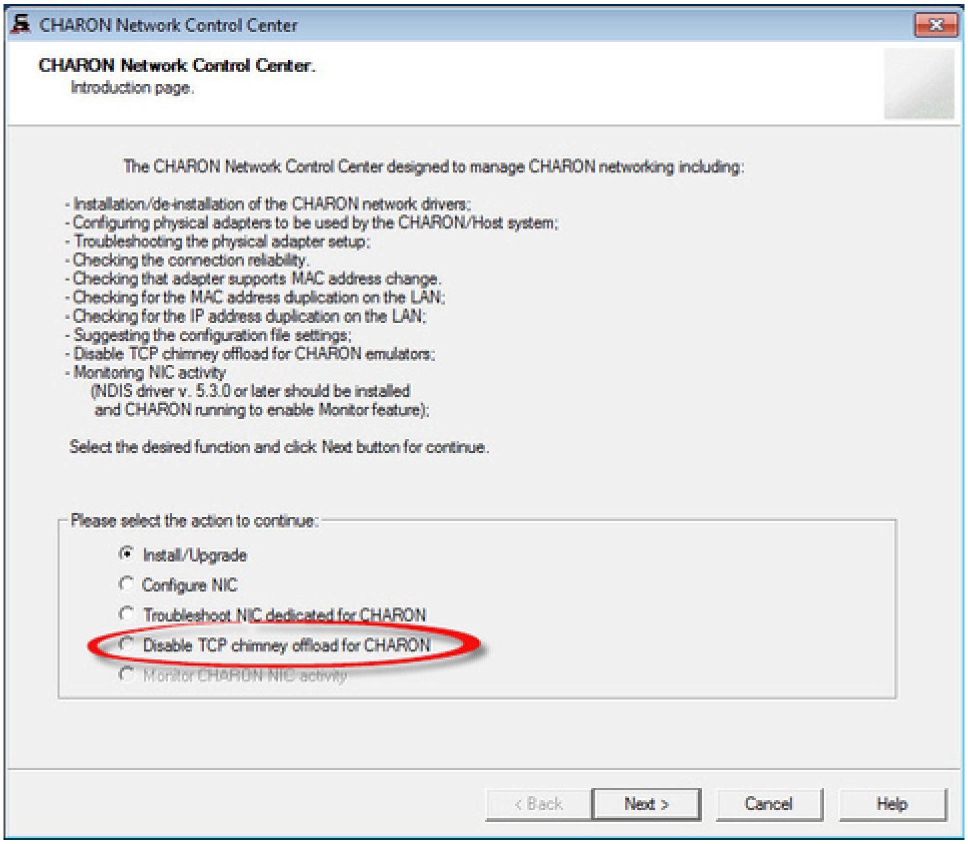
Receive-Side Scaling State   : enabled
Chimney Offload State   : disabled
NetDMA State   : disabled
Direct Cache Access (DCA)   : disabled
...
</pre>💡 To revert back to the original settings manually, use the following command:<pre>
C:\Windows\system32>netsh int tcp set global
chimney=automatic
</pre></td><td><ul><li><b>CHARON-VAX V4.7 and CHARON-AXP V4.7 Build 171-10 and above (patched)</b></li><li><b>Charon-AXP/PDP/VAX V4.8 Build 183-02 and above (patched)</b></li></ul></td><td>Configuration type 1</td></tr>
<tr><td><b>Older versions of Charon-AXP/PDP/VAX</b>

⚠ Do not use the network control center utility to disable TCP chimney offload. Please use only the manual settings described in this chapter</td><td>Configuration type 2</td></tr>
<tr><td><b>Older versions of Windows</b></td><td>⚠ Running guests will have to be powered off/on for the new settings to be taken into account</td><td><b>Charon-AXP/PDP/VAX versions supported on these old versions of Windows</b></td><td>Configuration type 3</td></tr>
</table>

Configuration type 1

- **Charon-AXP/VAX V4.7**:
  - open the **Start** menu, select "**All Programs**" then "**CHARON**", select your Charon product version, "**Utilities**" then "**Network Controler Center version *x.xx***".
- **Charon-AXP/PDP/VAX V4.8**:
  - Double click the "**CHARON Virtual Machine Manager**" icon on desktop or select this utility in the tray menu; select "**Host Information and Utilities**" section and press "**Network Control Center**" button.

- From the "**Network Control Center**" utility main page, select the "**Disable TCP chimney offload for CHARON**" option:



CHARON Network Control Center

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- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

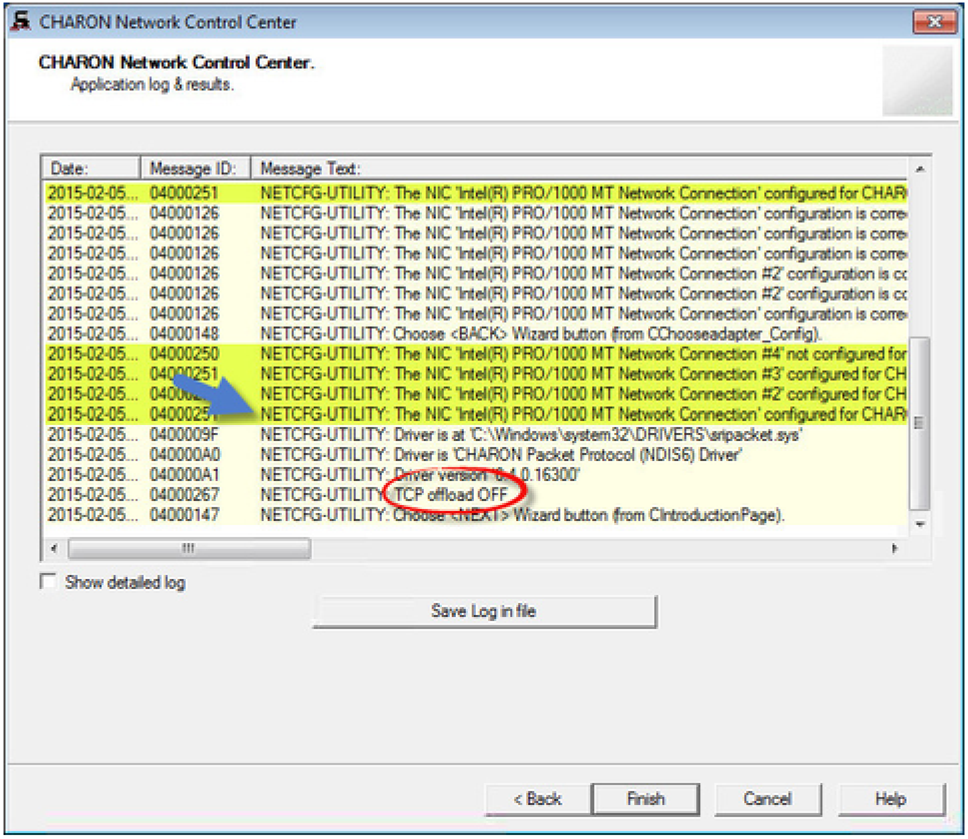
Select the desired function and click Next button for continue.

Please select the action to continue:

● Install/Upgrade
○ Configure NIC
○ Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload for CHARON
○ Monitor CHARON NIC activity

- Click on the "**Next**" button.

- The TCP Chimney offloading will be disabled:



CHARON Network Control Center

CHARON Network Control Center.
Application log & results.

```
Date:          Message ID:  Message Text:
2015-02-05...  04000251     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection' configured for CHAR
2015-02-05...  04000126     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection' configuration is corre
2015-02-05...  04000126     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection' configuration is corre
2015-02-05...  04000126     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection' configuration is corre
2015-02-05...  04000126     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection #2' configuration is cc
2015-02-05...  04000126     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection #2' configuration is cc
2015-02-05...  04000126     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection' configuration is corre
2015-02-05...  04000148     NETCFG-UTILITY: Choose <BACK> Wizard button (from CChooseadapter_Config).
2015-02-05...  04000250     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection #4' not configured for
2015-02-05...  04000251     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection #3' configured for CH
2015-02-05...  04000251     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection #2' configured for CH
2015-02-05...  04000251     NETCFG-UTILITY: The NIC 'Intel(R) PRO/1000 MT Network Connection' configured for CHAR
2015-02-05...  0400009F     NETCFG-UTILITY: Driver is at 'C:\Windows\system32\DRIVERS\sripacket.sys'
2015-02-05...  040000A0     NETCFG-UTILITY: Driver is 'CHARON Packet Protocol (NDIS6) Driver'
2015-02-05...  040000A1     NETCFG-UTILITY: Driver version '4.4.0.16300'
2015-02-05...  04000267     NETCFG-UTILITY: TCP offload OFF
2015-02-05...  04000147     NETCFG-UTILITY: Choose <NEXT> Wizard button (from CIntroductionPage).
```

☐ Show detailed log

- Click on the "**Finish**" button to exit.

Configuration type 2

- Open a command line windows with Admin rights
- Issue the following command:

```
C:\> netsh int tcp set global chimney=disabled
```

- Delete all occurrences of Charon executables in the following table if any as described below:

```
C:\> netsh interface tcp show chimney
...
C:\> netsh interface tcp delete chimneyapplication ^
More? application="C:\Program Files\CHARON\Build_16400\x64\as1000.exe"
```

Configuration type 3

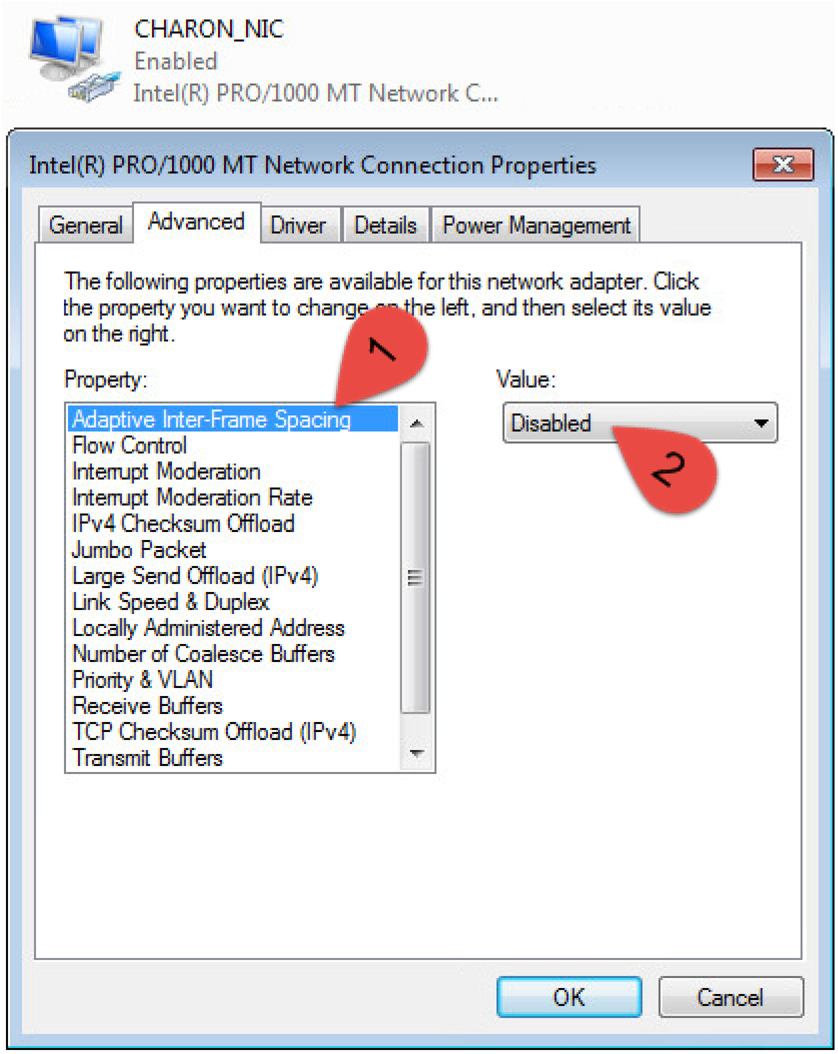
Intelligent packet processing should be switched off for the network adapters dedicated to CHARON-AXP (naming of the parameters depends on the network adapter driver):

- Adaptive interframe spacing
- Flow control
- Interrupt moderation
- Interrupt moderation rate
- Ipv4 checksum offload
- Jumbo packet
- Large send offload
- Disable Priority and VLAN
- TCP checksum offload
- UDP checksum offload

To do so, open the "**Control Panel**", select "**Network and Internet**" and "**Network Connections**". Right click on the adapter you dedicated to CHARON, select "**Properties**" and click on the "**Configure**" button.

Select the "**Advanced**" tab and disable the properties mentioned in the list above.

Example:


CHARON_NIC
Enabled
Intel(R) PRO/1000 MT Network C...
Intel(R) PRO/1000 MT Network Connection Properties
General
Advanced
Driver
Details
Power Management
1
2
OK
Cancel

The following properties are available for this network adapter. Click the property you want to change on the left, and then select its value on the right.

Property:

- Adaptive Inter-Frame Spacing
- Flow Control
- Interrupt Moderation
- Interrupt Moderation Rate
- IPv4 Checksum Offload
- Jumbo Packet
- Large Send Offload (IPv4)
- Link Speed & Duplex
- Locally Administered Address
- Number of Coalesce Buffers
- Priority & VLAN
- Receive Buffers
- TCP Checksum Offload (IPv4)
- Transmit Buffers

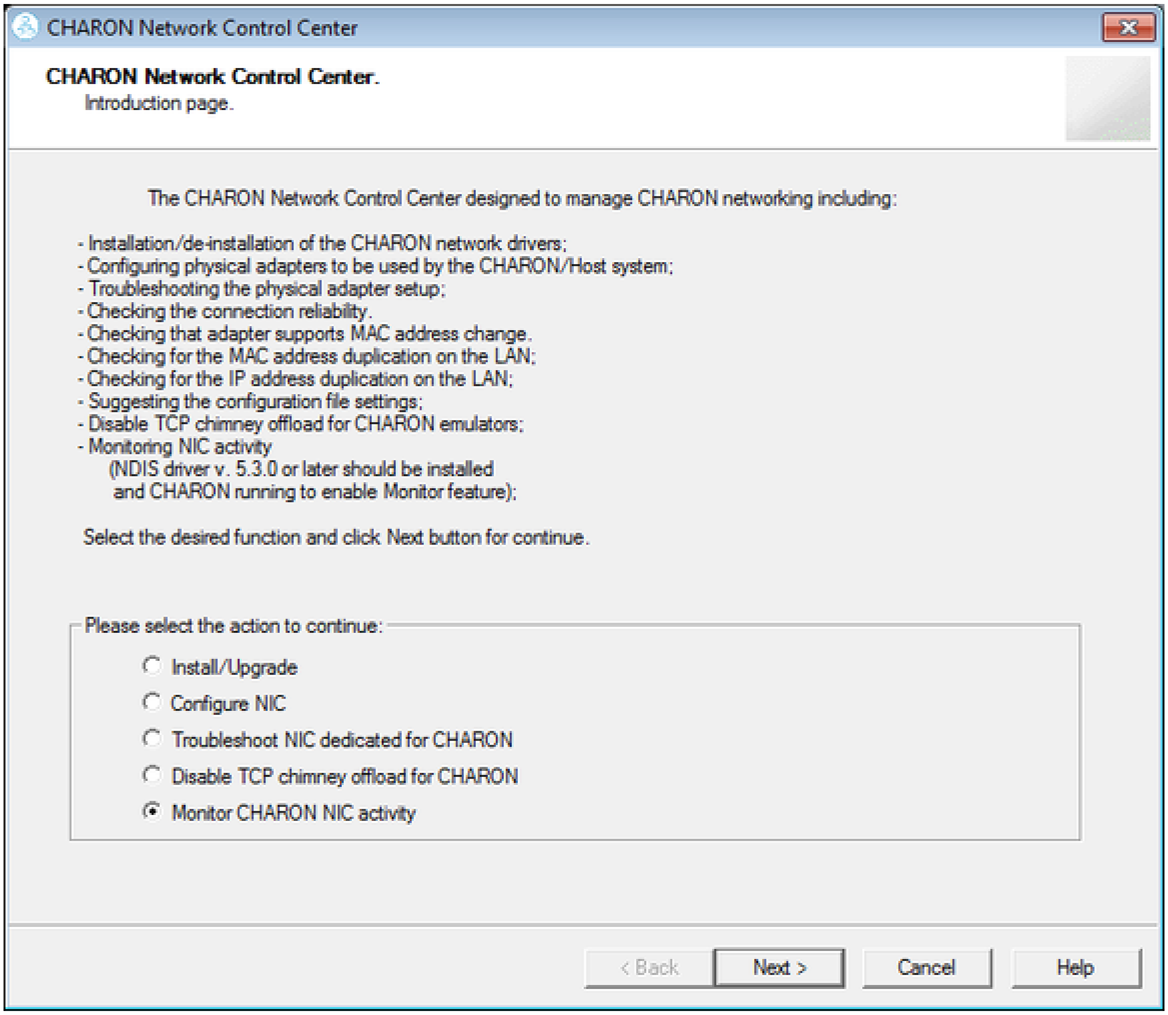
Value: Disabled

Once all parameters have been turned off, click on the "**OK**" button.

Monitoring the CHARON network activity

The Network Control Center is able to monitor CHARON network activity. This function is available only if CHARON is running.

Start the utility, select "Monitor CHARON NIC activity" and press the "Next" button:



CHARON Network Control Center

CHARON Network Control Center.
Introduction page.

The CHARON Network Control Center designed to manage CHARON networking including:

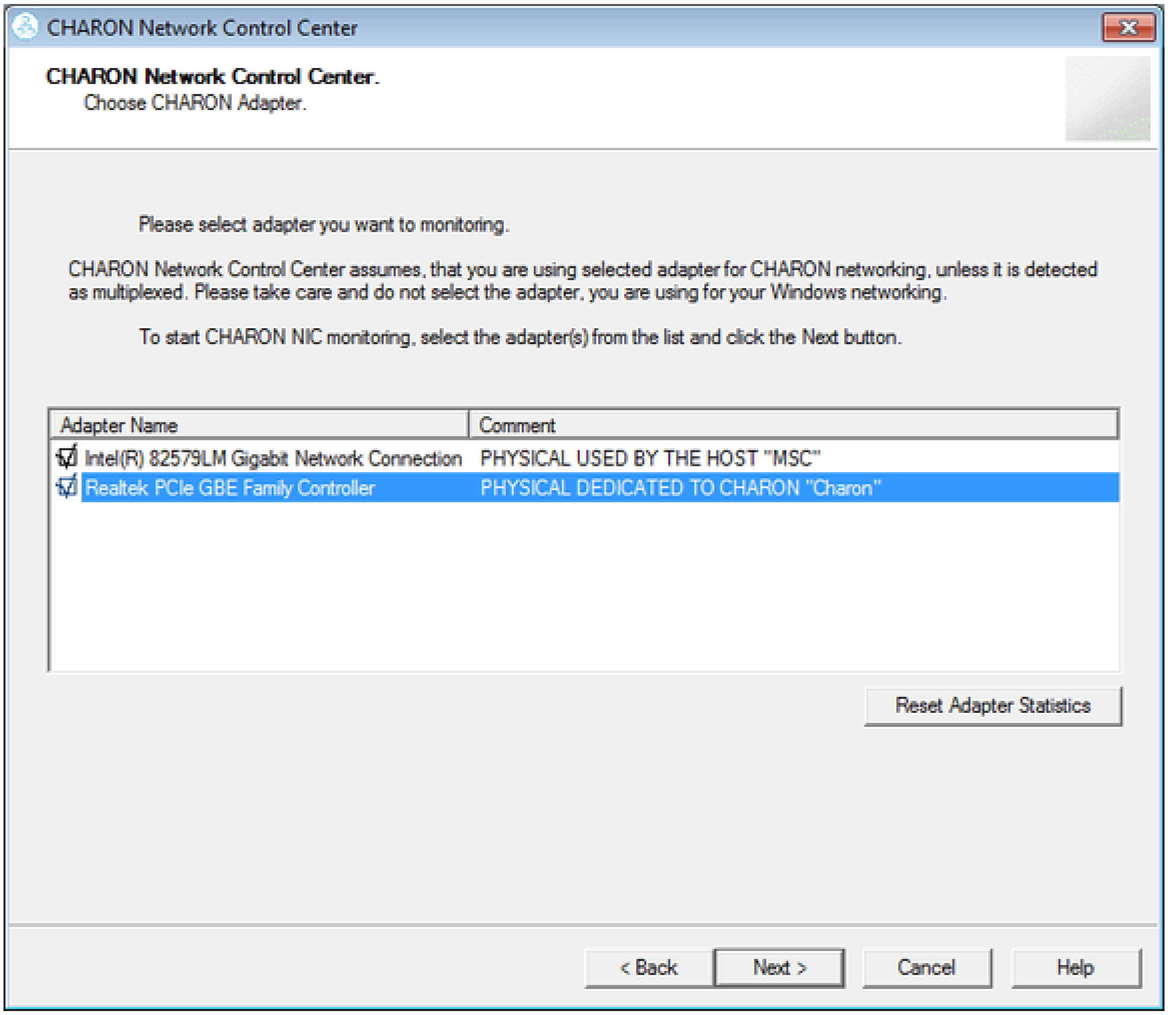
- Installation/de-installation of the CHARON network drivers;
- Configuring physical adapters to be used by the CHARON/Host system;
- Troubleshooting the physical adapter setup;
- Checking the connection reliability.
- Checking that adapter supports MAC address change.
- Checking for the MAC address duplication on the LAN;
- Checking for the IP address duplication on the LAN;
- Suggesting the configuration file settings;
- Disable TCP chimney offload for CHARON emulators;
- Monitoring NIC activity
  (NDIS driver v. 5.3.0 or later should be installed
  and CHARON running to enable Monitor feature);

Select the desired function and click Next button for continue.

Please select the action to continue:

○ Install/Upgrade
○ Configure NIC
○ Troubleshoot NIC dedicated for CHARON
○ Disable TCP chimney offload for CHARON
● Monitor CHARON NIC activity

Select the network interface to monitor (it must be dedicated to CHARON) and press the "Next" button:



CHARON Network Control Center.
Choose CHARON Adapter.

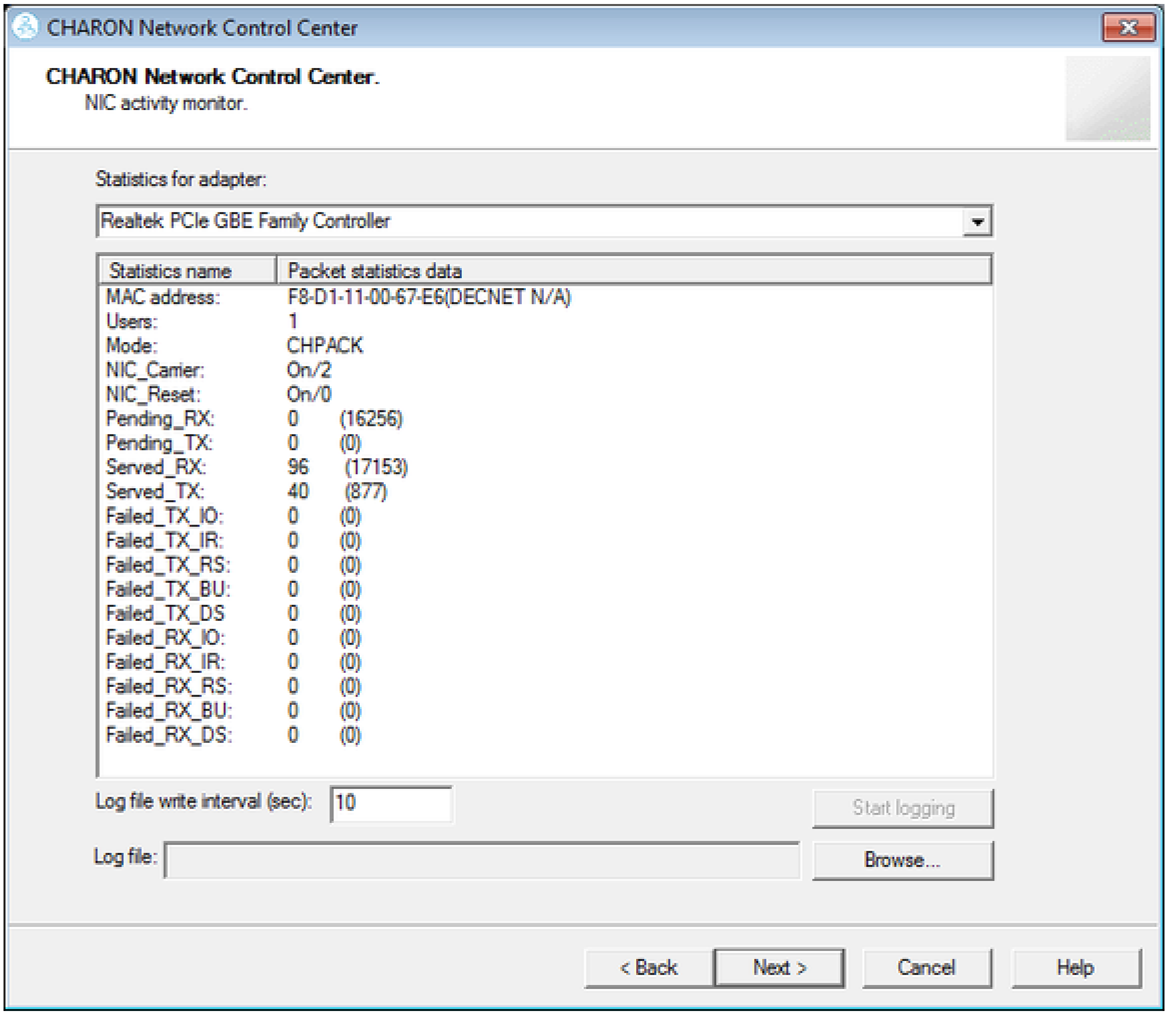
Please select adapter you want to monitoring.

CHARON Network Control Center assumes, that you are using selected adapter for CHARON networking, unless it is detected as multiplexed. Please take care and do not select the adapter, you are using for your Windows networking.

To start CHARON NIC monitoring, select the adapter(s) from the list and click the Next button.

Adapter Name	Comment
☑ Intel(R) 82579LM Gigabit Network Connection	PHYSICAL USED BY THE HOST "MSC"
☑ Realtek PCIe GBE Family Controller	PHYSICAL DEDICATED TO CHARON "Charon"

The utility will display statistics updated in a real time. Note it is possible to record the statistics in a log file with a selected write interval.



CHARON Network Control Center.
NIC activity monitor.

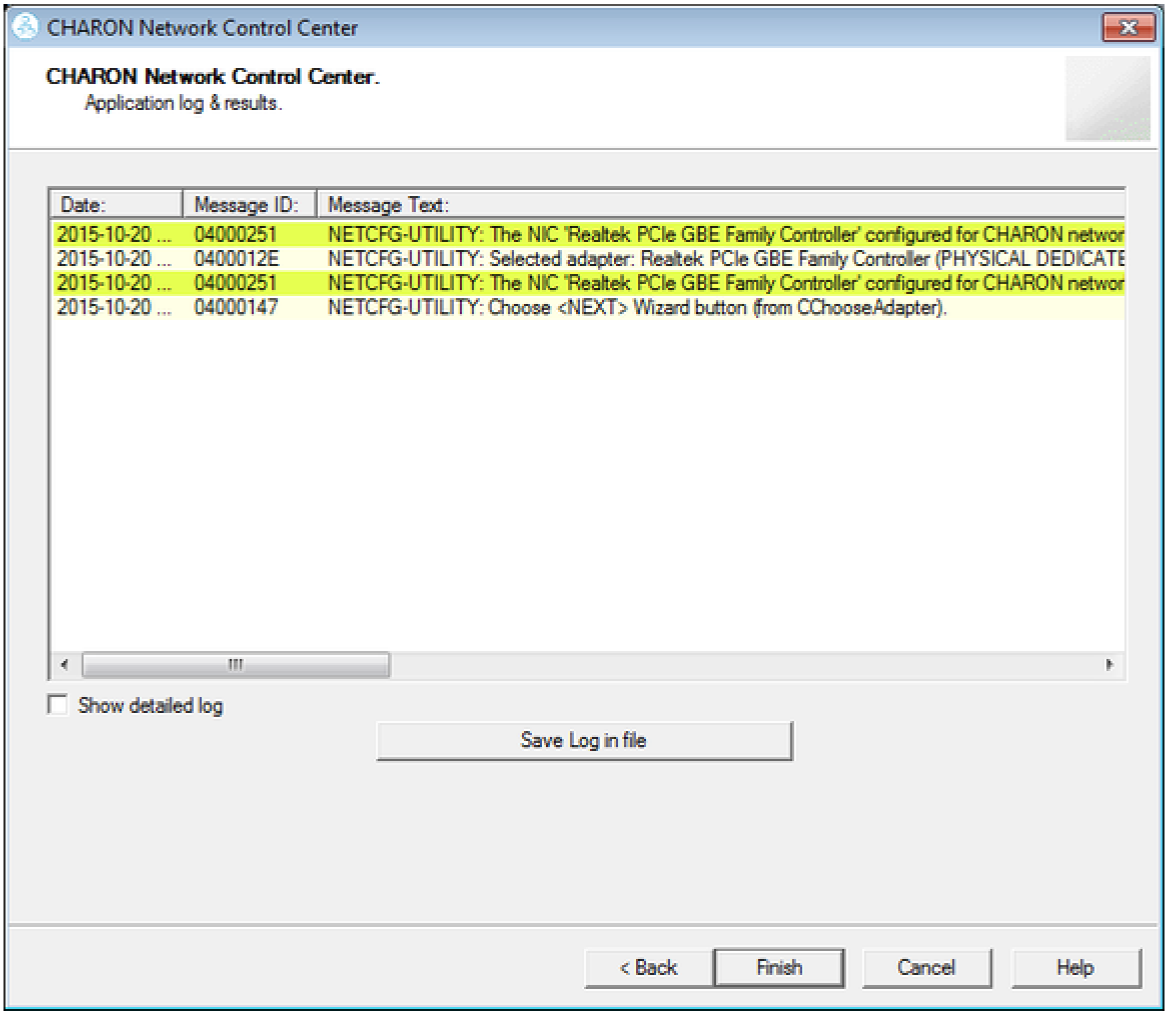
Statistics for adapter: Realtek PCIe GBE Family Controller

Statistics name	Packet statistics data	
MAC address:	F8-D1-11-00-67-E6(DECNET N/A)	
Users:	1	
Mode:	CHPACK	
NIC_Carrier:	On/2	
NIC_Reset:	On/0	
Pending_RX:	0	(16256)
Pending_TX:	0	(0)
Served_RX:	96	(17153)
Served_TX:	40	(877)
Failed_TX_IO:	0	(0)
Failed_TX_IR:	0	(0)
Failed_TX_RS:	0	(0)
Failed_TX_BU:	0	(0)
Failed_TX_DS	0	(0)
Failed_RX_IO:	0	(0)
Failed_RX_IR:	0	(0)
Failed_RX_RS:	0	(0)
Failed_RX_BU:	0	(0)
Failed_RX_DS:	0	(0)

Log file write interval (sec): 10

Log file:

Press the "Next" button to stop the recording and to see the log of this operation:


CHARON Network Control Center
CHARON Network Control Center.
Application log & results.

Date:	Message ID:	Message Text:
2015-10-20 ...	04000251	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configured for CHARON networ
2015-10-20 ...	0400012E	NETCFG-UTILITY: Selected adapter: Realtek PCIe GBE Family Controller (PHYSICAL DEDICATE
2015-10-20 ...	04000251	NETCFG-UTILITY: The NIC 'Realtek PCIe GBE Family Controller' configured for CHARON networ
2015-10-20 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CChooseAdapter).

Select "Show detailed log" for more detail.

Press the "Finish" button to exit.

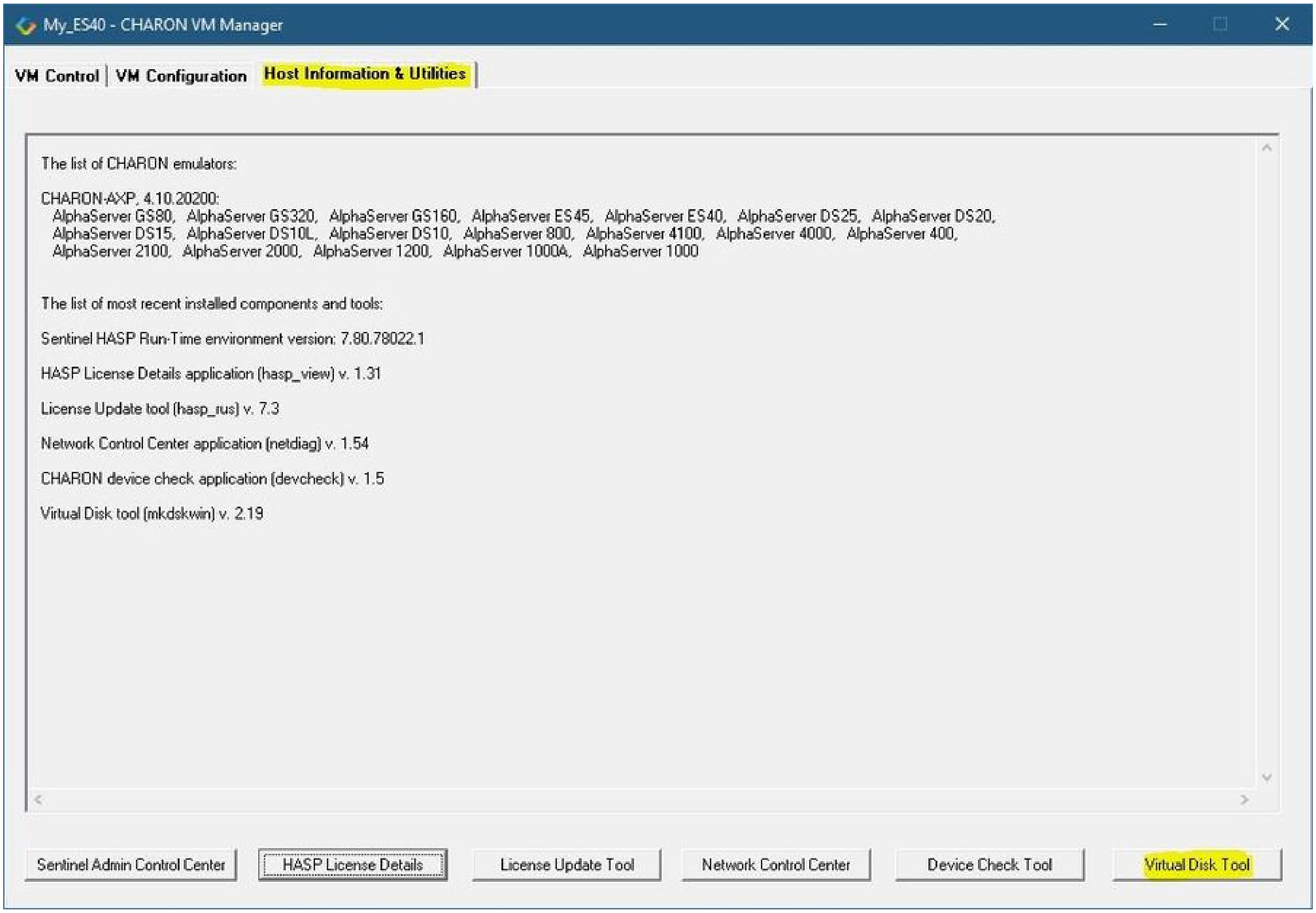
MkDisk

Table of Contents

General Description

The "MkDisk" utility is used to create CHARON standard or custom empty disk containers (disk images).

Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "Virtual Disk Tool" button:



The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
AlphaServer GS80, AlphaServer GS320, AlphaServer GS160, AlphaServer ES45, AlphaServer ES40, AlphaServer DS25, AlphaServer DS20, AlphaServer DS15, AlphaServer DS10L, AlphaServer DS10, AlphaServer 800, AlphaServer 4100, AlphaServer 4000, AlphaServer 400, AlphaServer 2100, AlphaServer 2000, AlphaServer 1200, AlphaServer 1000A, AlphaServer 1000

The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

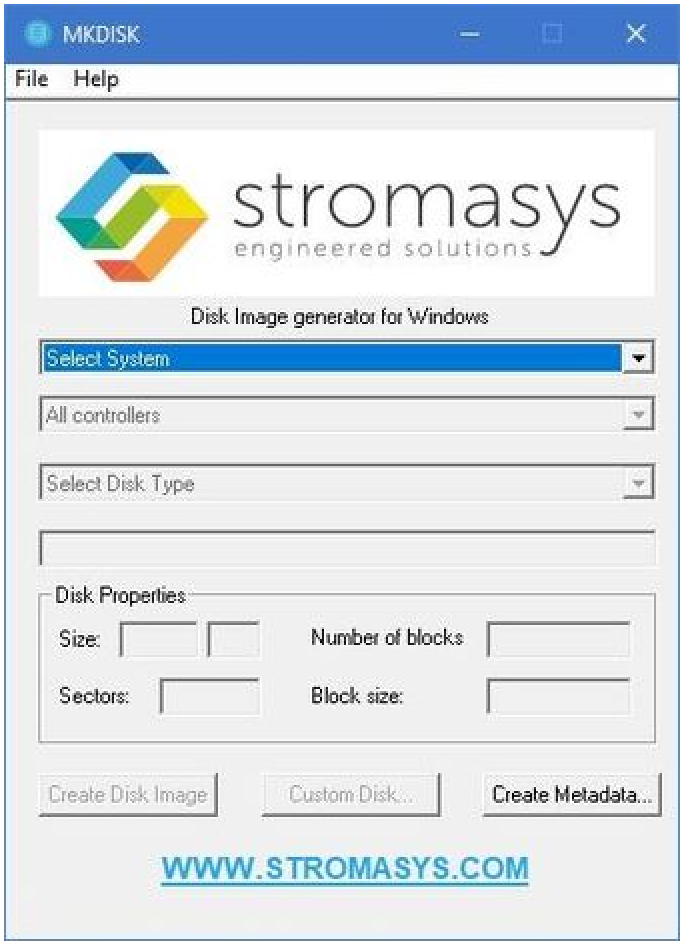
License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

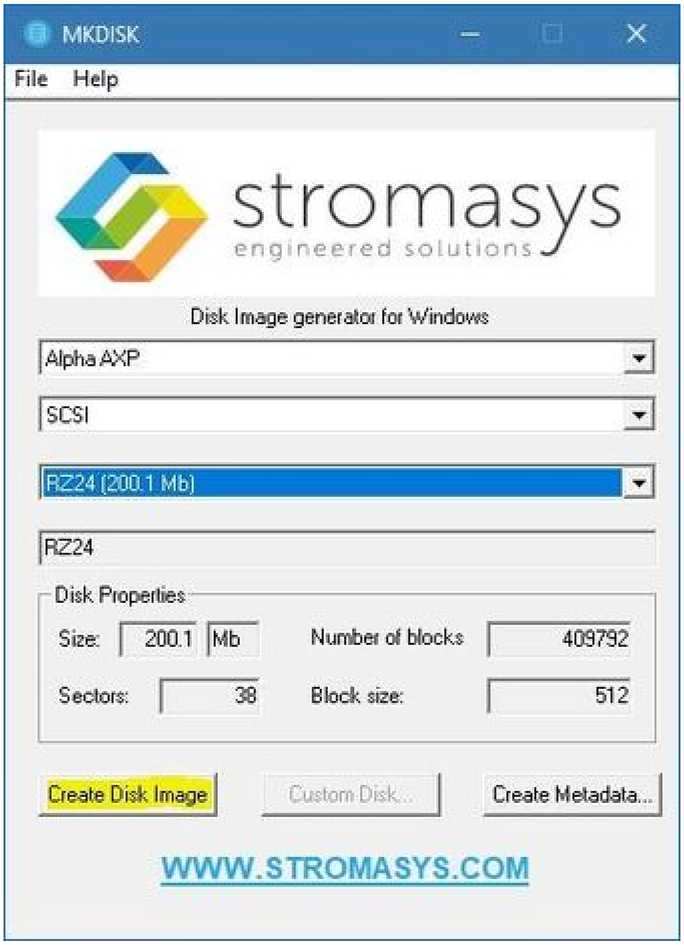
Virtual Disk tool (mkdskwin) v. 2.19

The main dialog of the utility will appear:



Creating empty disk container

Select "Alpha AXP" in the "Select System" drop-down list, "SCSI" in the "All Controllers" drop-down one and choose the desired disk type in the "Select Disk Type" drop-down list to create an empty disk container:



Alpha AXP

SCSI

RZ24 (200.1 Mb)

RZ24

Disk Properties

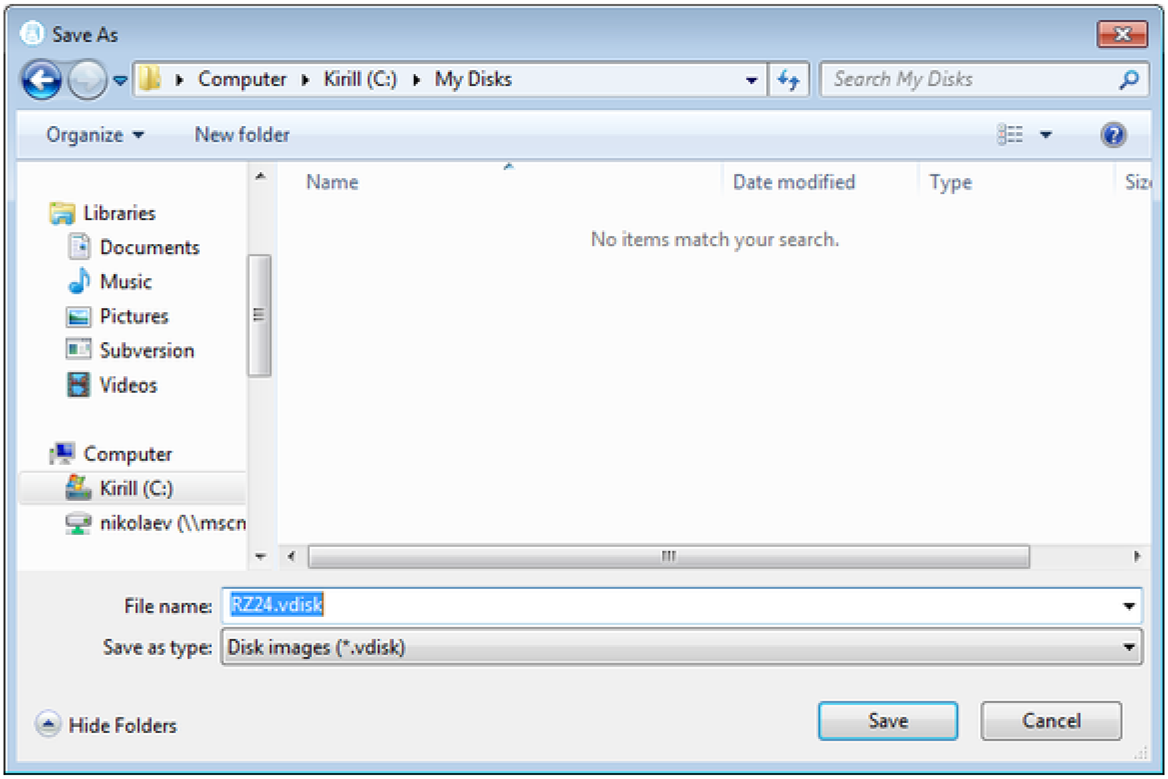
Size: 200.1 Mb

Number of blocks 409792

Sectors: 38

Block size: 512

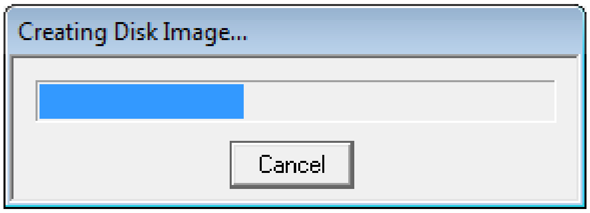
Press the "Create Disk Image" button to proceed. A dialog asking to specify the name of the disk image will appear:



File name: RZ24.vdisk

Save as type: Disk images (*.vdisk)

Browse to the target directory, specify the name of the disk image and press the "Save" button. The process of creating the disk container will start:



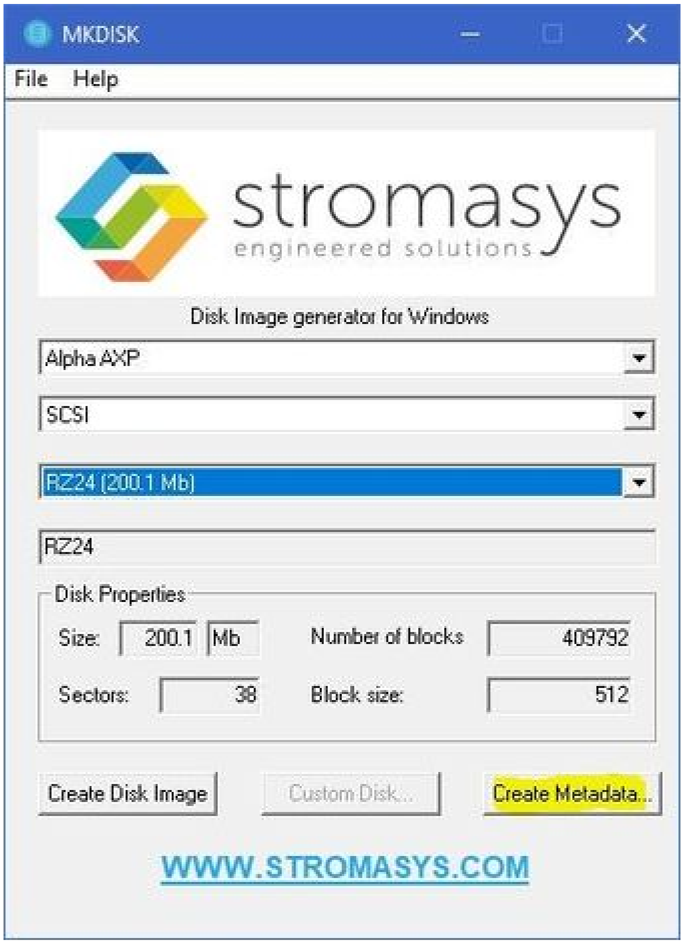
The target disk image is created - along with its metadata file (see below) once the process completes.

Creating disk metadata

The disk image metadata file contains important information about the target disk image structure - it is used by CHARON, automatically created with the same name with a different extension.

This functionality is needed if you have a disk image of a certain type and you want to generate a metadata file for it.

To create a metatada file press the "Create Metadata..." button:



Alpha AXP

SCSI

RZ24 (200.1 Mb)

RZ24

Disk Properties

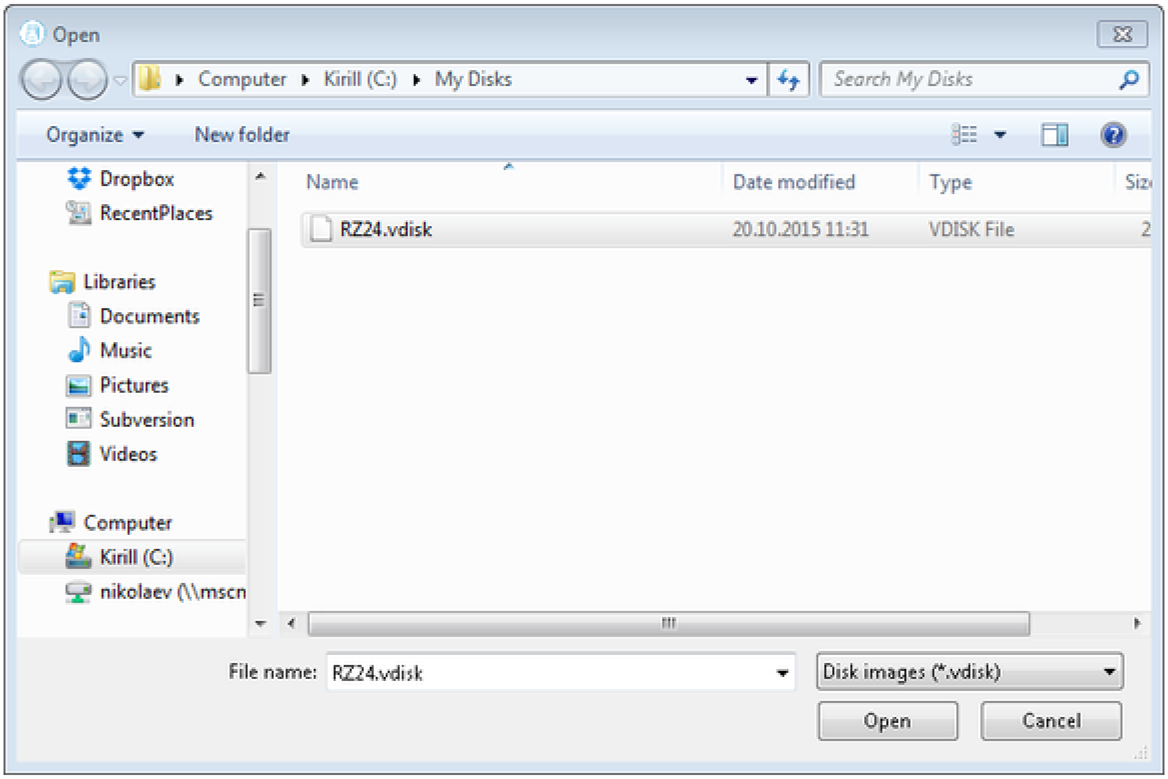
Size: 200.1 Mb

Number of blocks 409792

Sectors: 38

Block size: 512

The "MkDisk" utility will ask you to select a disk container for which to create the metadata file:

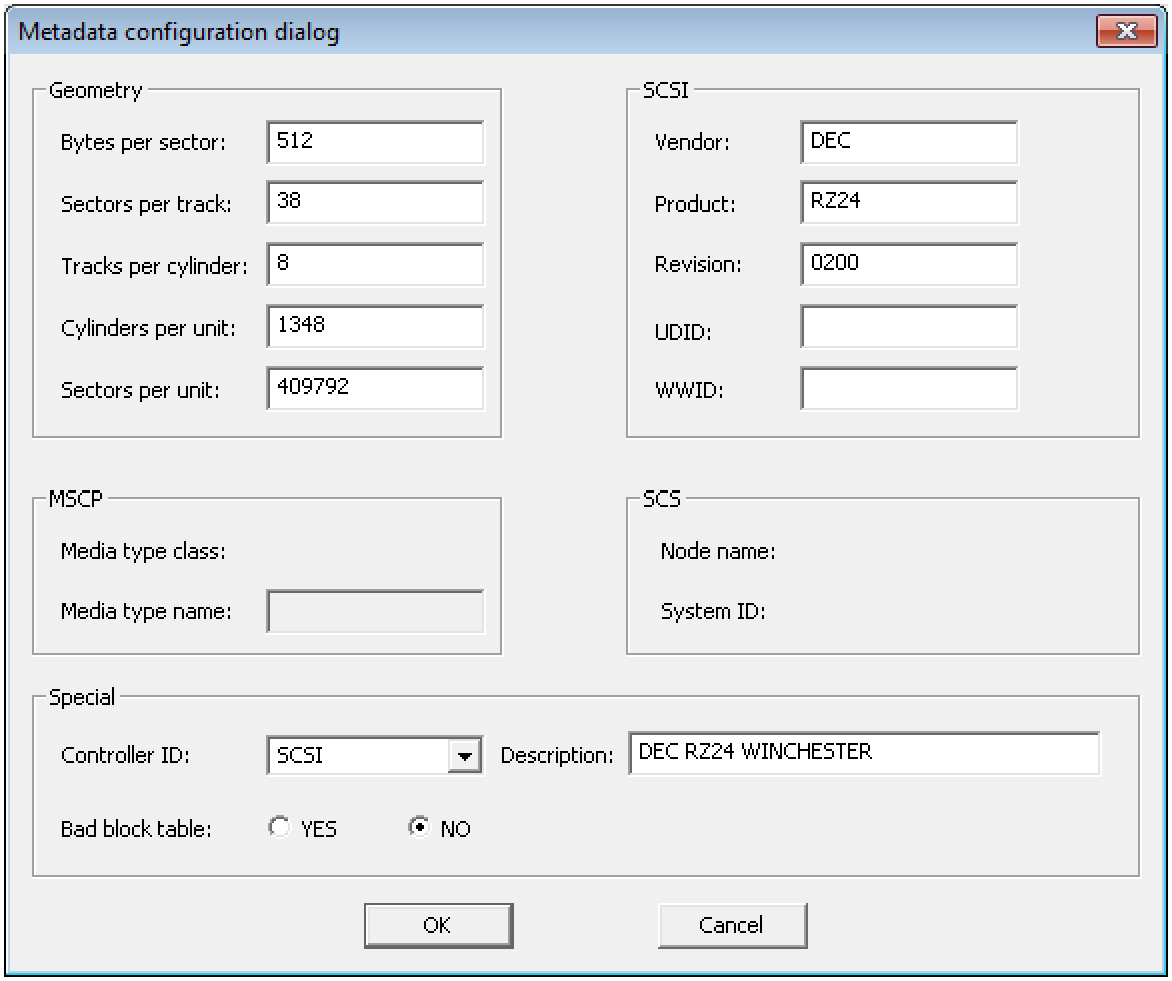


Name	Date modified	Type
RZ24.vdisk	20.10.2015 11:31	VDISK File

File name: RZ24.vdisk

Disk images (*.vdisk)

Select the target disk image and press the "Open" button. The utility will display a dialog for adjusting/correcting the disk image parameters:



Bytes per sector: 512

Sectors per track: 38

Tracks per cylinder: 8

Cylinders per unit: 1348

Sectors per unit: 409792

Vendor: DEC

Product: RZ24

Revision: 0200

UDID:

WWID:

Media type class:

Media type name:

Node name:

System ID:

Controller ID: SCSI

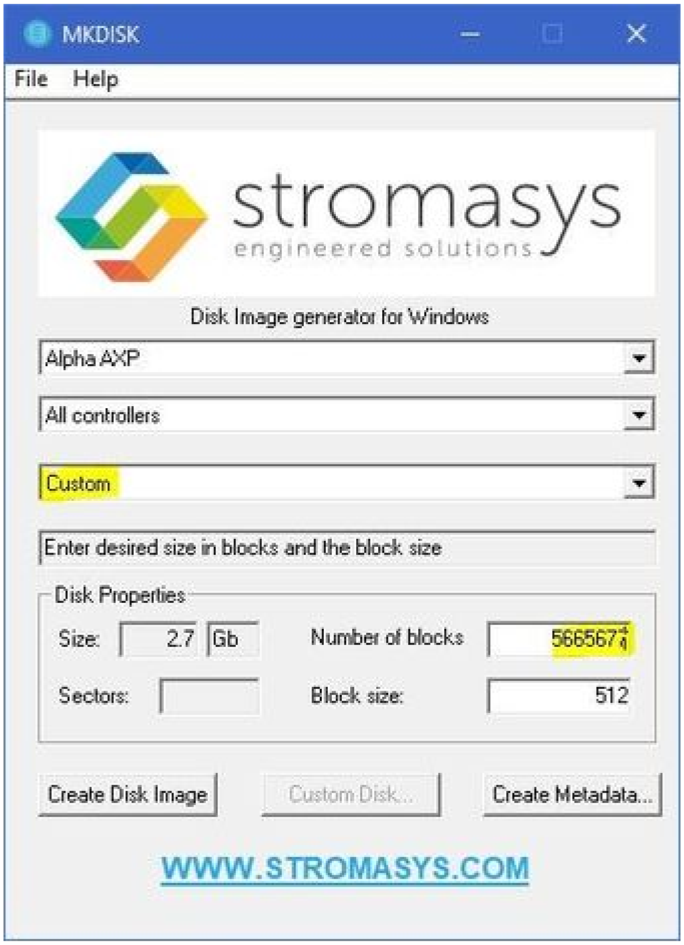
Description: DEC RZ24 WINCHESTER

Bad block table: ○ YES ● NO

Correct the desired parameters if needed and press the "Ok" button. The "MkDisk" utility will create a metadata file, having the same name as the target disk container, with extension ".avdisk"

Creating custom disk image

Select "Custom" in the "Select System" drop-down list, enter the desired number of blocks in the "Number of blocks" input box, specify the block size (if it is different from the default value of 512) in the "Block size" input box and press the "Create Disk Image" button to proceed:



Alpha AXP

All controllers

Custom

Enter desired size in blocks and the block size

Size: 2.7 Gb

Number of blocks: 566567

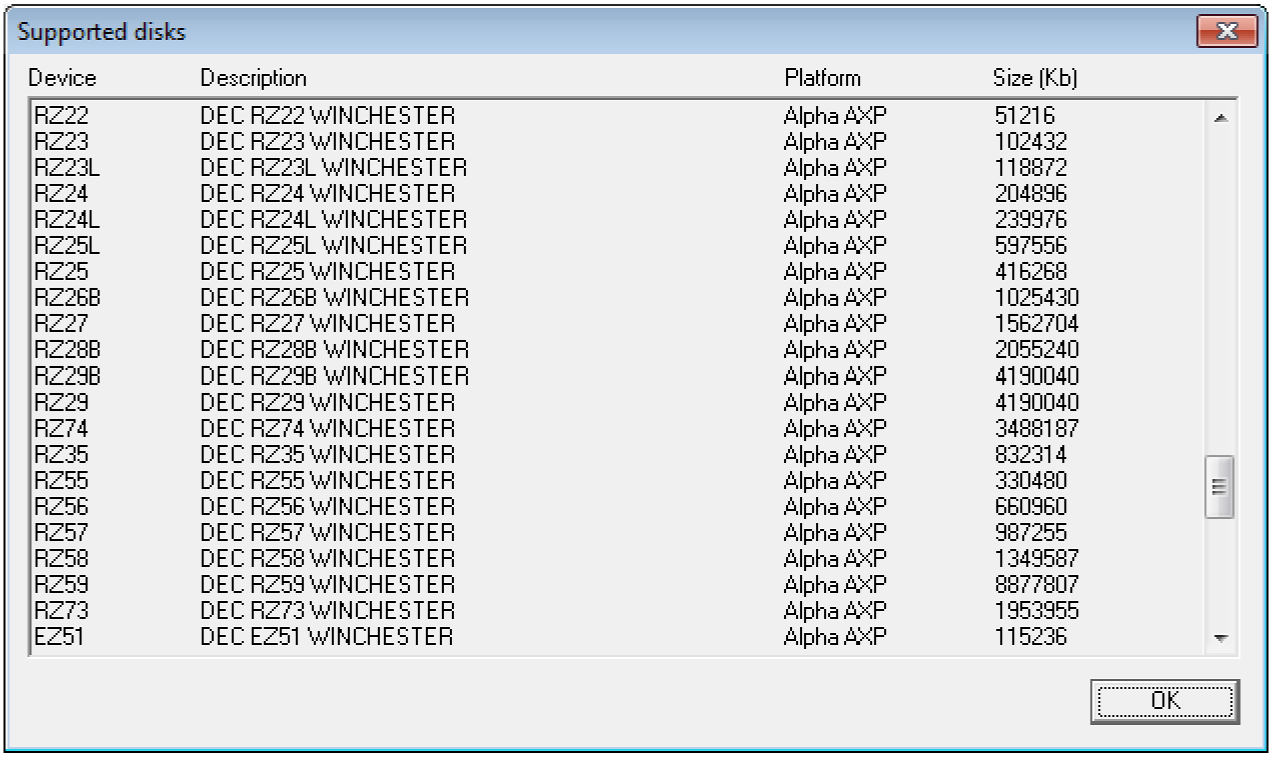
Sectors:

Block size: 512

Specify the location and name of the target disk container and press the "Save" button. The utility will create the disk image and will open the "Metadata Configuration dialog" window (for the .avdisk) → click OK to continue.

Getting information about available disk types

Information about the available disk types the "MkDisk" utility is able to create can be obtained by selecting the "Help->Disk Table" menu item. The following information dialog will appear:



Device	Description	Platform	Size (Kb)
RZ22	DEC RZ22 WINCHESTER	Alpha AXP	51216
RZ23	DEC RZ23 WINCHESTER	Alpha AXP	102432
RZ23L	DEC RZ23L WINCHESTER	Alpha AXP	118872
RZ24	DEC RZ24 WINCHESTER	Alpha AXP	204896
RZ24L	DEC RZ24L WINCHESTER	Alpha AXP	239976
RZ25L	DEC RZ25L WINCHESTER	Alpha AXP	597556
RZ25	DEC RZ25 WINCHESTER	Alpha AXP	416268
RZ26B	DEC RZ26B WINCHESTER	Alpha AXP	1025430
RZ27	DEC RZ27 WINCHESTER	Alpha AXP	1562704
RZ28B	DEC RZ28B WINCHESTER	Alpha AXP	2055240
RZ29B	DEC RZ29B WINCHESTER	Alpha AXP	4190040
RZ29	DEC RZ29 WINCHESTER	Alpha AXP	4190040
RZ74	DEC RZ74 WINCHESTER	Alpha AXP	3488187
RZ35	DEC RZ35 WINCHESTER	Alpha AXP	832314
RZ55	DEC RZ55 WINCHESTER	Alpha AXP	330480
RZ56	DEC RZ56 WINCHESTER	Alpha AXP	660960
RZ57	DEC RZ57 WINCHESTER	Alpha AXP	987255
RZ58	DEC RZ58 WINCHESTER	Alpha AXP	1349587
RZ59	DEC RZ59 WINCHESTER	Alpha AXP	8877807
RZ73	DEC RZ73 WINCHESTER	Alpha AXP	1953955
EZ51	DEC EZ51 WINCHESTER	Alpha AXP	115236

MkDskCmd

Table of Contents

General Description

The "`MkDskCmd`" utility:

- Creates empty disk images of a given standard or custom disk type or a custom disk size
- Transfers existing disk images of one type to disk images of another type.

To start the utility open "`cmd.exe`" from Administrator in the Start menu and switch to the CHARON installation folder then the "`\Build_XXX\xXX`" child folder where the utility is located.

Creating disk images

The first step is to obtain the disk type of the disk that needs to be created:

```
...> mkdskcmd -list
```

This command results in a list of all the supported disk types.

Choose the desired disk type (for example "RZ22") then use the "`mkdskcmd`" command to create the virtual disk image as shown below:

```
...> mkdskcmd -disk rz22 -output rz22.vdisk
```

A disk container "rz22.vdisk" will be created in the current directory.

A file "rz22.avdisk" will also be created. This file helps CHARON to accurately recognize a specific disk image type. It is recommended to put the ".avdisk" file in the same directory as the created disk image.

It is also possible to create custom disk images using the "`-blcount`" (blocks count) and "`-blsize`" (blocks size) switches.

For a list of all available parameters use the "-help" switch:

```
...> mkdskcmd -help

mkdisk for CHARON utility v. 1.17
Copyright: STROMASYS, 2017

Usage:
     mkdskcmd [Options]

Options:
    -h, -help - display help screen

    -o, -output <file> - specify output file name

    -d, -disk <name> - specify the disk name from Disk table

    -z, -blsize <value> - specify the block size in bytes (custom disk image)

    -c, -blcount <value> - specify number of the blocks (custom disk image)

    -a, -avtable <file> - specify AVDISK table file

    -r, -resize <file> [<disk-name>]
           - resize the disk image
       <file> - file name of the disk image to be resized
       <disk-name> - name of the disk from the Disk table

      <file> will either have the specified number of blocks added to the
      end or be truncated at the new smaller size.

      To specify a custom disk size, use the following parameters:
      -resize <file> -blsize <value> -blcount <value>

   -s, -shrink - mandatory parameter when resizing to smaller disk

   -l, -list - to display AVDISK table

   -q, -quiet - run in quiet mode

Return value:
   0 - Success
   Non zero - Failure

Examples:
mkdskcmd -help
mkdskcmd -list
mkdskcmd -avtable mkdsk.vtable -output rk07.vdisk -disk rk07
mkdskcmd -output disks\custom.vdisk -blsize 512 -blcount 16384
mkdskcmd -r E:\disks\rz22.vdisk rz59 -a "C:\Program Files\CHARON\disks\mkdsk.vtable"
```

The "-avtable" parameter is used to work with an alternative disk specification database or to point to the standard database ("mkdsk.vtable") if it is in a location other than the current directory.

The "-blcount" (blocks count) and "-blsize" (blocks size) switches are used to create custom disk images.

Resizing disk images

The "MkDskCmd" utility is able to resize (copy) disk images of one type to a disk image of another type.

This operation is needed, for example, to obtain more free space on a disk image that already contains data.

Notes:

- It is not possible to add more free space dynamically. The virtual machine must be stopped before performing this operation.
- Resizing a disk image requires the operating system running on the Charon virtual machine to be able to handle Dynamic Volume Expansion. Please refer to the documentation of your operating system version. If this is not supported, please create a new virtual disk then backup and restore the existing data.

> If a source disk image is larger than the target disk image, the extra data is lost. If the source disk image is smaller, it will be extended and padded with null bytes ('\0').

An example of the syntax follows:

```
...> mkdskcmd -resize <source disk file name> <source disk parameters> [-shrink] [-k]
```

where:

- <source disk file name> - the file name of the disk image to be resized
- <source disk parameters> - the disk type taken from the list of available disk types displayed by the "mkdskcmd -list" command or the disk geometry specification (see below).
- -shrink or -k - used to force the shrink when the target disk size is smaller than the source disk size.

Example:

```
...> mkdskcmd -resize "C:\My Disks\rz22.vdisk" rz25
```

It is also possible to specify the disk parameters manually with "-blcount / -c" (blocks count) and "-blsize / -z" (blocks size) switches:

```
...> mkdskcmd -resize <source disk file name> -blsize <number> -blcount <number>
```

Example:

```
...> mkdskcmd -r "C:\My Disks\custom.vdisk" -z 512 -c 262134
```

> There is a certain delay between the moment when the utility reports that a disk image has been resized and its actual availability to CHARON. This delay can reach up to several minutes in the case of very large disk resizes. This is because the host operating system needs time for the actual allocation of the enlarged file on HDD.

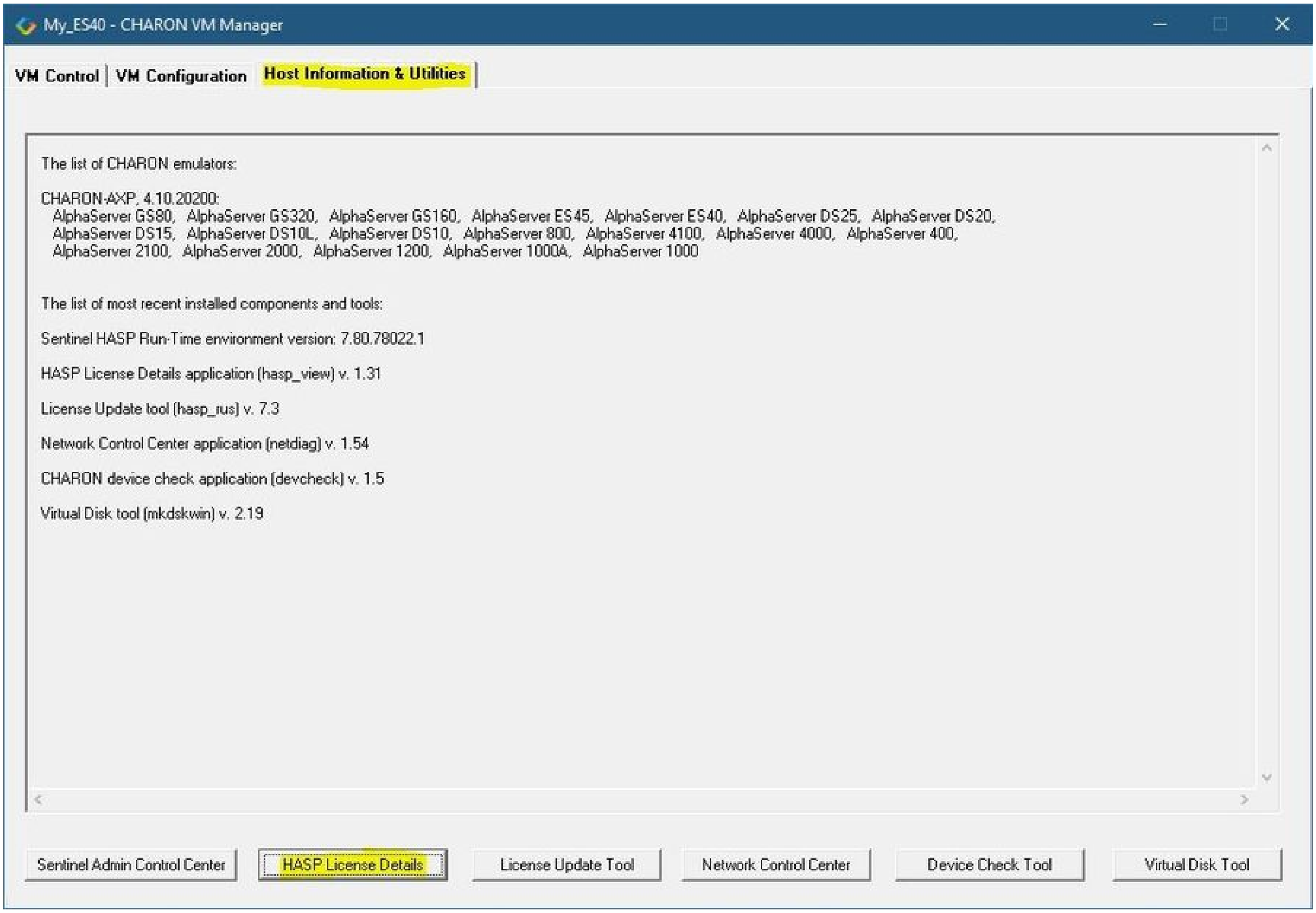
HASP View

Table of Contents

General Description

The "HASP View" utility is used to display the CHARON license content.

Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "HASP License Details" button:

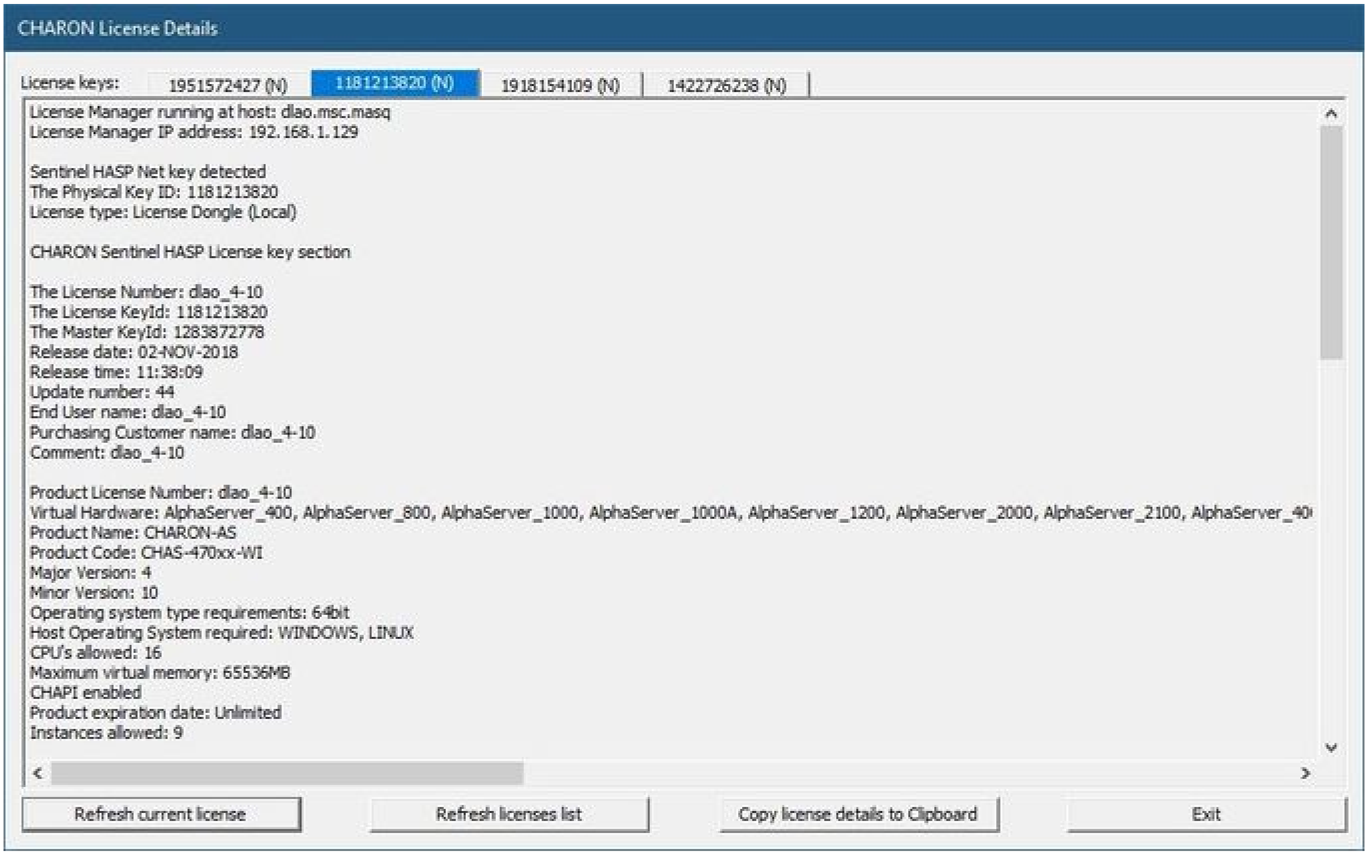


```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000

The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

Getting CHARON licenses content

The "HASP View" utility displays the content of the licenses to be used by CHARON.

Example:



```
License Manager running at host: dlao.msc.masq
License Manager IP address: 192.168.1.129

Sentinel HASP Net key detected
The Physical Key ID: 1181213820
License type: License Dongle (Local)

CHARON Sentinel HASP License key section

The License Number: dlao_4-10
The License KeyId: 1181213820
The Master KeyId: 1283872778
Release date: 02-NOV-2018
Release time: 11:38:09
Update number: 44
End User name: dlao_4-10
Purchasing Customer name: dlao_4-10
Comment: dlao_4-10

Product License Number: dlao_4-10
Virtual Hardware: AlphaServer_400, AlphaServer_800, AlphaServer_1000, AlphaServer_1000A, AlphaServer_1200, AlphaServer_2000, AlphaServer_2100, AlphaServer_40
Product Name: CHARON-AS
Product Code: CHAS-470xx-WI
Major Version: 4
Minor Version: 10
Operating system type requirements: 64bit
Host Operating System required: WINDOWS, LINUX
CPU's allowed: 16
Maximum virtual memory: 65536MB
CHAPI enabled
Product expiration date: Unlimited
Instances allowed: 9
```

Use the "License keys" tabs to view the content of the CHARON licenses found.

Press the "Refresh key list" button to look for newly added and available licenses.

Note: collecting the license content may take some time. Use the buttons located at the bottom of the window to refresh the license content and to copy the license details to the clipboard if needed.

Press the "Exit" button to exit from the utility.

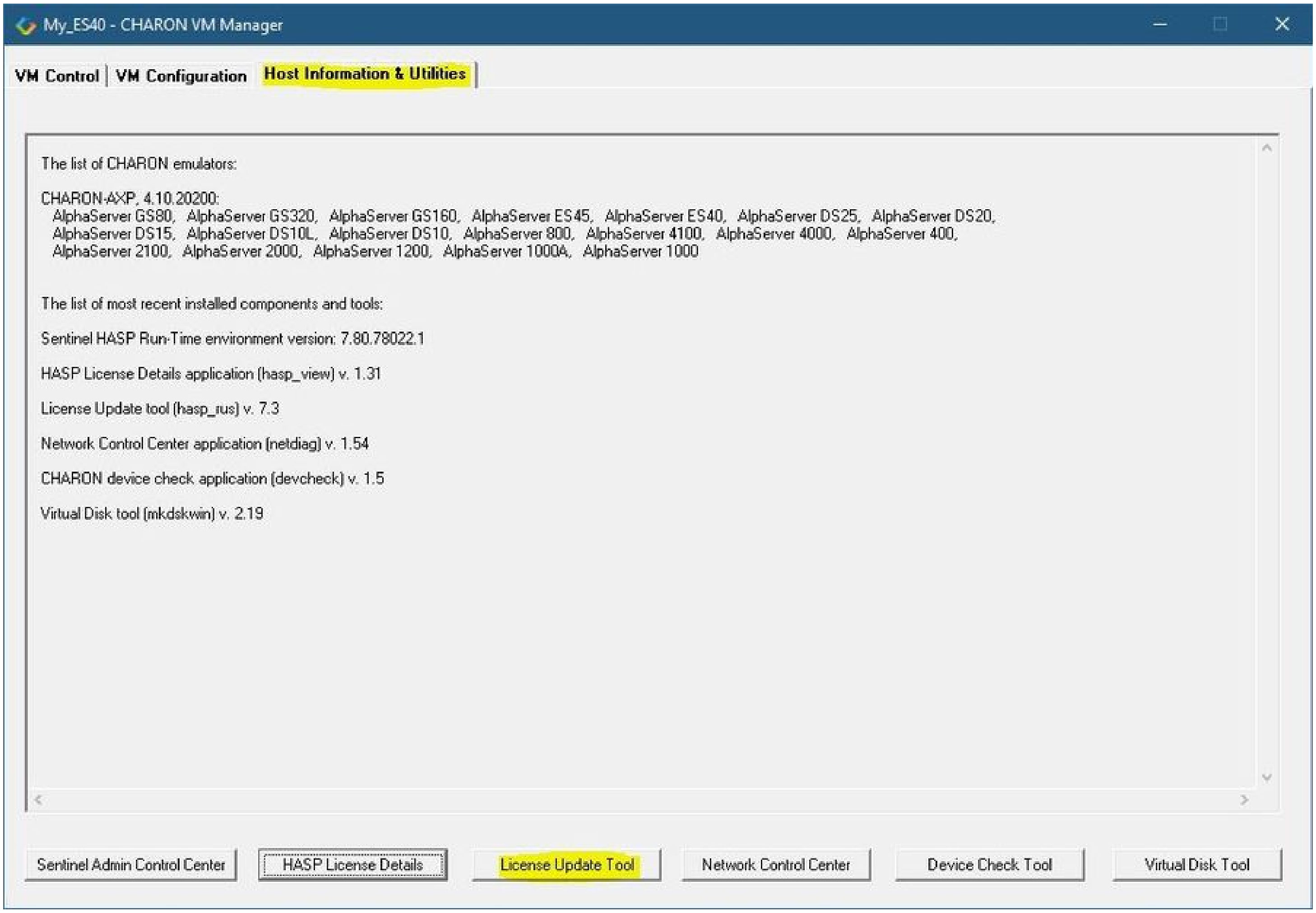
License Update Service

Table of Contents

General Description

The "License Update Service" utility is used to manage CHARON licenses, collect the host system fingerprint.

Open the CHARON Virtual Machines Manager, switch to the "Host Information & Utilities" tab and press the "License Update Tool" button:

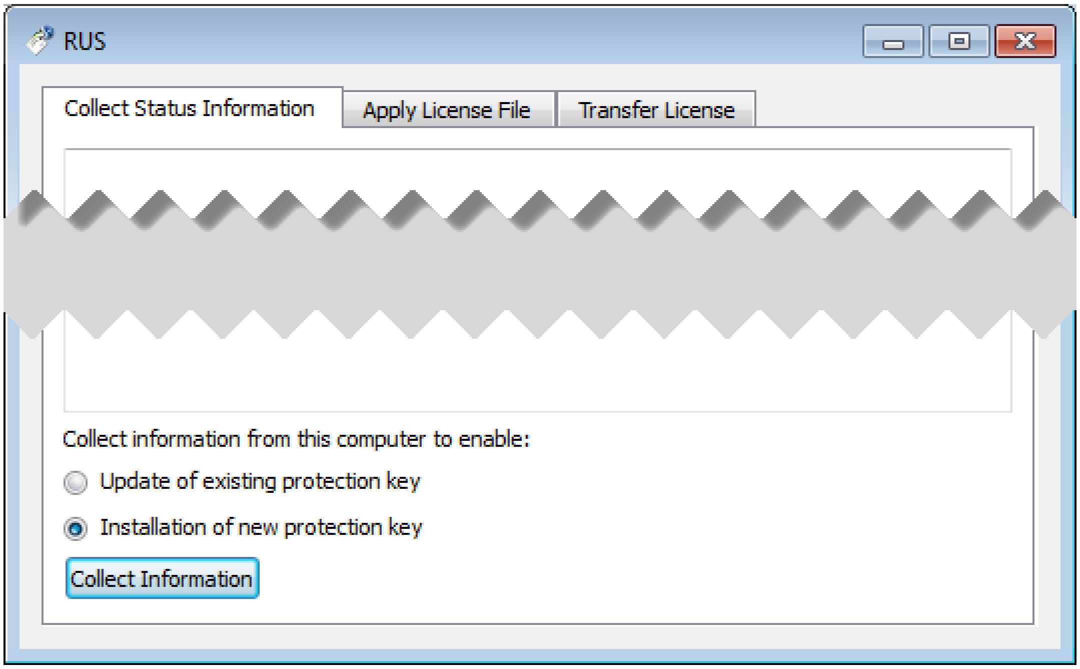


```
The list of CHARON emulators:

CHARON-AXP, 4.10.20200:
  AlphaServer GS80,  AlphaServer GS320,  AlphaServer GS160,  AlphaServer ES45,  AlphaServer ES40,  AlphaServer DS25,  AlphaServer DS20,
  AlphaServer DS15,  AlphaServer DS10L,  AlphaServer DS10,  AlphaServer 800,  AlphaServer 4100,  AlphaServer 4000,  AlphaServer 400,
  AlphaServer 2100,  AlphaServer 2000,  AlphaServer 1200,  AlphaServer 1000A,  AlphaServer 1000


The list of most recent installed components and tools:

Sentinel HASP Run-Time environment version: 7.80.78022.1

HASP License Details application (hasp_view) v. 1.31

License Update tool (hasp_rus) v. 7.3

Network Control Center application (netdiag) v. 1.54

CHARON device check application (devcheck) v. 1.5

Virtual Disk tool (mkdskwin) v. 2.19
```

Collecting the host fingerprint and information on an existing license

Open the "Collect Status Information" tab.

Select either "Update of existing protection key" to acquire information on the current hardware of software license or "Installation of new protection key" to get information on the host system.

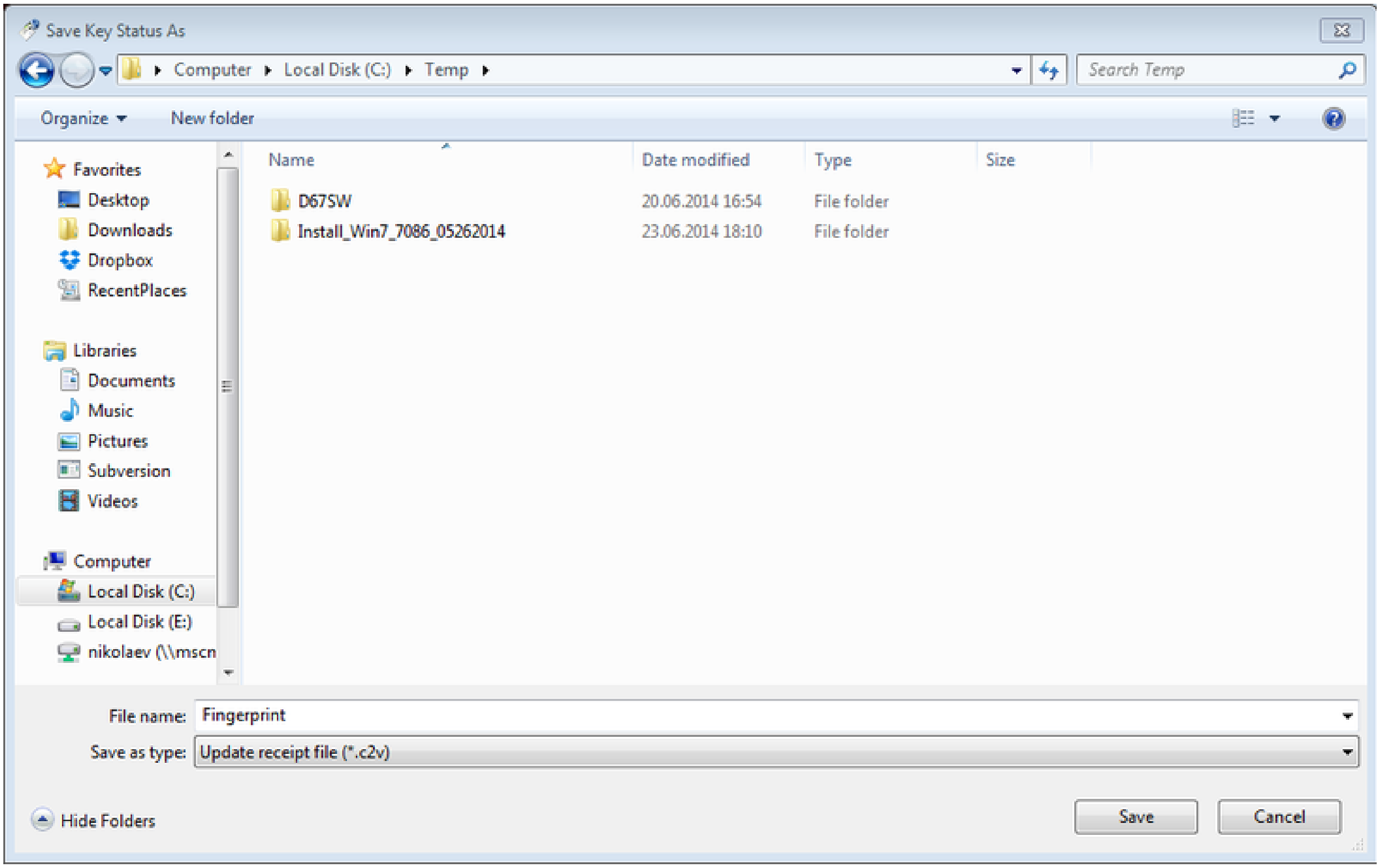


Collect information from this computer to enable:

○ Update of existing protection key

● Installation of new protection key

Press the "Collect Information" button and save the fingerprint or the information on the current license to a "*.c2v" file:



Name	Date modified	Type	Size
D67SW	20.06.2014 16:54	File folder	
Install_Win7_7086_05262014	23.06.2014 18:10	File folder	

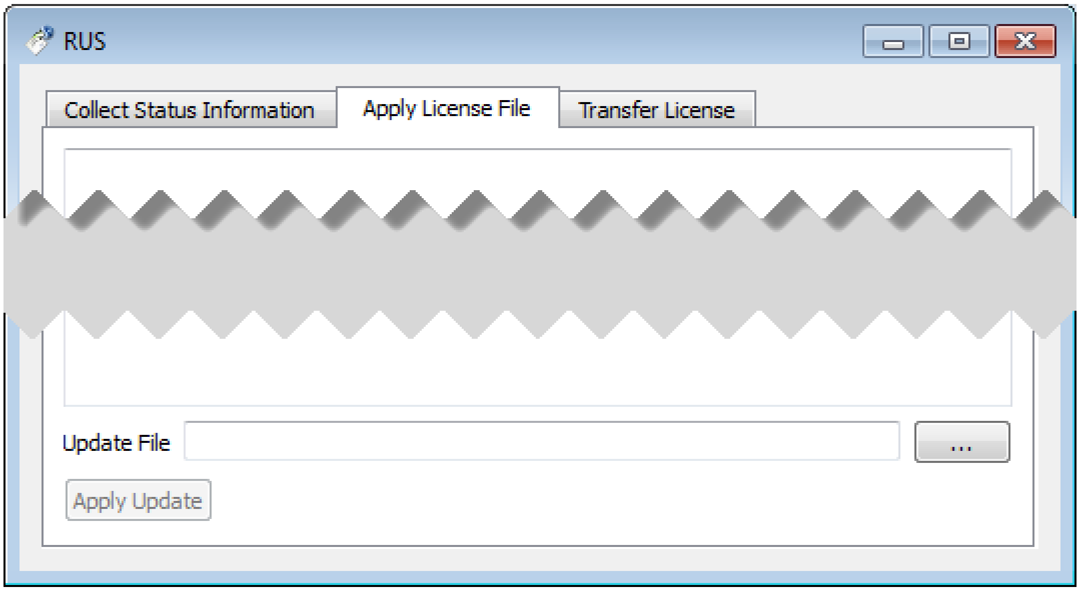
File name: Fingerprint

Save as type: Update receipt file (*.c2v)

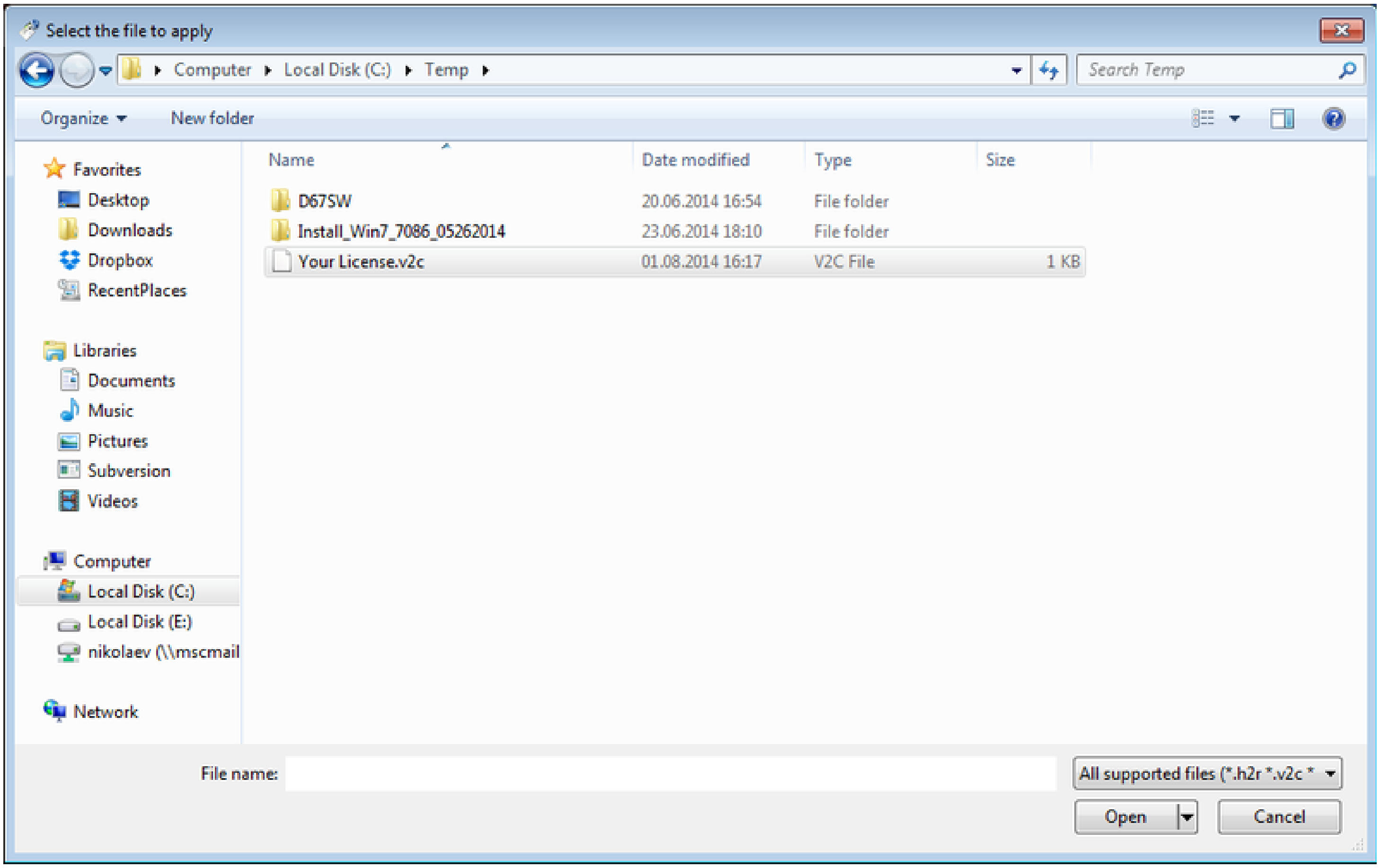
Press the "Save" button to create the "*.c2v" file and send this file to STROMASYS to receive an update of the current license or a new license.

Installation and update of a CHARON license

Open the "Apply License File" tab and press the "..." button:



Select the license "*.v2c" file received from STROMASYS:



Select the file to apply

Computer ▸ Local Disk (C:) ▸ Temp ▸

Name	Date modified	Type	Size
D67SW	20.06.2014 16:54	File folder	
Install_Win7_7086_05262014	23.06.2014 18:10	File folder	
Your License.v2c	01.08.2014 16:17	V2C File	1 KB

File name:

All supported files (*.h2r *.v2c *

Press the "Open" button and then the "Apply Update" button in the main dialog box to apply the new license or to update an existing one.

In case you receive 2 files to update the license, install the "_fmt" (format) one first then the second one.

License expiration check

Introduction

The license expiration check utility is provided with the CHARON-AXP V4.10 kit, this utility will execute once a day at 09:00 AM and will send Windows Application Events 15 days before expiration. No other action will be taken unless you customize the `expiredlicense.bat` script. The utility can be found in the Charon installation folder under the "Redistributables\Stromasys" child folder.

The installation process is described below. It is recommended not to update the example files given with the kit as they could be overwritten by a patch installation or product upgrade. It is preferable to copy them in a dedicated folder.

Version: 1.16 - **Published**: 22 Jul 2020

Table of contents

Description

The goal of this Powershell script is to read the license content and send alerts 15 days (by default) before expiration. This document is related to the kit versions 1.9 to 1.16.

Alerts consist in:

- Adding a Windows Event entry in the Application log
- Executing a customized script named "`expiredlicense.bat`" that can execute actions at your convenience: send an email, send an event to a monitoring software, etc...

Alert levels:

Days before expiration (date limited license)	Hours before expiration (time limited license)	Alert level
Between 7 and number of days defined (15 by default)	Between 73 and 96 hours	Informational
Between 3 and 7	Between 49 and 72 hours	Warning
Less than 3 and expired	Less than 49 and expired	Error

Related products:

Charon-AXP and Charon-VAX/PDP V4.5 and above

Operating systems:

Windows 7, Windows 8.1, Windows 10 Professional, Windows Server 2008 R2, Windows Server 2012 (R2), Windows Server 2016, Windows Server 2019

Step-by-step guide

Installation

- Create a folder dedicated to store the scripts, for example: "`C:\Charon`"
- Download the kit from our SFTP server (please ask us connection credentials if you have no access) and extract all files in this folder.
  The kit contains some files, their usage is described further in this document.
- Optionally create the "`expiredlicense.bat`" file in the same folder and customize it at your own (to send emails for example).

  If the script does not exist, a warning event will be posted but it will not prevent the script from running. In this case only Windows Application events will be sent.

  Below is a simple example to append entries in a log file. You will find further in this article an example on how to send an email using powershell.

  ```
  echo %date% %time% %1 %2 >> C:\Charon\expiredlicense.log
  ```

  Notes:
  - "%1" corresponds to the severity level and can be "informational", "warning" or "error"
  - "%2" corresponds to the alert message containing the license number, the product name and the expiration status

Interactive check

- Open a command line window
- Move to the folder you created, example: `C:\Charon`
- Execute the powershell script. The following parameters can be passed to the script:
  - "`-folder`" is used to specify where the scripts (.ps1 and .bat) are stored. If not specified, default is "`C:\Charon`"
  - "`-nbdays`" is used to specify the number of days before expiration to start sending alerts, default is 15
  - "`-nbhours`" is used to specify the number of hours before expiration of a backup/spare license (time limited) to start sending alerts, default is 96. Must not be lower than 72.
  - "`-usevanilla`" is used in case the `hasp_view.exe` program is not able to provide the expiration date in the output file (bug found in builds 18304 and 18305 with `hasp_view.exe` version 1.26). In this case, the script will use the `hasp_view.exe` program located in the "*`xxxxx`*`_ORIGINALS_`*`xxx`*`_PATCH_`*`xxx`*" folder (example: `B18302_ORIGINALS_AXP_PATCH_X64`). The bug is solved with `hasp_view.exe` version 1.27 and later.
  - "`-haspview` *`<hasp_view.exe location>`*" is used to specify the location of the `hasp_view.exe` file. If this parameter is not specified then the script searches for the location itself depending on Charon installation folder. It is used in case a license server performs the checks instead of the server hosting the Charon virtual machines. The "`-usevanilla`" parameter is ignored if this parameter is defined.
  - "`-ini` *`<file>`*" is used to specify a file where the `-folder`, `-nbdays`, `-nbhours`, `-usevanilla`, `-haspview` and `-tick` parameters can be stored. Priority goes to the parameters passed in the command line then those in the specified file. The file is used to facilitate updates in the parameters passed in the tasks scheduler (update the file instead of the task).
  - "`-tick`" parameter is used to execute external script (`expiredlicense.bat`) even if no alert is detected (counter alert for monitoring software). If used in the .ini file, "1", "y", "yes" or "true" value activates it, other values will invalidate (**Example**: `tick=true`)

> To run PowerShell scripts (files that end with .ps1), you must first set the execution policy to Unrestricted (This operation has to be done once).
>
> To do so, open a command line window (cmd.exe) as an Administrator and use the following command:
>
> ```
> c:\Charon>powershell -command "Set-ExecutionPolicy Unrestricted"
> ```
>
> The ExecutionPolicy can also be set to "`RemoteSigned`". In this case the `.ps1` script files will have to be unblocked as described below.
>
> If you are still prompted to allow for execution of the script, please run the following command to unblock the downloaded `charon_expchk.ps1` file:
>
> ```
> c:\Charon>powershell -command "Unblock-File -path c:\charon\charon_expchk.ps1"
> ```

Example:

```
c:\Charon>powershell -file charon_expchk.ps1 -folder c:\charon -nbdays 20
```

If the license is not readable (dongle not connected for example), the script will end with an "Unable to generate the license view from hasp_view.exe!" error, an entry will be added to the Windows Event Application log and the `expiredlicense.bat` script will be executed.

If no script error is detected, it is now possible to create a new scheduled task.

Scheduled task creation

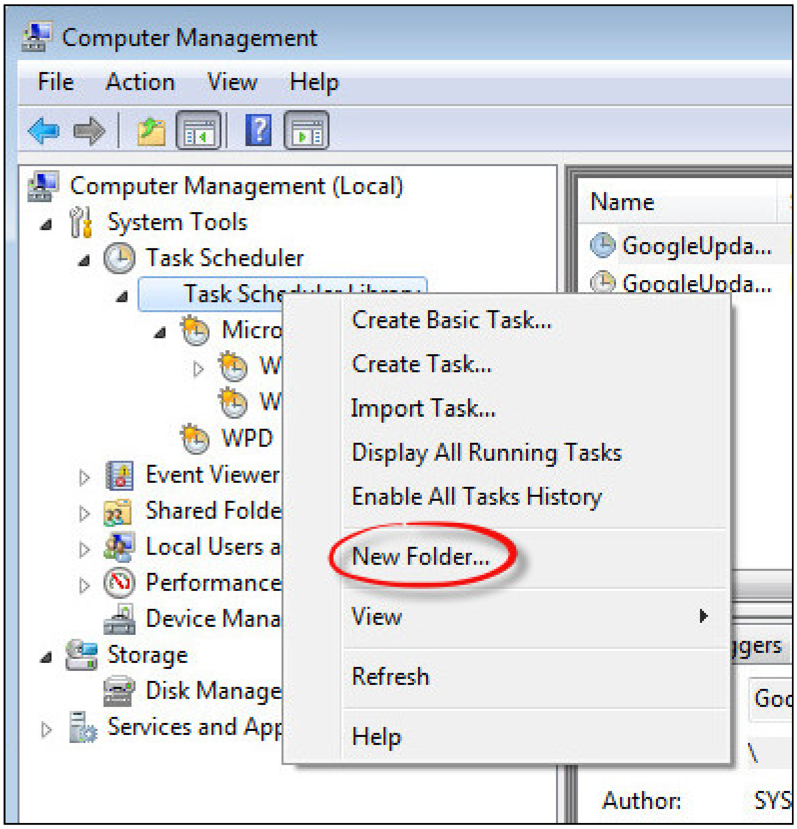
Scheduled task creation using the Graphical User Interface

To set this,

- either open the Administrative tools under Control Panel and select "**Task Scheduler**" or
- execute `taskschd.msc` from the Windows run command (press Windows key + R)

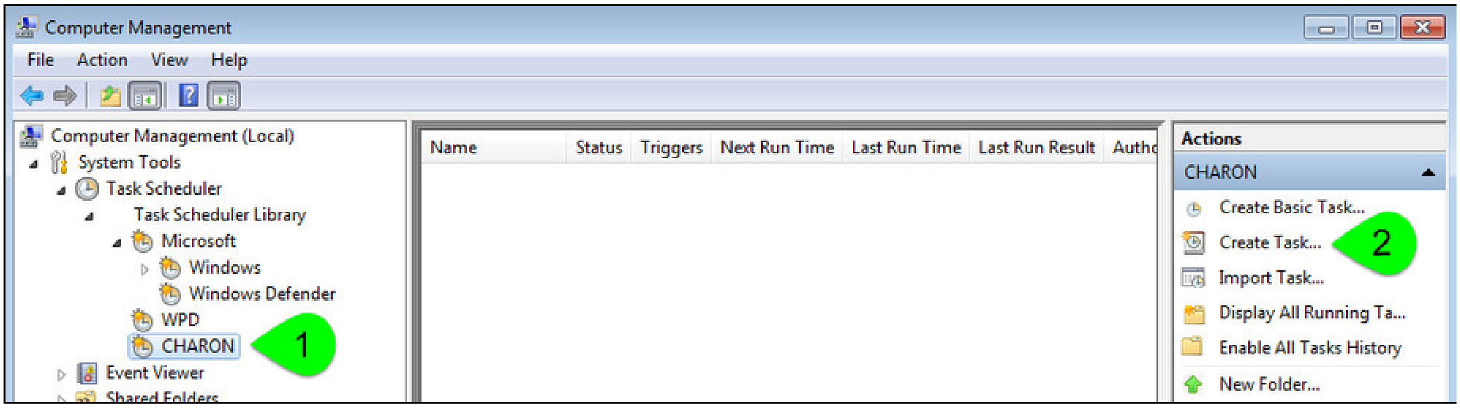
Examples are given based on a Windows 2008 R2 server

Right click on **Task Scheduler Library**, select New folder then enter **CHARON**.

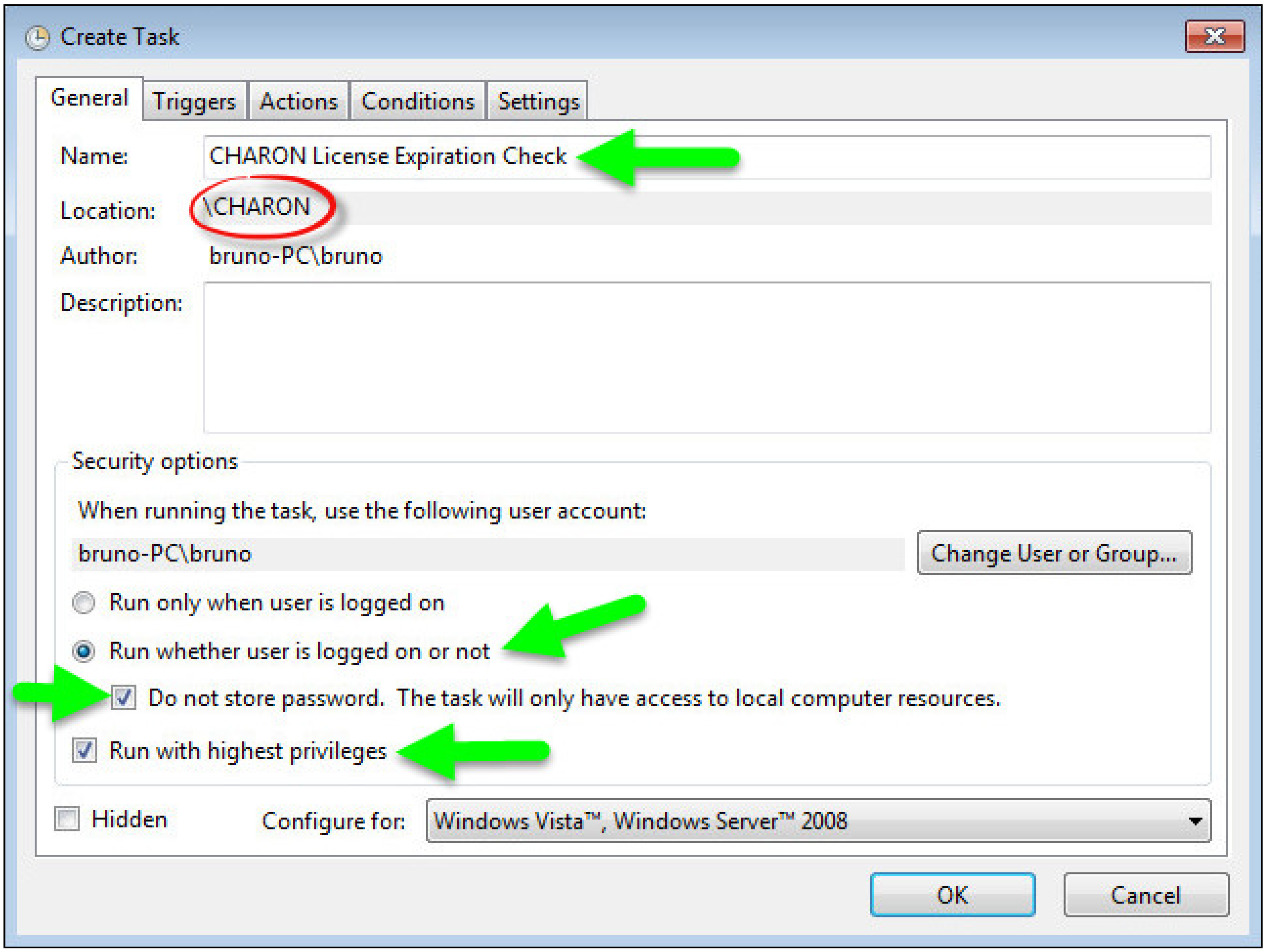


Select the newly created folder (**1**) and on the right pane, select "**Create Task...**" (**2**).

Do not use "Create Basic Task..." some of the options required aren't available in that wizard.



Fill the **General** tab as below:



Name: CHARON License Expiration Check

Location: \CHARON

Author: bruno-PC\bruno

Description:

When running the task, use the following user account:

bruno-PC\bruno

○ Run only when user is logged on

● Run whether user is logged on or not

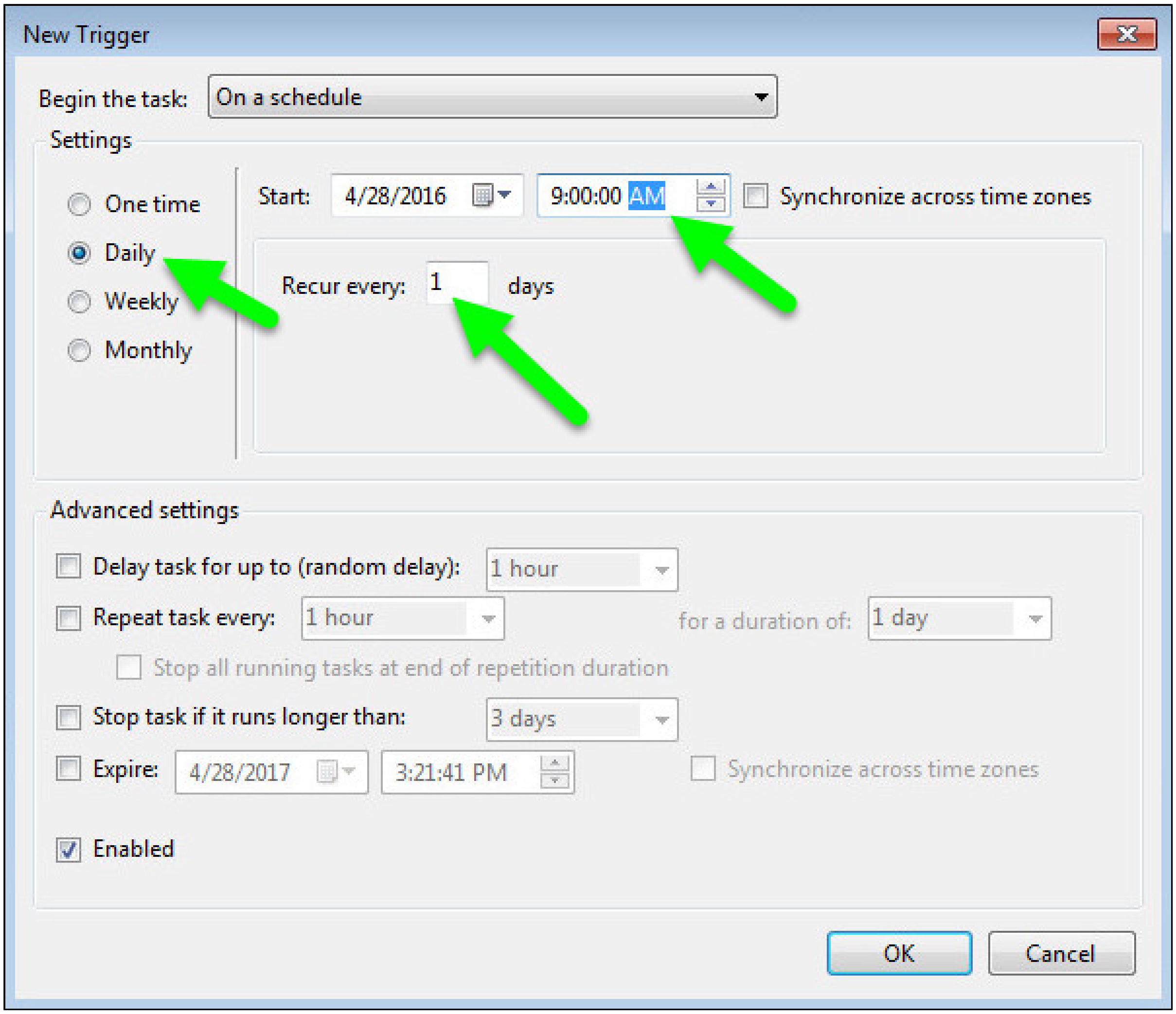
☑ Do not store password. The task will only have access to local computer resources.

☑ Run with highest privileges

□ Hidden

Configure for: Windows Vista™, Windows Server™ 2008

Select the **Triggers** tab and set the check interval, for example here: everyday at 09:00 AM



Begin the task: On a schedule

○ One time
● Daily
○ Weekly
○ Monthly

Start: 4/28/2016 9:00:00 AM □ Synchronize across time zones

Recur every: 1 days

□ Delay task for up to (random delay): 1 hour

□ Repeat task every: 1 hour for a duration of: 1 day

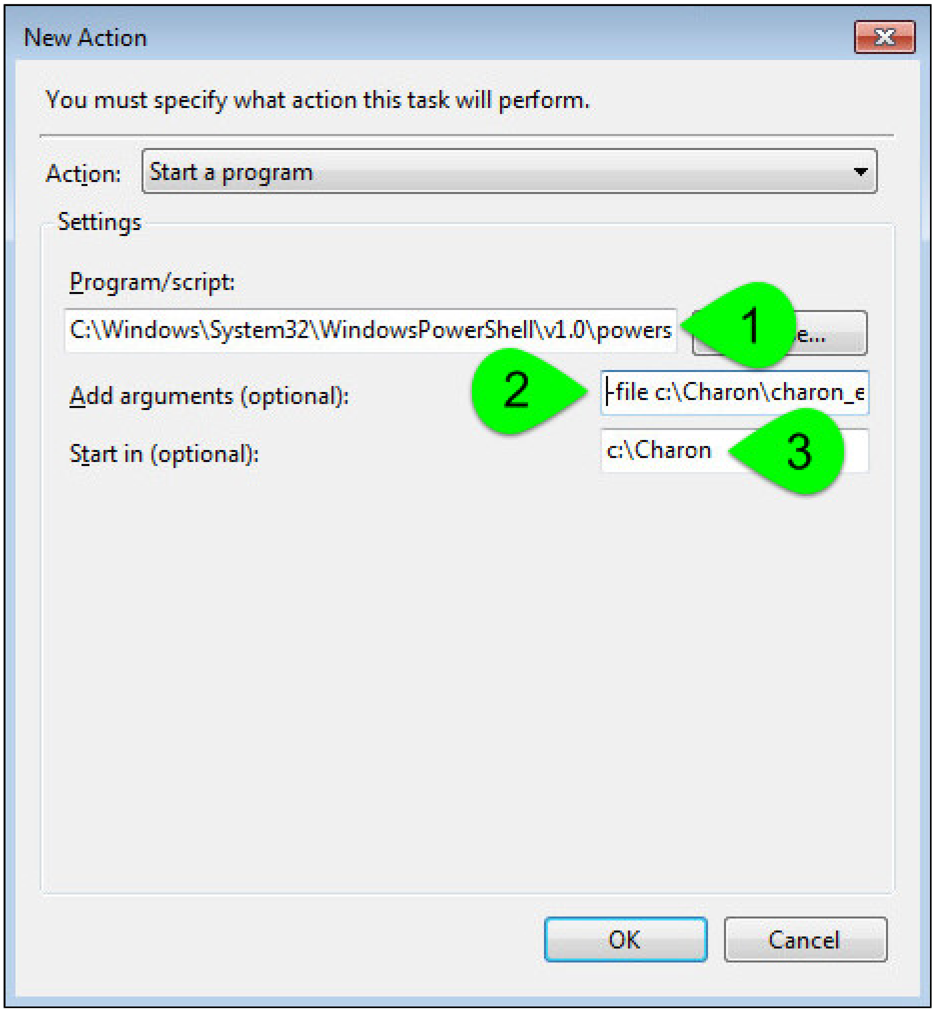
□ Stop all running tasks at end of repetition duration

□ Stop task if it runs longer than: 3 days

□ Expire: 4/28/2017 3:21:41 PM □ Synchronize across time zones

☑ Enabled

Select the **Actions** tab and configure powershell to be executed with the following parameters:



New Action

You must specify what action this task will perform.

Action: Start a program

Settings

Program/script: C:\Windows\System32\WindowsPowerShell\v1.0\powers

Add arguments (optional): -file c:\Charon\charon_e

Start in (optional): c:\Charon

(**1**) : Powershell location here is "`C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe`"

(**2**) : Define the powershell arguments to be added: `-file c:\Charon\charon_expchk.ps1 -folder c:\Charon` (the folder parameter is optional here as it is the same as the default folder)

(**3**) : Set the folder to be the one where the scripts reside

Once the task is created, it is recommended to right click on the task then "Run". To verify the script ran correctly, please check the existence of the "`charon_expchk.txt`" file in the installation folder (it should contain the license view, if the license is present) and check for events in the Windows Event Application log if any.

Scheduled task creation using the Character User Interface

Open a command line window (cmd.exe) and execute the following command:

```
c:\Charon>schtasks /create /SC DAILY /ST 09:00 /NP /RL HIGHEST /TN "CHARON\CHARON License Expiration Check" ^
More? /TR "C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -file c:\Charon\charon_expchk.ps1 -folder c:\Charon"
```

Update the schedule type (/SC) and time (/ST) to your desired settings

Start the task as shown below:

```
c:\Charon>schtasks /run /TN "CHARON\CHARON License Expiration Check"
```

To verify the script ran correctly, please check the existence of the "`charon_expchk.txt`" file in the installation folder (it should contain the license view, if the license is present) and check for events in the Windows Event Application log if any.

Configuration file example

In the following example, the parameters/values are stored in the `c:\charon\charon_expchk.ini` file.

Example:

```
#Folder where the scripts are located
folder=C:\Charon

# Number of days before expiration alert
nbdays=21

# Location of the hasp_view.exe file if Charon is not installed
haspview=C:\Charon

# Send an alert even if no license is about to or has expired
tick=true
```

To execute the script with the .ini file, use the following command:

```
c:\Charon>powershell -file c:\charon\charon_expchk.ps1 -ini c:\charon\charon_expchk.ini
```

To create the scheduled task, open a command line window (cmd.exe) and execute the following command:

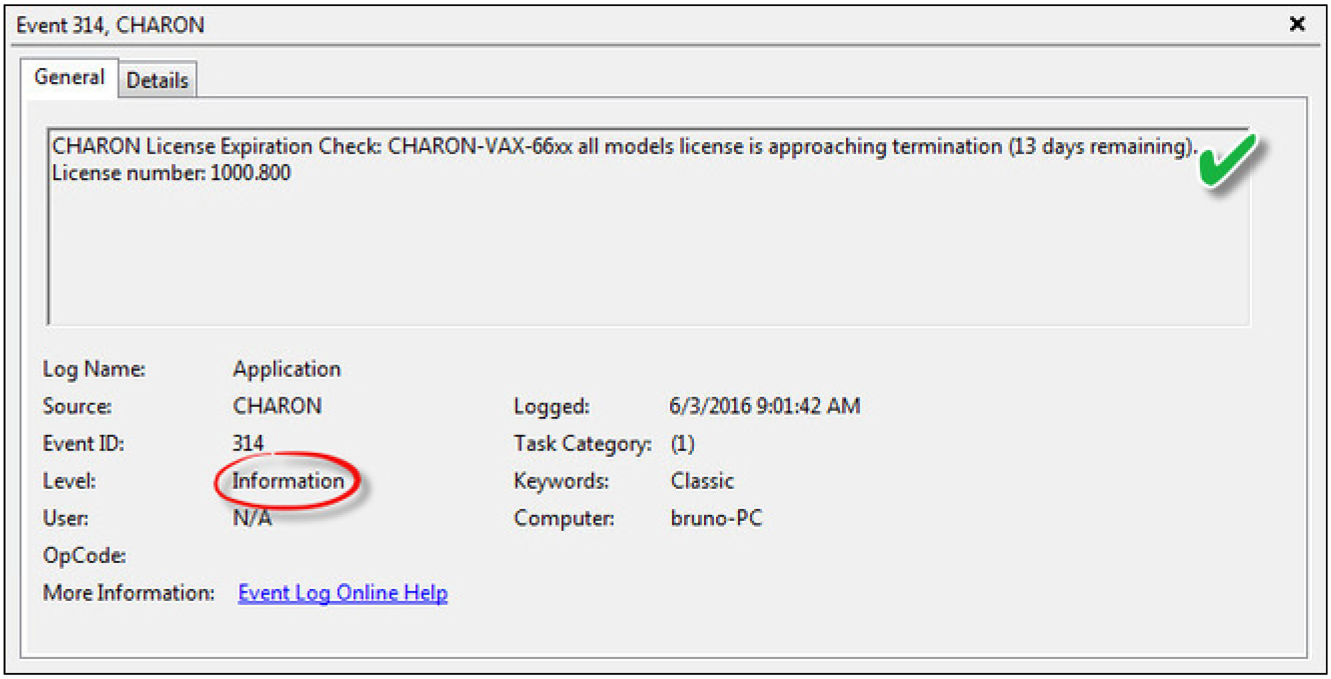
```
c:\Charon>schtasks /create /SC DAILY /ST 09:00 /NP /RL HIGHEST /TN "CHARON\CHARON License Expiration Check" ^
More? /TR "C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -file c:\Charon\charon_expchk.ps1 -ini c:
\Charon\charon_expchk.ini"
```

Hints

To verify the script is correctly working and to force the creation of a Windows event, and eventually the execution of the "`expiredlicense.bat`" file, you can:

- either play with the removal of the dongle (if there is, that is no Software License)
- or with the number of days (if the license is not unlimited)
- or you can specify a folder that does not exist.

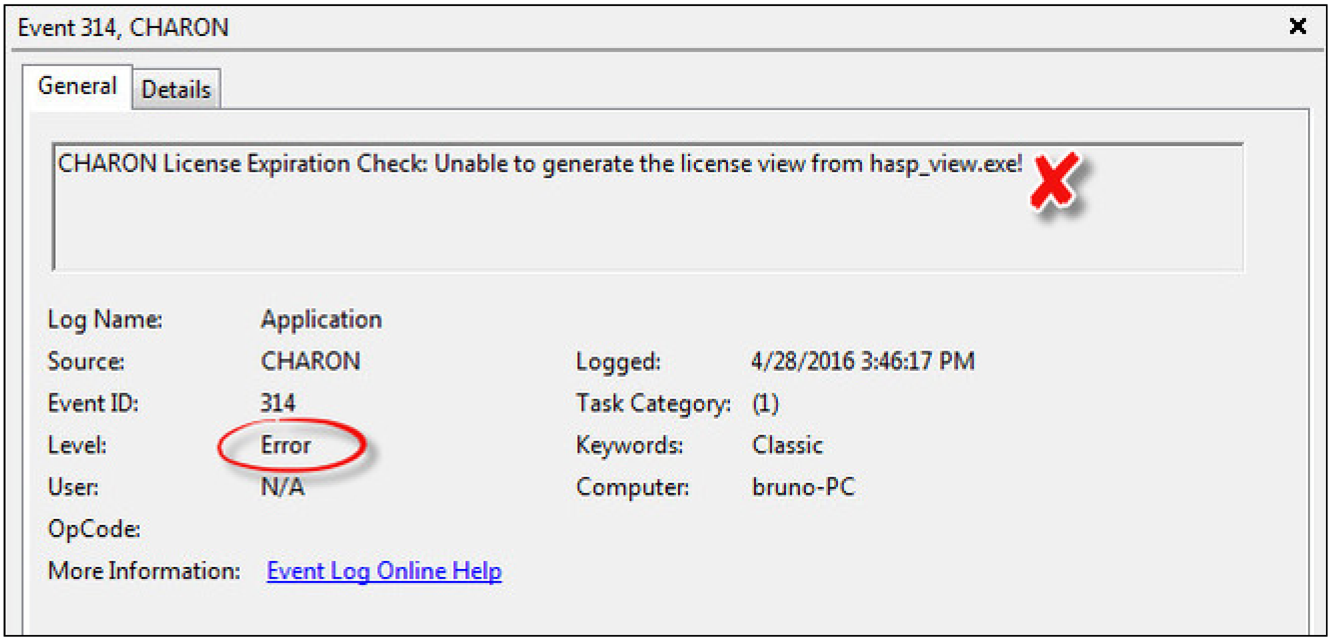
Windows Event Application log example - Information alert:



CHARON License Expiration Check: CHARON-VAX-66xx all models license is approaching termination (13 days remaining).
License number: 1000.800

Log Name:	Application		
Source:	CHARON	Logged:	6/3/2016 9:01:42 AM
Event ID:	314	Task Category:	(1)
Level:	Information	Keywords:	Classic
User:	N/A	Computer:	bruno-PC
OpCode:			
More Information:	Event Log Online Help		

Windows Event Application log example - License dongle not connected:



CHARON License Expiration Check: Unable to generate the license view from hasp_view.exe!

Log Name:	Application		
Source:	CHARON	Logged:	4/28/2016 3:46:17 PM
Event ID:	314	Task Category:	(1)
Level:	Error	Keywords:	Classic
User:	N/A	Computer:	bruno-PC
OpCode:			
More Information:	Event Log Online Help		

Sending alerts via email - example

Using Powershell we can send alerts via email. You will find below an example with configuration steps.

Configuration details:

- Windows 2008 R2 server
- Powershell V4.0 installed.
    - ⚠ This version is required to have the "-port" option available from the "send-mailmessage" powershell command.
    - To determine which version of Powershell is installed and upgrade if necessary, see Powershell version, upgrade, enabling scripts execution, tips and tricks
- Email account hosted on Office365

Email account password encryption

Due to the email account settings, to be able to send an email we need to generate a CliXML file that will store the encrypted password as described below.

ℹ This file will only be valid for the current user and machine. The following operations must be performed using the same user as the author of the scheduled task.

❓ The "<monitoring-account>@<somewhere>" value must be adapted to your configuration

❓ When you will execute the "get-credential" command, you will be prompted to store the password of the corresponding email account, that is the "sender".

```
C:\Charon>powershell
Windows PowerShell
Copyright (C) 2014 Microsoft Corporation. All rights reserved.

PS C:\Charon> $From="<monitoring-account>@<somewhere>"
PS C:\Charon> $Creds=(get-credential -credential $From)
PS C:\Charon> $Creds | Export-CliXML C:\Charon\creds.clixml
PS C:\Charon> exit
C:\Charon>exit
```

⚠ If the sender's email address or its password has to be changed, the .clixml file will have to be recreated.

Powershell script used to send emails

Create a Powershell script named "`sendmail.ps1`" in the "`c:\Charon`" folder for example.

The sender ($From) and recipient ($To) values must be adapted to your configuration

```
Param(
  [string]$lvl = "Information",
  [string]$msg = "no message"
)

$Hostname = (Get-Item env:\COMPUTERNAME).value
$Creds = Import-clixml C:\Charon\creds.clixml

#--- Customize the values below: "From" and "To" -----------------------------
$From = "<monitoring-account>@<somewhere>"
$To = "<someone>@<somewhere>"
#----------------------------------------------------------------------------

send-mailmessage -to $To -from $From -subject "CHARON License Expiration Check for $Hostname ($lvl)" -body "$msg" -credential
$Creds -smtpserver smtp.office365.com -usessl -port 587 -delivery none
```

> If you have to specify multiple recipients, an array has to be used as described below.
>
> **Example1**:
>
> `$To = @( "James T. Kirk <kirk@uss-enterprise.fed>", "Spock <spock@uss-enterprise.fed>" )`
>
> **Example2**:
>
> `$To = @( "kirk@uss-enterprise.fed", "spock@uss-enterprise.fed", "uhura@uss-enterprise.fed" )`

The example shown above and another one given with embedded html code and colored email body are part of the kit downloaded previously.

> Office365 email account is given here as an example but you can use "gmail" also and create a free dedicated account to send alerts. In this case the last line of the script(s) above has to be updated: the "`-smtpserver`" parameter has its "`smtp.office365.com`" value to be replaced by "`smtp.gmail.com`" (no other value to update)
>
> ⚠ Google may block sign-in attempts when using powershell and send-mailmessage. In this case the sender will receive a "Sign in attempt prevented" alert email. To allow emails to be sent:
>
> 1. Create a dedicated gmail account
> 2. Allow less secure apps to access your account. See this article: https://support.google.com/accounts/answer/6010255?hl=en

expiredlicense.bat file settings

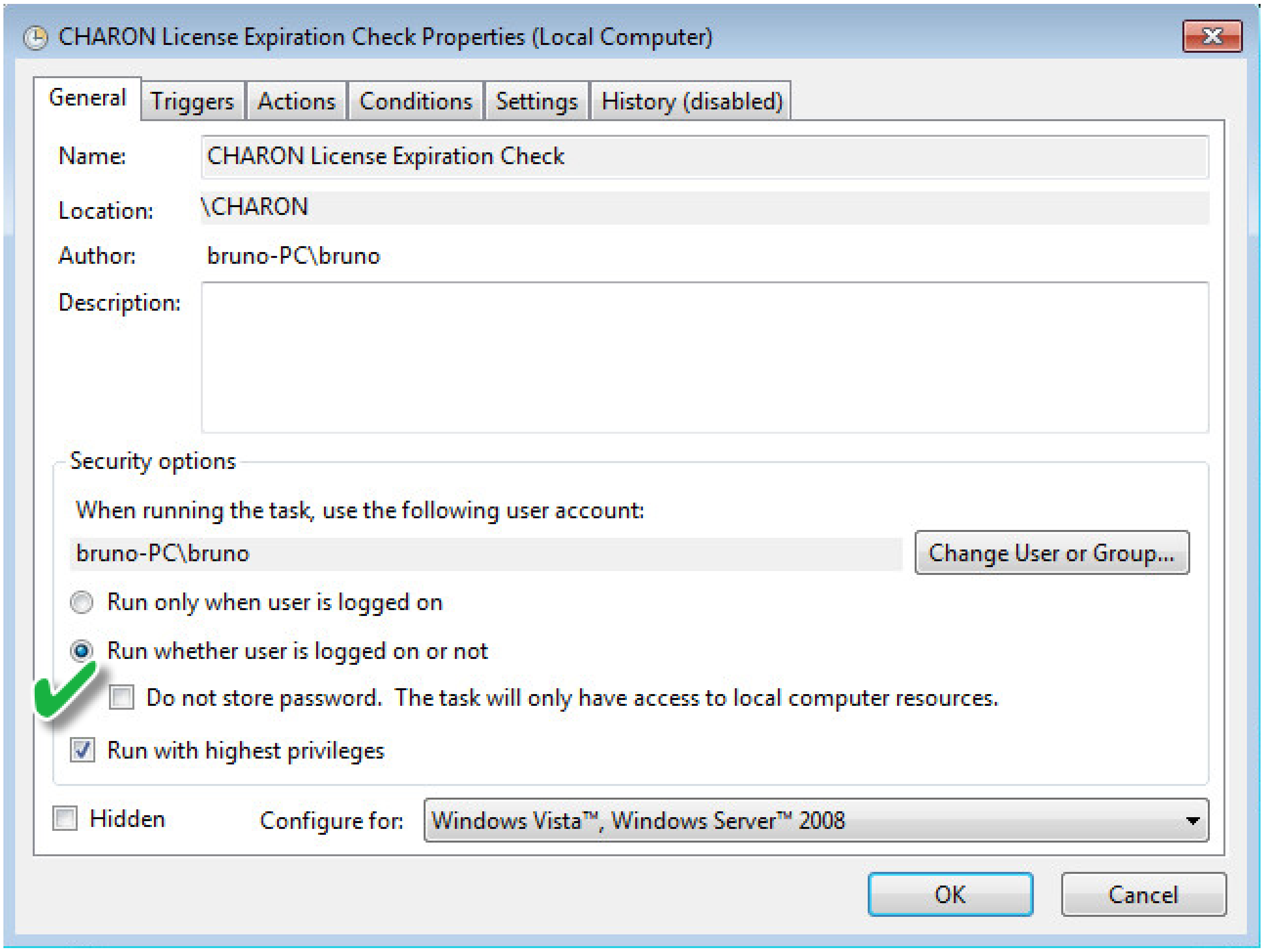
Add the following line in the "`expiredlicense.bat`" file:

```
powershell -NonInteractive -file c:\charon\sendmail.ps1 -lvl %1 -msg %2
```

This .bat file can be found in the kit downloaded previously.

Scheduled task settings update

This time, the **General** tab of the Scheduled task has to be updated in order to store the password and to be able to send the email:



CHARON License Expiration Check Properties (Local Computer)

Name: CHARON License Expiration Check

Location: \CHARON

Author: bruno-PC\bruno

Description:

Security options

When running the task, use the following user account:

bruno-PC\bruno

○ Run only when user is logged on

● Run whether user is logged on or not

✓ □ Do not store password. The task will only have access to local computer resources.

☑ Run with highest privileges

□ Hidden

Configure for: Windows Vista™, Windows Server™ 2008

You will be prompted to store the password of the author.

This can also be done using the command line:

```
c:\Charon>schtasks /change /TN "CHARON\CHARON License Expiration Check" /rp <password>
```

Related articles

- How-to install Charon license expiration check on a Linux server
- Charon Log monitoring on Windows (logmond) - Best practices for V4.9 to V4.11
- CHARON on Windows - Automated License Expiration Check
- CHARON on Windows - Automated License Expiration Check - Release Notes
- USB over IP boxes and Charon license dongles usage

mtd

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General Description

"`mtd`" is a command line utility to:

- Create a CHARON tape image from a physical tape.
- Write a tape image to a physical tape.
- Convert tape images formats.
- Test a tape container integrity.

To start the utility open "`cmd.exe`" in the Start menu and switch to the CHARON installation folder then the "`\Build_XXX\xXX`" child folder where the utility is located.

Usage

The following are examples of the usage syntax:

Dump tape content to file:

```
...> mtd [options] <tape device name> <tape container name>
```

Restore dump to tape:

```
...> mtd [options] <tape container name> <tape device name>
```

Convert formats:

```
...> mtd [options] <tape container name> <tape container name>
```

Examine tape dump and check its integrity:

```
...> mtd [options] <tape container name>
```

Options:

Parameter	Description
`-l <file name>`	Creates a log file. The name is "file name".
`-r <number>`	Specifies a number of attempts to read a damaged data block
`-i`	Ignore bad blocks and continue processing w/o interruption. It implies "-r 0"
`-n`	Do not rewind tape
`-p`	Disable progress reporting
`-v`	Enable verbose tracing of data transfer (implies "-p")
`-s`	Write tape image in Charon-AXP/SMA (named SMA further) format
`-g`	Gather statistics and print upon completion
`-a`	Do not print logo

Examples:

```
...> mtd -l tape1.txt -r 10 \\.\Tape0 "C:\Charon\Tapes\tape1.vtape"
```

```
...> mtd "C:\Charon\Tapes\tape1.vtape" \\.\Tape0
```

Tape container formats transfer

Use the following syntax to transfer the CHARON-AXP/SMA tape container format to the CHARON-AXP/VAX/PDP one:

```
...> mtd <SMA tape container name> <AXP/VAX/PDP tape container name>
```

Example:

```
...> mtd C:\charon\tapes\sma_tape.vtape C:\charon\tapes\axp_tape.vtape
```

Use the following syntax to transfer the CHARON-AXP/VAX/PDP tape container format to the CHARON-AXP/SMA one:

```
...> mtd -s <AXP/VAX/PDP tape container name> <SMA tape container name>
```

Example:

```
...> mtd -s C:\charon\tapes\axp_tape.vtape C:\charon\tapes\sma_tape.vtape
```

CHARON Log Monitor and Dispatcher

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General Description

The Log Monitor & Dispatcher is a special program which monitors a guest LOG file produced by CHARON and executes a custom script when it detects removal of a license.

It runs in the background (as a program or as a service) and periodically scans a specified LOG file. It detects the following messages and executes the associated scripts (created manually):

Error code	Description	Script executed
`00000424`	Detected removal of a license.	`nolicense.bat`
`0000040B`	License has changed. License detected and online.	`license_changed.bat`

The Log Monitor & Dispatcher service is installed as EmulatorLogMonitor. By default it is installed in such a way that requires explicit actions to be started (either through a command line interface or using the standard ways of service management). For unattended execution, change the service's configuration so that Windows starts the service automatically.

ℹ The tool requires the specific files "`nolicense.bat`" and "`license_changed.bat`" containing specific instructions to be taken in situation of license absence or change. It is recommended you create these files in the folder (presumably) containing the LOG file.

When it is invoked by the “Log Monitor & Dispatcher”, the current directory of the batch process is set to the same folder from which the “Log Monitor & Dispatcher” was previously installed as a service or from which it was started as a background process. This means that the user action file may, in principle, operate with relative paths and relocate (as part of the whole configuration, i.e. together with accompanying LOG file).

⚠ The user action file will not invoke interactive applications as it may run in an environment where interactive services do not work, for example: when “Log Monitor & Dispatcher” is installed as a service.

Starting in background mode

In order to **start** the Log Monitor & Dispatcher as a background application:

1. Open "cmd.exe" from the "Start" menu.
2. Change current directory to the folder (presumably) containing the CHARON configuration file.
3. Start the Log Monitor & Dispatcher using the following command line as an example:

   For single log file:

```
...> “C:\Program Files\CHARON\Build_XXX\x64\logmond” C:\my_charon.log
```

For rotating log file:

```
...> “C:\Program Files\CHARON\Build_XXX\x64\logmond” -l <log-directory> -p <log-prefix>
```

where:

- <log-directory> is the directory where the rotating log files are stored
- <log-prefix> is the same as the "configuration_name" value in corresponding CHARON configuration file (or "hw_model", if "configuration_name" is not specified).

Example:

```
...> “C:\Program Files\CHARON\Build_XXX\x64\logmond” -l "C:\My CHARON logs" -p "MY_VAX"
```

To stop the Log Monitor & Dispatcher application, open the Task Manager, find the “logmond.exe” process and terminate it.

Installing as a service

In order to install the Log Monitor & Dispatcher as a background application:

1. Open "cmd.exe" from the "Start" menu in "Run as Administrator" mode.
2. Install Log Monitor & Dispatcher service using the following command line as an example:

```
...> “C:\Program Files\CHARON\Build_XXX\x64\logmond” -r
...> “C:\Program Files\CHARON\Build_XXX\x64\logmond” -i
```

As result the "logmond" service has "Manual" service start type. Use Windows service management tools to change this mode to "Automatic" if it is required.

⚠

- There will have one `logmond` father process that will scan the virtual machines services and one `logmond` process per log monitored.
- The `EmulatorLogMonitor` service running the `logmond` processes will discover already installed CHARON virtual machines services. If a new virtual machine service is added, it's log file will be automatically discovered and monitored.
- The "`nolicense.bat`" and "`license_changed.bat`" files have to be placed in the virtual machine "Home directory". This directory corresponds to the configuration file folder when the service is installed, however it will not change if the configuration file is relocated and the service is updated. To find this "Home directory", open the "CHARON Service Manager" utility, right click on the corresponding service and select "View configuration"

Starting the Log Monitor and Dispatcher service

In order to start the Log Monitor & Dispatcher as a background application:

1. Open "cmd.exe" from the "Start" menu in "Run as Administrator" mode.
2. Start the Log Monitor & Dispatcher service using the following command line as an example:

```
...> "C:\Program Files\CHARON\Build_XXX\x64\logmond" -u
```

It is also possible to use Windows service management tools to start up the service.

As soon as "logmond" service is installed this way, and started, it monitors all CHARON instances (provided that these are installed as services).

It does NOT monitor emulator instances started from Launcher or manually from command line prompt, these cases can still be monitored with "logmond" invoked from command line prompt with name of the log file as an argument (see above).

Stopping the Log Monitor and Dispatcher service

In order to stop the Log Monitor & Dispatcher as a background application:

1. Open "cmd.exe" from the "Start" menu in "Run as Administrator" mode.
2. Stop the Log Monitor & Dispatcher service using the following command line as an example

```
...> "C:\Program Files\CHARON\Build_XXX\x64\logmond" -d
```

It is also possible to use Windows service management tools to stop the service.

Uninstalling the Log Monitor and Dispatcher service

In order to uninstall the Log Monitor & Dispatcher as a background application:

1. Open "cmd.exe" from the "Start" menu in "Run as Administrator" mode.
2. Uninstall the Log Monitor & Dispatcher service using the following command line as an example

```
...> "C:\Program Files\CHARON\Build_XXX\x64\logmond" -r
```

Log Monitor and Dispatcher best practice

Refer to this article in the Appendixes for proper configuration of the "nolicense.bat" file to establish needed actions on the dongle removal.

HOSTPrint

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General Description

The HOSTPrint utility is used to print CHARON output to Windows printers. Typically it receives data from COM2 port of emulated HP Alpha model via a TCP/IP socket and prints the data received on the default Windows printer (if no printer is specified at the utility command line) on the host computer.

Note that the second console line "TTA0" (COM2) is available only for 1 CPU models such as:

- HP AlphaServer 400
- HP AlphaServer 800
- HP AlphaServer 1000
- HP AlphaServer 1000A
- HP AlphaServer DS10
- HP AlphaServer DS10L
- HP AlphaServer DS15

Usage

HOSTPrint calling is specified in the CHARON configuration file. The call implements one or more of the following parameters:

Parameter	Description
-host=<hostname>	Name of the host - source of the printing data.
-port=<connection port number>	Port on the host to get the information to print from.
-delay=<delay for automatically buffer flush in seconds>	Flushing delay, 0 - wait infinite, 5..10800 - timeout for flush

-printer=[PrinterDeviceName]	Host name for the printer used.
	Example 1:
	`-printer=[\\.\Microsoft Office Document Image Writer]`
	Example 2:
	`-printer=[\\print_server\MSCLPS]`

-font=<default font face>	Default font name.
-fontsize=<default font size>	Default font size.

The two last parameters are only used for compatibility with older versions of the utility (HOSTprint allows changing font settings from a popup menu).

> ⚠ It is strongly recommended to use fixed-size fonts (by default the "Courier" font is used) to avoid any problems relevant to proper calculation of the printing line length.

Example of CHARON-AXP configuration file for the HOSTPrint usage:

```
set COM2 alias = TTA0 port = 10000 application = "hostprint.exe -port=10000 -printer=[\\print_server\MSCPS2] -font=\Courier
New\ -fontsize=10"
```

After initialization, HOSTprint creates an icon in the Windows tray. The icon can have two colors:

Color	Description
GREEN	IDLE (or Ready) state
YELLOW	BUSY (processing) mode

*: 💡 To access the HOSTprint application popup menu, point the mouse cursor at its icon in the system tray menu and click the right button, preview the last page content then change the utility mode via the flush buffer delay or change the default font setting.

CHARON Guest Utilities for OpenVMS

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General Description

The "CHARON Guest Utilities for OpenVMS" (CHARONCP) package contains several utilities for managing virtual tapes, changing the emulator speed and creating useful definitions for that operations.

This set of utilities is located in the "`charoncp013.vdisk`" disk file in the "`C:\Program Files\CHARON\Virtual Disk Images\Tape utilities package`" folder.

Supported OpenVMS versions: OpenVMS 6.1 and above.

In case of OpenVMS upgrade, CHARONCP will have to be re-installed.

Installation

Make this virtual disk file recognized by the virtual machine in the CHARON configuration file, boot from the system disk and mount the disk with the following OpenVMS command:

```
$ MOUNT<device name>/OVERRIDE=IDENTIFICATION
```

Issue the following commands to install the package (example given for OpenVMS V8.4):

```
$ @SYS$UPDATE:VMSINSTAL

...

* Are you satisfied with the backup of your system disk [YES]? YES
* Where will the distribution volumes be mounted: <device name>:[CHARONCP013.KIT]

Enter the products to be processed from the first distribution volume set.
* Products: CHARONCP013

* Enter installation options you wish to use (none): <press enter>

...

Do you want to install this product [NO]? YES

...

* Where should the CHARONCP root directory be located ? [SYS$SYSDEVICE:[CHARONCP]]: <press enter>

...

* Do you want to purge files replaced by this installation [YES]? <press enter>
```

Select all the components included in the package:

```
                           Component Selection

Select the CHARONCP components you wish to install from the menu below.
An asterisk appears next to the packages that have already been
selected. You can remove a package from the list by selecting it
again. You may enter more than one selection by separating your
choices with commas.

1. [*] CHARONCP Guest Utility (REQUIRED)
2. [*] Compatability Utilities
3. [*] Install DCL Commands & Help

4. Exit

* Your choice [4]: 1,2,3

…

* Your choice [4]: 4

…

* Is this correct [YES]: <press enter>

…

* Products:<press enter>

        VMSINSTAL procedure done at hh:mn

$
```

Proceed with installation using all the default options.

Once the installation is completed, add the following line to the "SYS$STARTUP:SYSTARTUP_VMS.COM" file for the package to be loaded automatically at system startup:

```
$ @SYS$STARTUP:CHARONCP_STARTUP
```

Performance optimization

CHARON takes 100% of host CPU even in case of idle state of guest OpenVMS operating system. To get rid of such resources consumption there is a specific option provided by CHARON Guest Utilities: "idle" mode.

Command	Description
$ **CHARONCP SET IDLE /ENABLE**	Loads the OpenVMS idle loop detection software. This allows CHARON to detect when the emulated CPU(s) are idle and use the host power saving instructions to reduce power usage.
$ **CHARONCP SET IDLE /DISABLE**	Unloads the OpenVMS idle loop detection software.

Virtual tapes management

Specify mapping to tape container in the following way in the CHARON configuration file:

```
set <adapter name> container[<unit name>] = ".vtape" removable[<unit name>] = true
```

- It is mandatory to set the "`removable`" parameter to "`true`"
- The container name must be "`.vtape`", no name and path must be specified, only extension.

Example:

```
set PKA container[600] = ".vtape" removable[600] = true
```

Once it is done using the following commands it is possible to manage virtual tapes attached to CHARON:

Loading:

Command	$ **CHARONCP SET MAGTAPE** *<device>* **/LOAD=**"*<filename>*.**vtape**" ⚠ The container name specified in the /LOAD parameter must not be more than 255 characters
Description	Create the specified host-file (if it does not already exist) and attach it to the specified virtual tape device. **Example**: $ **CHARONCP SET MAGTAPEMKA600: /LOAD="E:\Charon\Tapes\backup_01.vtape"**

Unloading:

Command	$ **CHARONCP SET MAGTAPE** *<device>* **/UNLOAD**
Description	Detach any file currently attached to te specified virtual tape device. **Example**: $ **CHARONCP SET MAGTAPEMKA600: /UNLOAD**

Possible errors:

Error	Description
`BADFILENAME`	The filename specified as a value to the qualifier `/LOAD` was either too long or does not have a file extension of ".vtape".
`DEVNOTDISM`	Attempting to execute a `SET MAGTAPE/LOAD` command when a file is already attached. Perform a `SET MAGTAPE/UNLOAD` first. If a `SET MAGTAPE/LOAD` command has not previously been executed then the CHARON configuration container specification for the tape device may contain a full path. Doing this will create and attach and initial tape container file. To avoid this, remove the file name from the specification (leaving only a file extension of ".vtape" and optional directory).

If some tape container has been already specified in the CHARON configuration file, use the command "`CHARONCP SET MAGTAPE` *`<device>`* `/UNLOAD`" to unload it first.

Defining keys

It is possible to define certain keys on the terminal keyboard for fast access to the CHARONCP functionalilty while you are in CHARONCP:

Command	Description
$ **CHARONCP** CHARONCP> **DEFINE /KEY** *<key-name> <equivalence-string>*	Defines an equivalence string and a set of attributes with a key on the terminal keyboard. You can have a set of keys defined automatically for use with the CHARONCP utility by placing `DEFINE/KEY` commands in the `SYS$LOGIN:CHARONCP_KEYDEFS.INI` file. **Example**: $ **CHARONCP** CHARONCP> **DEFINE /KEY***F1 "SET MAGTAPE MKA600: /UNLOAD"*
$ **CHARONCP** CHARONCP> **SHOW KEY** *<key-name>*	Displays key definitions created with the `DEFINE/KEY` command. Refer to the DCL help entry for `SHOW KEY` for further information. **Example**: $ **CHARONCP** CHARONCP> **SHOW KEY***F1* DEFAULT key state definitions: F1 = "set magtape mka600: /unload" CHARONCP> ℹ For more information refer to the OpenVMS DCL Dictionary (`DEFINE/KEY` section).

Displaying version

Command	Description
$ **CHARONCP SHOW VERSION**	Displays the CHARONCP package version number and architecture. This can be useful for customers reporting issues with the CHARONCP software. **Example**: $ **CHARONCP SHOW VERSION** CHARONCP version id is: V1.3

CHARON-AXP for Windows configuration details

Introduction

This chapter describes, in detail, the configuration parameters of the devices emulated by CHARON-AXP for Windows, with corresponding examples and parameters.

The emulated devices are loaded with the "load" command (if a device has not been already loaded) and the parameters are made active with the "set" command. These parameters can be specified directly in the "load" command.

Example:

```
load KZPBA DKA
set DKA container[0]="C:\Charon\Disks\BootDisk.vdisk"
```

In this example, an instance of a KZPBA controller is loaded with the name "DKA". Its first unit, "container[0]", is mapped to the "C:\Charon\Disks\BootDisk.vdisk" disk image.

> The Controller name is accompanied with a "/<module name>". The module name is a CHARON-AXP component that specifies the controller load module. Its name can be the same as the loaded controller, however this is not mandatory. Once a module name is specified, there is no need to specify it again for additional references of the same controller.

Details of CHARON-AXP configuration

General Settings

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Session

General settings that control the execution of CHARON Virtual Machine (VM) belong to an object called the "session". It is a preloaded object; therefore, only "set" commands are necessary.

Example:

```
set session <parameter>=<value>
```

The following table describes all available "session" parameters, their meaning and examples of their usage:

hw_model

Parameter	hw_model
Type	Text string
Value	Virtual HP Alpha system hardware model to be emulated. Use a default configuration template for each particular model as a starting point for a custom configuration. This would ensure that the parameter is set correctly. **Example**: `set session hw_model="AlphaServer_ES40"` Available models are: • AlphaServer_AS400 • AlphaServer_AS800 • AlphaServer_AS1000 • AlphaServer_AS1000A • AlphaServer_AS1200 • AlphaServer_AS2000 • AlphaServer_AS2100 • AlphaServer_AS4000 • AlphaServer_AS4100 • AlphaServer_DS10 • AlphaServer_DS10L • AlphaServer_DS15 • AlphaServer_DS20 • AlphaServer_DS25 • AlphaServer_ES40 • AlphaServer_ES45 • AlphaServer_GS80 • AlphaServer_GS160 • AlphaServer_GS320 ℹ Refer to this section to find how to set a particular HP Alpha model supported by CHARON-AXP.

configuration_name

Parameter	configuration_name
Type	Text string

Value	Name of the CHARON VM (it must be unique):
	`set session configuration_name="MSCDV1"`
	⚠ In provided templates this parameter is specified in the included configuration file "configuration_name.icfg".
	The value of this parameter is used as a prefix to the event log file name (see below).
	From the example above, the CHARON VM log file will have the following name:
	`MSCDV1-YYYY-MM-DD-hh-mm-ss-xxxxxxxxx.log`
	xxxxxxxxx is an increasing decimal number starting from 000000000 to separate log files with the same time of creation (in case the log is being written faster than one log file per second).
	⚠ It is strictly recommended to use the "configuration_name" parameter if more than one CHARON VM runs on the same server.

log

Parameter	log
Type	Text string
Value	The log file or directory name is where the log file for each CHARON-AXP execution session is stored.

Log specified as a file name

It is possible to overwrite the existing log file or to extend it using the "log_method" parameter.

The "log_method" parameter is effective only when a single log file is specified, not a directory.

Example:

```
set session log="C:\Charon\es40prod.log"
```

Log specified as a directory

CHARON-AXP automatically creates individual log files for each CHARON-AXP execution session. If the log parameter is omitted, CHARON-AXP creates a log file for each CHARON-AXP execution session in the directory where the emulator was started. In these two cases, the log rotation mode is enabled, meaning a new log file is created each time the virtual machine is started and when the log file size exceeds the one specified (see log_file_size) and/or when the log file is older than a specified number of days (see log_rotation_period).

A shortcut located in the same directory will be created, pointing to the active log file. Its name is based on the hw_model parameter or the configuration_name parameter if specified.

If the "configuration_name" parameter of the sessionis specified, the log file name is composed as follows:

```
<configuration_name>-YYYY-MM-DD-hh-mm-ss-xxxxxxxxx.log
```

If the "configuration_name" parameter is omitted, the log file name will have the following format:

```
<hw_model>-YYYY-MM-DD-hh-mm-ss-xxxxxxxxx.log
```

where "xxxxxxxxx" is an increasing decimal integer, starting from 000000000 to separate log files with the same time of creation (in case the log is being created faster than one log file per second).

Only existing directory can be specified. If the directory specified does not exist, this will be considered as a flat file. No trailing backslash character is allowed.

Example:

```
set session configuration_name="es40prod"

set session log="C:\Charon\Logs"
```

The execution of the virtual machine will create a log file, named `C:\Charon\Logs\es40prod-2016-10-13-10-00-00-000000000.log` (for example) and a shortcut named `C:\Charon\Logs\es40prod.log` pointing to this file. The shortcut will be updated when the log rotation will occur.

log_method

Parameter	log_method
Type	Text string
Value	- "append" (default) - "overwrite" Determines if the previous log information is maintained or overwritten. This parameter must be specified only in addition to the “log” parameter on the same line. This parameter is applicable only if the CHARON VM log is stored to a file that is specified explicitly with the "log" parameter. **Example**: `set session log="log.txt" log_method="append"`

log_show_messages

Parameter	log_show_messages
Type	Text string
Value	- "all" (default) - "info" - "warning" - "error" Defines the message types to be shown. The parameter is a string of comma delimited words. **Example**: `set session log_show_messages="error, warning"`

log_file_size

Parameter	log_file_size
Type	Text string

Value	If log rotation is enabled, the log_file_size parameter determines the log file size threshold at which the log is automatically rotated. Rotating log file size is multiple of 64K
	- "unlimited" or "0" (default) - the feature is disabled
	- "default" - default size is used (4Mb)
	- <size>[KMG] - size of the current log file in bytes with additional multipliers:
	  - K - Kilobyte - multiply by 1024
	  - M - Megabyte - multiply by 1024*1024
	  - G - Gigabyte - multiply by 1024*1024*1024
	Examples:
	`set session log_file_size="default"`
	`set session log_file_size=10M`
	Minimum LOG File size is 64K, maximum is 1G. Setting a size less than 64K effectively makes the log file size unlimited.

log_rotation_period

Parameter	log_rotation_period
Type	Text string

Value	- "default" - default value, 7 days. This value is used even if the "log_rotation_period" is not specified.
	- "daily" or "1"
	- "weekly" or "7"
	- "never"
	- <N> - in N days where N is greater than 0
	If the rotation log mode is enabled, this parameter controls switching to the next log file based on a period of time. If enabled, the switching to the next log file occurs at midnight
	Examples:
	`set session log_rotation_period="weekly"`
	`set session log_rotation_period=14`

log_repeat_filter

Parameter	log_repeat_filter
Type	Text string
Value	Specifies if repeated messages should be filtered or not. Possible values are "on" and "off" (default). If the value is "on", immediately following messages with the same identifier and system error code are not listed in the log but they are counted. When a different log message is generated, the repeat count of the earlier log message is reported with the entry "The previous message has been repeated *N* times." and the counter is cleared. ⚠ Stromasys highly recommends to let this value to "off" otherwise important information will not be reported in the log file. **Example**: `set session log_repeat_filter="off"`

log_flush_period

Parameter	log_flush_period
Type	Numeric
Value	• <period-in-seconds> Defines a period of flushing log to disk. Default period is 60 seconds (it means that every minute log file is flushed to disk) **Examples**: `set session log_flush_period=30`

license_key_id

Parameter	license_key_id
Type	Text string
Value	A set of Sentinel Key IDs that specifies the license keys to be used by CHARON. It is also possibly to use a keyword "**any**" to force CHARON to look for a suitable license in all available keys if the license is not found in the specified keys. **Example**: `set session license_key_id = "1877752571,354850588,any"` Based on the presence of this parameter in the configuration file, CHARON behaves as follows: 1. **No keys are specified (the parameter is absent)** CHARON performs an unqualified search for any suitable key in unspecified order. If no key is found, CHARON exits. 2. **One or many keys are specified** CHARON performs a qualified search for a regular license key in the specified order. If it is not found, CHARON exits (if the keyword "any" is not set). If the keyword "any" is specified then if no valid license has been found in the keys with specified ID’s all other available keys are examined for valid license as well. ⚠ The order in which keys are specified is very important. If a valid license was found in the key which ID was not the first one specified in configuration file, then available keys are periodically re-scanned and if the key with the ID earlier in the list than the current one is found CHARON tries to find a valid license there and in case of success switches to that key.

license_id

Parameter	license_id
Type	Text string
Value	A set of license identifiers that specifies the licenses to be used by CHARON. This parameter is applicable only to licenses on which Stromasys placed restrictions on what products can be combined on a single license key. Please contact your Stromasys representative or VAR for more information. **Example**: `set session license_id = "2718281828,314159265"` If this parameter is set, Charon considers for validation only the available licenses with license ID parameter set and equal to one of the license ID's specified in the configuration. This prioritized list corresponds to the "Product License Number" line in the Product section of the license.

license_key_lookup_retry

Parameter	license_key_lookup_retry
Type	Text String

Value	In case the CHARON-AXP license connection is not present when the guest starts up, this parameter specifies how many times CHARON-AXP will try to establish the connection and, optionally, a period of time between retries.
	Syntax:
	`set session license_key_lookup_retry = "N [, T]"`
	Options:
	● N - Number of retries to look for license keys.
	● T - Time between retries in seconds. If not specified 60 seconds are used
	Example 1:
	`set session license_key_lookup_retry = 1`
	If license key is not found during initial scan, do only one more attempt after 60 seconds.
	Example 2:
	`set session license_key_lookup_retry = "1,30"`
	Same as above but retry in 30 seconds.
	Example 3:
	`set session license_key_lookup_retry = "3,10"`
	If license key is not found during initial scan, do 3 more attempts waiting 10 seconds between them.
	Example 4:
	`set session license_key_lookup_retry = "5"`
	If license key is not found during the initial scan, do 5 more attempts waiting 60 seconds between them.

affinity

Parameter	affinity
Type	Text string
Value	Overrides any initial process affinity mask provided by the host operating system. Once specified it binds the running instance of the emulator to particular host CPUs. Used for soft partitioning of the host CPU resources and/or for isolating host CPUs for other applications. By default the CHARON VM allocates as many host CPUs as possible. The “affinity” parameter overrides that and allows explicit specification on which host CPU the instance must run on. ⚠ The "affinity" parameter defines the total number of host CPUs to be used both for emulated Alpha CPUs and for the CHARON VM itself (including the CPUs to be used for I/O - they are controlled by the "n_of_io_cpus" parameter described below). Host CPUs are enumerated as a comma separated list of host system assigned CPU numbers: `set session affinity="0, 2, 4, 6"`

n_of_cpus

<table>
<tr><td><b>Parameter</b></td><td>n_of_cpus</td></tr>
<tr><td><b>Type</b></td><td>Numeric</td></tr>
<tr><td><b>Value</b></td><td>Limits the number of emulated CPUs.

<b>Example</b>:

<code>set session n_of_cpus=3</code>

The maximum number of CPUs enabled by CHARON VM is specified by the license key. It cannot exceed the original hardware restrictions:

<table>
<tr><th>HP Alpha Model</th><th>Number of emulated CPUs</th></tr>
<tr><td>AlphaServer_AS400</td><td>1</td></tr>
<tr><td>AlphaServer_AS800</td><td>1</td></tr>
<tr><td>AlphaServer_AS1000</td><td>1</td></tr>
<tr><td>AlphaServer_AS1000A</td><td>1</td></tr>
<tr><td>AlphaServer_AS1200</td><td>2</td></tr>
<tr><td>AlphaServer_AS2000</td><td>2</td></tr>
<tr><td>AlphaServer_AS2100</td><td>4</td></tr>
<tr><td>AlphaServer_AS4000</td><td>2</td></tr>
<tr><td>AlphaServer_AS4100</td><td>4</td></tr>
<tr><td>AlphaServer_DS10</td><td>1</td></tr>
<tr><td>AlphaServer_DS15</td><td>1</td></tr>
<tr><td>AlphaServer_DS20</td><td>2</td></tr>
<tr><td>AlphaServer_DS25</td><td>2</td></tr>
<tr><td>AlphaServer_ES40</td><td>4</td></tr>
<tr><td>AlphaServer_ES45</td><td>4</td></tr>
<tr><td>AlphaServer_GS80</td><td>8</td></tr>
<tr><td>AlphaServer_GS160</td><td>16</td></tr>
<tr><td>AlphaServer_GS320</td><td>32</td></tr>
</table>
</td></tr>
</table>

n_of_io_cpus

Parameter	n_of_io_cpus
Type	Numeric
Value	This parameter specifies how many host CPUs CHARON VM must use for I/O handling. Use of the “affinity” parameter may limit the number of CPUs available. By default the CHARON VM reserves one third of all available host CPUs for I/O processing (round down, at least one). The “n_of_io_cpus” parameter overrides that by specifying the number of CHARON I/O CPUs explicitly. **Example**: `set session n_of_io_cpus=2`

File inclusion

It is possible to include a configuration file into an existing one using the "`include`" command. The file extension is usually `.icfg`.

Format:

```
include "file.icfg"
```

Example:

```
include "c:\charon\commonpart.icfg"
```

ℹ The configuration template files are defined to use the "configuration_name.icfg" configuration file which is used by the CHARON Virtual Machines Manager. If you use an existing configuration file, including this file is not necessary.

Core Devices

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CPU

The CHARON Virtual Machine (VM) CPU can be calibrated with "set ace" directive and the following parameters:

enabled

Parameter	enabled
Type	Boolean
Value	A CHARON-AXP emulated CPU is configured with the "enabled" command enabling the high performance Advanced CPU Emulation mode ("ACE"). The ACE option optimizes the HP Alpha instruction interpretation and significantly improves performance. It also requires approximately twice the amount of host memory allocated by CHARON instance itself to store the optimized code (Note that 2Gb of host memory + the amount of HP Alpha memory emulated per each CHARON instance is required). ACE optimization is performed dynamically during execution. It does not need to write optimized code back to disk, ACE provides its full capability instantly. The optimization does not compromise the HP Alpha instruction decoding; CHARON-AXP remains fully HP Alpha hardware compatible and completely transparent to the HP Alpha operating systems and applications. This configuration setting enables the ACE mode if the CHARON-AXP license permits it. If this configuration setting is omitted from the CHARON VM configuration file and the license permits it, "true" is the default, otherwise "false" is the default. **Example**: `set ace enabled = false` ⓘ `"set ace enabled=true"` is ignored when the license does not permit ACE operation. The ACE mode is disabled when the host system does not meet the minimum physical requirements for this operation. If the emulator appears not to run at its normal performance, check the log file for a change in the ACE mode and verify that sufficient host resources, especially memory, are available.

cpu_architecture

Parameter	cpu_architecture
Type	Text String
Value	Specifies the architecture of the virtual Alpha CPU. Can be one of the following: EV4, EV45, EV5, EV56, EV6, EV67, EV68 **Example**: `set ace cpu_architecture = EV6` Refer to Setting of a particular HP Alpha model to find an appropriate value of the HP Alpha architecture per each HP Alpha model supported by CHARON-AXP.

cache_size

Parameter	cache_size
Type	Value
Value	⚠ This parameter may affect Charon performance. Do not change this parameter until advised by Stromasys "cache_size" defines the amount of memory in megabytes allocated to the ACE cache. Default value is 1GB (1024 MB). **Example**: `set ace cache_size = 2048` This parameter may be changed for performance optimization in case of some guest OS specific tasks (see the section below).

num_translators

Parameter	num_translators
Type	Value
Value	⚠ This parameter may affect Charon performance. Do not change this parameter until advised by Stromasys "num_translators" defines the number of ACE translators. Default value in most situations is number of I/O CPUs dedicated to CHARON (defined by "n_of_io_cpus" parameter) minus 1, but in some specific situations it may be set to some other value for better performance. **Example**: `set ace num_translators = 4`

host_options

Parameter	host_options
Type	Text String
Value	⚠ This parameter may affect Charon performance. Do not change this parameter until advised by Stromasys "host_options" defines options of ACE (DIT) translator and code-generator. Those options affect Charon performance. Default settings are set to optimize performance for most geust OS (VMS and Tru64) usage profiles. However there are some profiles (for example OpenVMS compilation tasks) where the default settings do not provide optimal perfromance. The following switches are available to user: 1. *--fixed-variant=[X]* The value X can be one of three options: [-1, 0, 1]. This value defines the desired translation variant. Set -1 for dynamic (default) or 0 or 1 for the fixed number implemented by the translator. 2. *--x64-optimize or --x64-nooptimize* This switch enables translation optimizations (the default is to optimize). ⚠ **Default parameters have been changed in Charon version 4.9 compared to previous versions (4.8 and below). If Charon system demonstrates lower performance after upgrade to version 4.9, please test the system with host_options switched to default 4.8 settings:** `set ace host_options = "--fixed-variant=0 --x64-nooptimize"` Note that in this case the parameter "num_translators" must be set to the number of I/O CPUs dedicated to CHARON (see the "n_of_io_cpus" parameter). Also note that changing parameter "cache_size" can be an alternative solution too (see the section below).

Enabling the old style performance optimization

Despite the fact that CHARON is already optimized for wide range of the guest OS tasks, there may be some situations (for example OpenVMS compilation tasks) when performance degradation may reach about 50% of the version 4.8.

In this case the following solutions can be applied:

Enlarging ACE cache size

Try this solution first. It is recommended to enlarge the ACE cache size at least in 2 times as it is shown in the following example:

```
set ace cache_size = 2048
```

If this solution does not work for the specific guest OS tasks, apply also the next solution.

Setting specific ACE host options

Set the following set of options in the configuration file:

```
set session n_of_io_cpus = <N>
set ace num_translators = <N>
set ace host_options = "--fixed-variant=0 --x64-nooptimize"
```

where <N> is number of the I/O CPUs dedicated to CHARON. If this value is not set (the default value is used) it is recommended to specify it explicitly.

RAM

The CHARON VM memory subsystem is permanently loaded and has the logical name "ram"

size

Parameter	size
Type	Numeric
Value	Size of the emulated memory in MB.

Example:

```
set ram size = 2048
```

The amount of memory is capped at a maximum, this is defined in the CHARON license key. If the host system cannot allocate enough memory to map the requested emulated memory, CHARON VM generates an error message in the log file and reduces its effective memory size.

The following table lists the values of emulated RAM for various hardware models of virtual HP Alpha systems:

Hardware Model	RAM size (in MB)			
	Min	**Max**	**Default**	**Increment**
AlphaServer 400	64	1024	512	64
AlphaServer 800	256	8192	512	256
AlphaServer 1000	256	1024	512	256
AlphaServer 1000A	256	1024	512	256
AlphaServer 1200	256	32768	512	256
AlphaServer 2000	64	2048	512	64
AlphaServer 2100	64	2048	512	64
AlphaServer 4000	64	32768	512	64
AlphaServer 4100	64	32768	512	64
AlphaServer DS10, DS10L	64	32768	512	64
AlphaServer DS15	64	32768	512	64
AlphaServer DS20	64	32768	512	64
AlphaServer DS25	64	32768	512	64
AlphaServer ES40	64	32768	512	64
AlphaServer ES45	64	32768	512	64
AlphaServer GS80	256	65536	512	256
AlphaServer GS160	512	131072	512	512
AlphaServer GS320	1024	262144	1024	1024

TOY

CHARON-AXP maintains its time and date using the "toy" (time-of-year) component. In order to preserve the time and date while a virtual system is not running, the TOY component uses a binary file on the host system to store the date and time relevant data. The name of the file is specified by the “container” option of the "toy" component.

container

Parameter	container
Type	Text string
Value	Specifies a name for the file in which CHARON VM preserves the time and date during its “offline” period. This file also keeps some console parameters (such as the default boot device). By default it is left unspecified. ℹ it is recommended to specify the full path to the TOY file.

sync_to_host

Parameter	sync_to_host
Type	Text string
Value	Specifies whether and how the guest OS time is synchronized with the CHARON host time.

Syntax:

```
set TOY sync_to_host = "{as_vms | as_tru64 | as_is}"
```

where:

Parameter	Description
as_vms	If the guest OS is OpenVMS/AXP and its date and time must be set to the host's date and time each time it boots.
as_tru64	If the guest OS is Tru64 UNIX and its date and time must be set to the host's date and time each time it boots.
as_is	If the TOY date and time must be set to the host's UTC date and time

Example:

```
set TOY sync_to_host = "as_vms"
```

To synchronize the guest OS with TOY, use the following commands (from "SYSTEM"/"root" account):

On OpenVMS/AXP	On Tru64 UNIX
`$ set time`	``# date -u `consvar -g date | cut -f 3 -d ' '` ``

The default value is "not specified" - it means that by default CHARON does not synchronize its guest OS time with the CHARON host time but collects date and time from the file specified with "container" parameter.

⚠ If "sync_to_host" parameter is specified there is no need to specify "container" parameter in addition.

Example

```
set toy container="C:\Charon\my_virtual_system.dat"
```

The CHARON VM time zone may be different from that of the host system. Correct CHARON time relies on the correctness of the host system time to calculate the duration of any CHARON “offline” periods. (i.e. while the virtual system is not running). Every time CHARON comes on line it calculates a Delta time (the system time is used if there is no TOY file). Therefore, if the host system time is changed while CHARON VM is not running, the CHARON time may be incorrect when CHARON VM is restarted and the CHARON time must be set manually.

ROM

The System Flash ROM file conserves specific parameters between reboots.

container

Parameter	container
Type	Text string
Value	Specifies the name of a file in which CHARON VM stores an intermediate state of its Flash ROM. This state includes, for example, most of the console parameters. By default it is left unspecified. ℹ it is recommended to specify the full path to this file **Example**: `set rom container="C:\Charon\my_virtual_system.rom"`

system_name

Parameter	system_name
Type	Text string
Value	Allows changing the system name, for example: `set rom system_name="Alpha Server 1000 4/200"` Refer to Setting of a particular HP Alpha model to find an appropriate value of the HP Alpha system name per each HP Alpha model supported by CHARON-AXP

system_serial_number

Parameter	system_serial_number
Type	Text string
Value	Allows changing the system serial number, for example: `set rom system_serial_number = NY12345678` Any sequence of characters can be used as a serial number. Sequences longer than 16 symbols are truncated to 16 symbols. Serial Numbers should be according to DEC standard: 10 characters. First two characters are capital letters, remaining 8 characters are decimal digits. By default it is set to SN01234567

dsrdb

Parameter	dsrdb[n]
Type	Numeric
Value	DSRDB - Dynamic System Recognition Data Block. These parameters allow changing the emulated hardware model type. dsrdb[0] stands for SMM - System Marketing Model. **Example**: `set rom dsrdb[0]=1090` Setting of a particular HP Alpha model describes connection between "dsrdb" parameter and the rest of the parameters defining an exact HP Alpha model - including SMM.

version

<table>
<tr><td><b>Parameter</b></td><td>version</td></tr>
<tr><td><b>Type</b></td><td>Text string</td></tr>
<tr><td><b>Value</b></td><td>Sets Console and PAL code versions in the following way:
<table>
<tr><th>Function</th><th>Command</th></tr>
<tr><td>Set SRM Console version to X.Y-Z</td><td><code>set rom version[0] = x.y-z</code></td></tr>
<tr><td>Set OpenVMS PAL code version to X.Y-Z</td><td><code>set rom version[1] = x.y-z</code></td></tr>
<tr><td>Set Tru64 UNIX PAL code version to X.Y-Z</td><td><code>set rom version[2] = x.y-z</code></td></tr>
</table>
<b>Example</b>:
<pre>set rom version[0] = 7.3-1 version[1] = 1.98-104 version[2] = 1.92-105</pre>
</td></tr>
</table>

Virtual HP Alpha interval timer

The CHARON-AXP provides interval timer interrupts to virtual Alpha CPU(s) at frequency 100Hz (100 interrupts a second).

This is default behavior which may be changed through “clock_period” configuration parameter of virtual ISA or EISA bus, depending on emulated hardware model of virtual HP Alpha system.

Value of the parameter is interval timer period in microseconds. By default it is set to 10000. By changing it to 1000 frequency of virtual interval timer interrupts may be increased to 1000Hz (1000 interrupts per second).

clock_period

Parameter	clock_period
Type	Numeric
Value	Specifies period of interval timer, in microseconds. Only two values are supported: ● 10000 (which corresponds to 100Hz interval timer) ● 1000 (which corresponds to 1000Hz interval timer) By default it is set to 10000.

Example for AlphaServer 400, DS, ES, GS

```
set ISA clock_period=1000
```

Example for AlphaServer 800, 1000, 1000A, 1200, 2000, 2100, 4000, 4100

```
set EISA clock_period=1000
```

⚠ Higher interval timer frequency creates higher load for virtual Alpha CPU which may cause degradation of overall virtual system performance.

Setting of a particular HP Alpha model

It is important to have the "system_name", "hw_model", "cpu_architecture" and "dsrdb[n]" (DSRDB - Dynamic System Recognition Data Block) parameters in sync. (see above for details) to configure CHARON VM for emulation of a particular HP Alpha model.

The following tables illustrate how to synchronize those values:

HP AlphaStation 200 - 400

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_400	AlphaStation 200 4/100	EV4	1156
AlphaServer_400	AlphaStation 200 4/133	EV4	1088
AlphaServer_400	AlphaStation 205 4/133	EV4	1250
AlphaServer_400	AlphaStation 255 4/133	EV4	1257
AlphaServer_400	AlphaStation 200 4/166	EV4	1087
AlphaServer_400	AlphaStation 205 4/166	EV4	1251
AlphaServer_400	AlphaStation 255 4/166	EV4	1258
AlphaServer_400	AlphaStation 400 4/166	EV4	1086
AlphaServer_400	AlphaStation 205 4/200	EV4	1252
AlphaServer_400	AlphaStation 255 4/200	EV4	1259
AlphaServer_400	AlphaStation 200 4/233	EV45	1151
AlphaServer_400	AlphaStation 205 4/233	EV45	1253
AlphaServer_400	AlphaStation 255 4/233	EV45	1260
AlphaServer_400	AlphaStation 400 4/233	EV45	1152
AlphaServer_400	AlphaStation 205 4/266	EV45	1254
AlphaServer_400	AlphaStation 255 4/266	EV45	1261
AlphaServer_400	AlphaServer 300 4/266	EV45	1593
AlphaServer_400	AlphaStation 400 4/266	EV45	1153
AlphaServer_400	AlphaStation 400 4/266	EV45	1154
AlphaServer_400	AlphaStation 200 4/300	EV45	1157
AlphaServer_400	AlphaStation 205 4/300	EV45	1255
AlphaServer_400	AlphaStation 255 4/300	EV45	1262
AlphaServer_400	AlphaStation 400 4/300	EV45	1160
AlphaServer_400	AlphaStation 205 4/333	EV45	1256
AlphaServer_400	AlphaStation 255 4/333	EV45	1263

HP AlphaServer 600 - 800

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_800	AlphaServer 600 5/333	EV56	1310
AlphaServer_800	AlphaServer 800 5/333	EV56	1310
AlphaServer_800	AlphaServer 800 5/400	EV56	1584
AlphaServer_800	AlphaStation 600A 5/500	EV56	1590
AlphaServer_800	AlphaServer 800 5/500	EV56	1585

HP AlphaServer 1000

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_1000	AlphaServer 1000 4/200	EV4	1090
AlphaServer_1000	AlphaServer 1000 4/233	EV45	1091
AlphaServer_1000	AlphaServer 1000 4/266	EV45	1264

HP AlphaServer 1000A

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_1000A	AlphaServer 1000A 4/266	EV45	1265

HP AlphaServer 1200 and AlphaStation 1200

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_1200	AlphaServer 1200 5/300	EV5	1722
AlphaServer_1200	AlphaServer 1200 5/300	EV5	1724
AlphaServer_1200	AlphaServer 1200 5/400	EV56	1726
AlphaServer_1200	AlphaServer 1200 5/400	EV56	1728
AlphaServer_1200	AlphaStation 1200 5/400	EV56	1758
AlphaServer_1200	AlphaStation 1200 5/400	EV56	1760
AlphaServer_1200	AlphaServer 1200 5/466	EV56	1730
AlphaServer_1200	AlphaServer 1200 5/466	EV56	1732
AlphaServer_1200	AlphaStation 1200 5/466	EV56	1762
AlphaServer_1200	AlphaStation 1200 5/466	EV56	1764
AlphaServer_1200	AlphaServer 1200 5/533	EV56	1734
AlphaServer_1200	AlphaServer 1200 5/533	EV56	1736
AlphaServer_1200	AlphaServer 1200 5/533	EV56	1746
AlphaServer_1200	AlphaServer 1200 5/533	EV56	1748
AlphaServer_1200	AlphaStation 1200 5/533	EV56	1766
AlphaServer_1200	AlphaStation 1200 5/533	EV56	1768
AlphaServer_1200	AlphaStation 1200 5/533	EV56	1778
AlphaServer_1200	AlphaStation 1200 5/533	EV56	1780
AlphaServer_1200	AlphaServer 1200 5/600	EV56	1738
AlphaServer_1200	AlphaServer 1200 5/600	EV56	1740
AlphaServer_1200	AlphaServer 1200 5/600	EV56	1750
AlphaServer_1200	AlphaStation 1200 5/600	EV56	1752
AlphaServer_1200	AlphaStation 1200 5/600	EV56	1770
AlphaServer_1200	AlphaStation 1200 5/600	EV56	1772
AlphaServer_1200	AlphaStation 1200 5/600	EV56	1782

AlphaServer_1200	AlphaStation 1200 5/600	EV56	1784
AlphaServer_1200	AlphaServer 1200 5/666	EV56	1742
AlphaServer_1200	AlphaServer 1200 5/666	EV56	1744
AlphaServer_1200	AlphaServer 1200 5/666	EV56	1754
AlphaServer_1200	AlphaServer 1200 5/666	EV56	1756
AlphaServer_1200	AlphaStation 1200 5/666	EV56	1774
AlphaServer_1200	AlphaStation 1200 5/666	EV56	1776
AlphaServer_1200	AlphaStation 1200 5/666	EV56	1786
AlphaServer_1200	AlphaStation 1200 5/666	EV56	1788

HP AlphaServer 2000

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_2000	AlphaServer 2000 4/200	EV4	1123
AlphaServer_2000	AlphaServer 2000 4/233	EV45	1171
AlphaServer_2000	AlphaServer 2000 4/275	EV45	1127

HP AlphaServer 2100

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_2100	AlphaServer 2100 4/200	EV4	1059
AlphaServer_2100	AlphaServer 2100 4/200	EV4	1135
AlphaServer_2100	AlphaServer 2100 4/233	EV45	1179
AlphaServer_2100	AlphaServer 2100 4/233	EV45	1187
AlphaServer_2100	AlphaServer 2100 4/275	EV45	1115
AlphaServer_2100	AlphaServer 2100 4/275	EV45	1139

HP AlphaServer 4000

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1409
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1411
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1421
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1423
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1433
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1435
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1445
AlphaServer_4000	AlphaServer 4000 5/266	EV5	1447
AlphaServer_4000	AlphaServer 4000 5/300	EV5	1413
AlphaServer_4000	AlphaServer 4000 5/300	EV5	1415

AlphaServer_4000	AlphaServer 4000 5/300	EV5	1425
AlphaServer_4000	AlphaServer 4000 5/300	EV5	1427
AlphaServer_4000	AlphaServer 4000 5/300	EV5	1437
AlphaServer_4000	AlphaServer 4000 5/300	EV5	1439
AlphaServer_4000	AlphaServer 4000 5/300	EV5	1449
AlphaServer_4000	AlphaServer 4000 5/300	EV5	1451
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1417
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1419
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1429
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1431
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1441
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1443
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1453
AlphaServer_4000	AlphaServer 4000 5/400	EV56	1455
AlphaServer_4000	AlphaServer 4000 5/466	EV56	1634
AlphaServer_4000	AlphaServer 4000 5/466	EV56	1636
AlphaServer_4000	AlphaServer 4000 5/466	EV56	1654
AlphaServer_4000	AlphaServer 4000 5/466	EV56	1656
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1638
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1640
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1642
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1644
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1658
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1660
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1662
AlphaServer_4000	AlphaServer 4000 5/533	EV56	1664
AlphaServer_4000	AlphaServer 4000 5/600	EV56	1646
AlphaServer_4000	AlphaServer 4000 5/600	EV56	1648
AlphaServer_4000	AlphaServer 4000 5/600	EV56	1666
AlphaServer_4000	AlphaServer 4000 5/600	EV56	1668
AlphaServer_4000	AlphaServer 4000 5/666	EV56	1650
AlphaServer_4000	AlphaServer 4000 5/666	EV56	1652
AlphaServer_4000	AlphaServer 4000 5/666	EV56	1670
AlphaServer_4000	AlphaServer 4000 5/666	EV56	1672

HP AlphaServer 4100

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1313
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1317
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1337
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1341
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1361
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1365
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1385
AlphaServer_4100	AlphaServer 4100 5/266	EV5	1389
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1321
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1325
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1345
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1349
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1369
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1373
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1393
AlphaServer_4100	AlphaServer 4100 5/300	EV5	1397
AlphaServer_4100	AlphaServer 4100 5/400	EV56	1329
AlphaServer_4100	AlphaServer 4100 5/400	EV56	1333
AlphaServer_4100	AlphaServer 4000 5/400	EV56	1353
AlphaServer_4100	AlphaServer 4000 5/400	EV56	1357
AlphaServer_4100	AlphaServer 4000 5/400	EV56	1377
AlphaServer_4100	AlphaServer 4100 5/400	EV56	1381
AlphaServer_4100	AlphaServer 4100 5/400	EV56	1401
AlphaServer_4100	AlphaServer 4100 5/400	EV56	1405
AlphaServer_4100	AlphaServer 4100 5/466	EV56	1594
AlphaServer_4100	AlphaServer 4100 5/466	EV56	1598
AlphaServer_4100	AlphaServer 4100 5/533	EV56	1602
AlphaServer_4100	AlphaServer 4100 5/533	EV56	1606
AlphaServer_4100	AlphaServer 4100 5/533	EV56	1610
AlphaServer_4100	AlphaServer 4100 5/533	EV56	1614
AlphaServer_4100	AlphaServer 4100 5/600	EV56	1618
AlphaServer_4100	AlphaServer 4100 5/600	EV56	1622
AlphaServer_4100	AlphaServer 4100 5/666	EV56	1626
AlphaServer_4100	AlphaServer 4100 5/666	EV56	1630

HP AlphaServer/AlphaStation DS10 and HP AlphaServer DS10L

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_DS10	AlphaServer DS10 6/466	EV6	1839
AlphaServer_DS10	AlphaStation DS10 6/466	EV6	1879
AlphaServer_DS10	AlphaStation XP900 6/466	EV6	1879
AlphaServer_DS10L	AlphaServer DS10L 6/466	EV6	1961
AlphaServer_DS10L	AlphaServer DS10L 67/616	EV67	1962
AlphaServer_DS10	AlphaStation DS10 67/616	EV67	1962
AlphaServer_DS10	AlphaServer DS10 67/616	EV67	1970

HP AlphaServer DS15 and HP AlphaStation DS15

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_DS15	AlphaServer DS15 68CB/1000	EV68	2047
AlphaServer_DS15	AlphaStation DS15 68CB/1000	EV68	2048
AlphaServer_DS15	AlphaServer TS15 68CB/1000	EV68	2049

HP AlphaServer DS20 and HP AlphaStation DS20

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_DS20	AlphaServer DS20 6/500	EV6	1838
AlphaServer_DS20	AlphaServer DS20E 6/500	EV6	1840
AlphaServer_DS20	AlphaServer DS20 6/500	EV6	1920
AlphaServer_DS20	AlphaServer DS20 6/500	EV6	1921
AlphaServer_DS20	AlphaServer DS20E 67/667	EV67	1939
AlphaServer_DS20	AlphaStation DS20E 6/500	EV6	1941
AlphaServer_DS20	AlphaStation DS20E 67/667	EV57	1943
AlphaServer_DS20	AlphaServer DS20E 68A/833	EV68	1964
AlphaServer_DS20	AlphaServer DS20E 68A/833	EV68	1982
AlphaServer_DS20	AlphaServer DS20L 68A/833	EV68	2006

HP AlphaServer DS25 and HP AlphaStation DS25

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_DS25	AlphaServer DS25 68CB/1000	EV68	1994
AlphaServer_DS25	AlphaStation DS25 68CB/1000	EV68	1995

HP AlphaServer ES40 and AlphaStation ES40

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_ES40	AlphaServer ES40 6/500	EV6	1813
AlphaServer_ES40	AlphaServer ES40 6/500	EV6	1861
AlphaServer_ES40	AlphaServer ES40 6/500	EV6	1869
AlphaServer_ES40	AlphaServer ES40 6/500	EV6	1923
AlphaServer_ES40	AlphaServer ES40 6/500	EV6	1931
AlphaServer_ES40	AlphaServer ES40 6/667	EV6	1817
AlphaServer_ES40	AlphaServer ES40 6/667	EV6	1865
AlphaServer_ES40	AlphaServer ES40 6/667	EV6	1873
AlphaServer_ES40	AlphaServer ES40 6/667	EV6	1927
AlphaServer_ES40	AlphaServer ES40 6/667	EV6	1935
AlphaServer_ES40	AlphaStation ES40 67/667	EV67	1949
AlphaServer_ES40	AlphaStation ES40 67/667	EV67	1957
AlphaServer_ES40	AlphaStation ES40 68/833	EV68	1984
AlphaServer_ES40	AlphaStation ES40 68/833	EV68	1988

HP AlphaServer ES45

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=
AlphaServer_ES45	AlphaServer ES45/3B 68CB/1000	EV68	1971
AlphaServer_ES45	AlphaServer ES45/2 68CB/1000	EV68	1975
AlphaServer_ES45	AlphaServer ES45/2B 68CB/1000	EV68	1975
AlphaServer_ES45	AlphaServer ES45/1B 68CB/1000	EV68	2002
AlphaServer_ES45	AlphaServer ES45/3B 68CB/1250	EV68	2013
AlphaServer_ES45	AlphaServer ES45/2 68CB/1250	EV68	2017
AlphaServer_ES45	AlphaServer ES45/2B 68CB/1250	EV68	2017
AlphaServer_ES45	AlphaServer ES45/1B 68CB/1250	EV68	2021

HP AlphaServer GS80

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=	set rom dsrdb[1]=	set rom dsrdb[4]=
AlphaServer_GS80	AlphaServer GS80 67/728	EV67	1967		
AlphaServer_GS80	AlphaServer GS1280	EV67	2038	50	3050

HP AlphaServer GS160

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=	set rom dsrdb[1]=	set rom dsrdb[4]=
AlphaServer_GS160	AlphaServer GS160 67 /728	EV67	1968		
AlphaServer_GS160	AlphaServer GS1280	EV67	2039	50	3050

HP AlphaServer GS320

set session hw_model=	set rom system_name=	set ace cpu_architecture=	set rom dsrdb[0]=	set rom dsrdb[1]=	set rom dsrdb[4]=
AlphaServer_GS320	AlphaServer GS320 67 /728	EV67	1969		
AlphaServer_GS320	AlphaServer GS1280	EV67	2040	50	3050

Auto Boot

CHARON VMs can be configured to boot the operating system automatically at start up.

auto_action restart

Parameter	auto_action restart
Type	Text string

Value	Determines whether CHARON VM boots automatically if the correct boot flags are set (and saved in the HP Alpha console files).
	Example:
	`>>>set bootdef_dev dka0`
	`>>>set auto_action restart`

Setting System Marketing Model (SMM)

CHARON-AXP allows to set an exact System Marketing Model (SMM) for a given model of HP Alpha, for example:

```
set rom dsrdb[0]=1090
```

Refer to Setting of a particular HP Alpha model to find allowed values of SMM per each HP Alpha model supported by CHARON-AXP.

Console

Table of Contents

General Description

CHARON-AXP offers two-port serial console on all supported AXP models.

Example for OPA0 console ("COM1" port):

```
set COM1 alias=OPA0
```

When using the TTA0 console ("COM2" port):

```
set COM2 alias=TTA0
```

Refer to Mapping Serial line controllers to system resources for details of mapping.

⚠ CHARON emulated console supports only 80 symbols in one line.

General parameters

CHARON-AXP console lines COM1 and COM2 have the following parameters:

ℹ All the values in the following tables are case insensitive.

alias

Parameter	alias
Type	Identifier
Value	This parameter is used to set an useful name for COM1 or COM2 ports. It can be any name, for example "Console1", but usually it is "OPA0" for COM1 and "TTA0" for COM2. This name is logged in CHARON log file, it can also be used for parametrization in CHARON configuration file along with "COM1" and "COM2" identifiers. The main purpose of this parameter is migration from old CHARON systems (which do not have the described implementation of consoles) to the current design, since it allows retaining the original name used for parametrization, since the rest of the parameters stay the same in both implementations. ⚠ If the "alias" parameter is not specified CHARON log file will miss the name for the given console, for example " : Connected. Remote 127.0.0.1:63516" will be displayed instead of "OPA0 : Connected. Remote 127.0.0.1:63516". So it is always recommended to specify the "alias" parameter. **Example**: `set COM2 alias=TTA0`

communication

Parameter	communication
Type	Text string
Value	● "ascii" - for connection to terminals (default) ● "binary" - for binary (packet) protocols, which are used mainly for communicating with PLCs

baud

Parameter	baud
Type	Numeric
Value	Forces the baud rate of the corresponding COM port to be a specified value. The variety of supported values depends on the underlying physical communication resource (COM port). The most widely used values are: 300, 1200, 9600, 19200, 38400. **Example**: `set OPA0 baud=38400`

break_on

Parameter	break_on
Type	Text string

Value	Specifies what byte sequences received over the physical serial line will trigger a HALT command.
	This parameter works only for the console line.
	Specify the following values: "Ctrl-P", "Break" or "none" ("none" disables triggering a HALT condition).
	⚠ If your guest operating system is OpenVMS in addition to "none" setting you have to set a specific console parameter "controlp" to "off" in the following way:
	`>>> set controlp off`
	`>>> power off`
	The second line is to preserve the ROM settings.
	Example:
	`set OPA0 break_on="Ctrl-P"`
	The default value is "Break".
	⚠ This parameter can be specified only for COM1 (OPA0) console

stop_on

Parameter	stop_on
Type	Text string
Value	Specifies what byte sequences received over the physical serial line will trigger a STOP condition. The STOP condition causes CHARON Virtual Machine (VM) to exit. Specify the one of the following values: “F6” or “none” ("none" disables triggering a STOP condition). **Example**: `set OPA0 stop_on="F6"` The default value is "none". Setting "F6" triggers the STOP condition upon receipt of the "`<ESC>[17~`" sequence. Terminals usually send these sequences by pressing the **F6** button ⚠ This parameter can be specified only for COM1 (OPA0) console

log

Parameter	log
Type	Text string

Value	A string specifying a file name to store the content of the console sessions or a directory where the log files for each individual session will be stored.
	If an existing directory is specified, CHARON VM automatically enables creation of individual log files, one for each session using the same scheme as used for the generation of the rotating log files. If the "log" parameter is omitted, CHARON VM does not create a console log.
	Examples:
	`set OPA0 log="log.txt"`
	`set OPA0 log="C:\Charon\Logs"`
	⚠ **Rotating logs notes**
	▪ Specify only an existing directory
	▪ If you want to store the OPA0 log file in the Charon virtual machine home directory (default for virtual machine log file), use: `set OPA0 log=".\."`

log_file_size

Parameter	log_file_size
Type	Text string

Value	If log rotation is enabled, the log_file_size parameter determines the log file size threshold at which the log is automatically rotated.
	● "unlimited" or "0" (default) - the feature is disabled
	● "default" - default size is used (4Mb)
	● <size>[KMG] - size of the current log file in bytes with additional multipliers:
	● K - Kilobyte - multiply by 1024
	● M - Megabyte - multiply by 1024*1024
	● G - Gigabyte - multiply by 1024*1024*1024
	Examples:
	`set OPA0 log_file_size="default"`
	`set OPA0 log_file_size=10M`
	⚠️ Minimum log file size is 64K, maximum is 1G. Setting size less then 64K effectively makes the log file unlimited.

log_flush_period

Parameter	log_flush_period
Type	Numeric
Value	● <period-in-seconds> Defines a period of flushing log to disk. Default period is 60 seconds (it means that every minute log file is flushed to disk) **Example**: `set OPA0 log_flush_period=30`

port

Parameter	port
Type	Numeric
Value	The TCP/IP port number for the virtual serial line. A virtual serial line always listens on this port for incoming connection requests. If multiple virtualized machines are running on a server, ensure the port number is unique across the platform.

application

Parameter	application
Type	Text string

Value	An application (a terminal emulator is assumed in most cases) to be started on initialization of this serial line emulation. The specified application startup string may contain all required parameters.
	Example:
	`set OPA0 application = "putty.exe -load OPA0"`
	In this example the terminal emulator application: "putty" is started with the parameters "-load OPA0" telling it to load a specific saved session named "OPA0", (created separately) from the host registry.
	The "application" parameter is often combined with a "port" parameter:
	`set TTA0 port = 10003 application = "putty.exe -load TTA1"`

Mapping Serial line controllers to system resources

line

Parameter	line
Type	Text string
Value	A defined COM port on a host system in the form of "\\.\COMn" (or "COM<n>:") **Example**: `set OPA0 line="\\.\COM1"`

Placement of peripheral devices on PCI bus

Table of Contents

General Description

Each peripheral device of CHARON Virtual Machine (VM) connects to CHARON-AXP emulated PCI bus with the following configuration parameters:

bus

Parameter	bus
Type	Text string
Value	Value formats:

Models	Format
AlphaServer 400-4100, DS, ES	"pci_<X>"
AlphaServer GS	"qbb_<X>_pca_<Y>_pci_<Z>"

When specified, the bus configuration parameter tells the CHARON-AXP software the virtual PCI bus to which virtual HP Alpha system shall connect a certain virtual PCI adapter.

By default the bus configuration parameter is not specified.

If the bus configuration parameter is not specified, CHARON VM software connects the virtual PCI adapter to the first available virtual PCI bus.

Example (AlphaServer ES40):

```
load KZPBA PKA bus=pci_1
```

Example (AlphaServer GS80):

```
load KZPBA PKA bus=qbb_1_pca_1_pci_0
```

device

Parameter	device
Type	Numeric
Value	When specified, the device configuration parameter specifies position of a virtual PCI adapter on virtual PCI bus.

By default the device configuration parameter is not specified.

If the device configuration parameter is not specified, the CHARON VM software connects the virtual PCI adapter at the first available position of the virtual PCI bus.

Example:

```
load KZPBA PKA device=2
```

function

Parameter	function
Type	Numeric
Value	When specified, the function configuration parameter specifies position of a virtual PCI adapter on virtual PCI bus. By default the function configuration parameter is not specified. If the function configuration parameter is not specified, the CHARON VM software connects the virtual PCI a dapter at the first available position of the virtual PCI bus. **Example**: `load KZPBA PKA function=0`

irq_bus

Parameter	irq_bus
Type	Text string
Value	When specified, the "irq_bus" configuration parameter specifies virtual bus routing interrupt requests from virtual PCI adapter to CHARON-AXP virtual Alpha CPUs. By default the "irq_bus" configuration parameter is not specified. The "irq_bus" configuration parameter must be set to “isa” for AlphaServer 400. For HP Alpha systems other than AlphaServer 400 the "irq_bus" configuration parameter must be left as is (i.e. not specified). **Example**: `load KZPBA PKA irq_bus=isa`

irq

Parameter	irq
Type	Numeric
Value	When specified, the "irq" configuration parameter assigns interrupt request to the virtual PCI adapter in HP Alpha system. By default the irq configuration parameter is not specified. If the irq configuration parameter is not specified, the CHARON VM software uses the correct values depending on the selected PCI position of a virtual PCI adapter. **Example**: `load KZPBA PKA irq=24`

Note that typically all or some of those parameters are specified on loading of some PCI controller in the following way:

```
load KZPBA PKA bus=pci_1 device=1 function=0 irq_bus=isa irq=24
```

Available PCI slots per each HP Alpha model emulated by CHARON-AXP

The tables below specifies a map of preloaded devices and available slots for each HP Alpha models emulated by CHARON-AXP.

AlphaServer 400 (3 PCI slots)

In addition to 3 PCI vacant slots there are 2 PCI positions occupied by on-board devices. All 5 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	6	0	11	NCR 53C810 PCI SCSI Adapter	PKA
-	0	7	0	-	Intel i82378 PCI ISA Bridge (SATURN)	
0	0	11	0	10	<option>	
1	0	12	0	15	<option>	
2	0	13	0	9	<option>	

The IRQ stands for ISA IRQ Number because all interrupts are routed through the Intel i82378 PCI ISA Bridge (SATURN) resident cascade of Intel i8259 interrupt controllers.

So far the CHARON-AXP VMs do not support virtual NCR 53C810 PCI SCSI adapter. Instead, virtual QLOGIC ISP1040B PCI SCSI adapter is used.

ℹ No support for Multi-Function PCI devices in AlphaServer 400.

Example: Loading DE435 into slot 0

```
load DE435/dec21x4x EWA bus=pci_0 device=11 function=0 irq_bus=isa
```

ℹ The "irq_bus=isa" setting is specific to AlphaServer 400 only.

AlphaServer 800 (4 PCI slots)

In addition to 4 PCI vacant slots there are 3 PCI positions occupied by on-board devices. All 7 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	5	0	0	QLOGIC ISP1020 PCI SCSI Adapter	PKA
-	0	6	0	0	S3 Trio32/64 Display Adapter	
-	0	7	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
0	0	11	0	1	<option>	
			1	2	<option>, function 1	
			2	17	<option>, function 2	
			3	18	<option>, function 3	
1	0	12	0	3	<option>	
			1	4	<option>, function 1	
			2	19	<option>, function 2	
			3	20	<option>, function 3	
2	0	13	0	5	<option>	
			1	6	<option>, function 1	
			2	21	<option>, function 2	
			3	22	<option>, function 3	
3	0	14	0	7	<option>	
			1	8	<option>, function 1	
			2	23	<option>, function 2	
			3	24	<option>, function 3	

The IRQ stands for input line of ASIC interrupt controllers. It has nothing to do with "EISA" style interrupts. So far, the CHARON-AXP VMs do not emulate S3 Trio32/64 Display Adapter. So position of the device 6, function 0 on the PCI 0 remains empty.

Example 1: Loading DE500BA into slot 0

```
load DE500BA/dec21x4x EWA bus=pci_0 device=11 function=0
```

Example 2: Loading multiple DE500BA's into slot 3, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_0 device=14 function=0
load DE500BA/dec21x4x EWB bus=pci_0 device=14 function=1
load DE500BA/dec21x4x EWC bus=pci_0 device=14 function=2
load DE500BA/dec21x4x EWD bus=pci_0 device=14 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_0 device=12 function=0
load DE500BA/dec21x4x EWA bus=pci_0 device=12 function=1
```

In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA.

AlphaServer 1000 (3 PCI slots)

In addition to 3 PCI vacant slots there are 2 PCI positions occupied by on-board devices. All 5 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	6	0	12	NCR 53C810 PCI SCSI Adapter	PKA
-	0	7	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
0	0	11	0	0	<option>	
			1	1	<option>, function 1	
			2	2	<option>, function 2	
			3	3	<option>, function 3	
1	0	12	0	4	<option>	
			1	5	<option>, function 1	
			2	6	<option>, function 2	
			3	7	<option>, function 3	
2	0	13	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	

The IRQ stands for input line of ASIC interrupt controllers. It has nothing to do with "EISA" style interrupts. So far, the CHARON-AXP VMs do not emulate NCR 53C810 PCI SCSI adapter. Instead, emulation of QLOGIC ISP1040B PCI SCSI adapter is used.

Example 1: Loading DE500BA into slot 0

```
load DE500BA/dec21x4x EWA bus=pci_0 device=11 function=0
```

Example 2: Loading multiple DE500BA’s into slot 0, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_0 device=11 function=0
load DE500BA/dec21x4x EWB bus=pci_0 device=11 function=1
load DE500BA/dec21x4x EWC bus=pci_0 device=11 function=2
load DE500BA/dec21x4x EWD bus=pci_0 device=11 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 2, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_0 device=13 function=0
load DE500BA/dec21x4x EWA bus=pci_0 device=13 function=1
```

In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA.

AlphaServer 1000A (7 PCI slots)

In addition to 7 PCI vacant slots there are 3 PCI positions occupied by on-board devices. All 10 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	6	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
-	0	7	0	-	DECchip 21050 PCI-to-PCI Bridge)	
0	0	11	0	1	<option>	
			1	2	<option>, function 1	
			2	17	<option>, function 2	
			3	18	<option>, function 3	
1	0	12	0	2	<option>	
			1	3	<option>, function 1	
			2	19	<option>, function 2	
			3	20	<option>, function 3	
2	0	13	0	3	<option>	
			1	4	<option>, function 1	
			2	21	<option>, function 2	
			3	22	<option>, function 3	
PCI1 (bus=pci_1)						
-	1	0	0	0	NCR 53C810 PCI SCSI Adapter	PKA
3	1	1	0	7	<option>	
			1	8	<option>, function 1	
			2	23	<option>, function 2	
			3	24	<option>, function 3	
4	1	2	0	9	<option>	
			1	10	<option>, function 1	
			2	25	<option>, function 2	
			3	26	<option>, function 3	
5	1	3	0	11	<option>	
			1	12	<option>, function 1	
			2	27	<option>, function 2	
			3	28	<option>, function 3	
6	1	4	0	13	<option>	
			1	14	<option>, function 1	
			2	29	<option>, function 2	
			3	30	<option>, function 3	

The IRQ stands for input line of ASIC interrupt controllers. It has nothing to do with "EISA" style interrupts. So far, the CHARON-AXP VMs do not emulate NCR 53C810 PCI SCSI adapter. Instead, emulation of QLOGIC ISP1040B PCI SCSI adapter is used.

Example 1: Loading DE500BA into slot 0

```
load DE500BA EWA bus=pci_0 device=11 function=0
```

Example 2: Loading multiple DE500BA’s into slot 0, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA EWA bus=pci_0 device=11 function=0
load DE500BA EWB bus=pci_0 device=11 function=1
load DE500BA EWC bus=pci_0 device=11 function=2
load DE500BA EWD bus=pci_0 device=11 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 3, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_1 device=1 function=0
load DE500BA EWA bus=pci_1 device=1 function=1
```

In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA.

AlphaServer 1200 (6 PCI slots)

In addition to 6 PCI vacant slots there are 2 PCI positions occupied by on-board devices. All 8 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI1 (bus=pci_1)						
-	1	1	0	4	NCR 53C810 PCI SCSI Adapter	PKA
0	1	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
1	1	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	16	<option>, function 3	
2	1	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
PCI0 (bus=pci_0)						
-	0	1	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
4	0	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
5	0	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
6	0	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	

So far, the CHARON-AXP VMs do not emulate NCR 53C810 PCI SCSI adapter. Instead, emulation of QLOGIC ISP1040B PCI SCSI adapter is used.

Example 1: Loading DE500BA into slot 4

```
load DE500BA/dec21x4x EWA bus=pci_0 device=2 function=0
```

Example 2: Loading multiple DE500BA’s into slot 4, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_0 device=2 function=0
load DE500BA/dec21x4x EWB bus=pci_0 device=2 function=1
load DE500BA/dec21x4x EWC bus=pci_0 device=2 function=2
load DE500BA/dec21x4x EWD bus=pci_0 device=2 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_1 device=2 function=0
load DE500BA/dec21x4x EWA bus=pci_1 device=2 function=1
```

ℹ In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA.

AlphaServer 2000 (3 PCI slots)

In addition to 3 PCI vacant slots there are 3 PCI positions occupied by on-board devices. All 6 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	0	0	2	DEC TULIP PCI Ethernet adapter	EWA
-	0	1	0	1	NCR 53C810 PCI SCSI Adapter	PKA
-	0	2	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
0	0	6	0	0	<option>	
			1	24	<option>, function 1	
			2	26	<option>, function 2	
			3	29	<option>, function 3	
1	0	7	0	4	<option>	
			1	25	<option>, function 1	
			2	27	<option>, function 2	
			3	30	<option>, function 3	
2	0	8	0	5	<option>	
			1	20	<option>, function 1	
			2	28	<option>, function 2	
			3	31	<option>, function 3	

The IRQ stands for input line of T2 resident cascade of Intel i8259 interrupt controllers. It has nothing to do with “EISA” style interrupts.

So far the CHARON-AXP emulators do not support virtual NCR 53C810 PCI SCSI adapter. Instead, virtual QLOGIC ISP1040B PCI SCSI adapter is used.

Example 1: Loading DE500BA into slot 0

```
load DE500BA/dec21x4x EWB bus=pci_0 device=6 function=0
```

Example 2: Loading multiple DE500BA’s into slot 0, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWB bus=pci_0 device=6 function=0
load DE500BA/dec21x4x EWC bus=pci_0 device=6 function=1
load DE500BA/dec21x4x EWD bus=pci_0 device=6 function=2
load DE500BA/dec21x4x EWE bus=pci_0 device=6 function=3
```

ℹ In the above examples device name is EWB as there is a built-in EW-like PCI Ethernet Adapter located “closer” to CPU and therefore assigned name EWA.

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_0 device=7 function=0
load DE500BA/dec21x4x EWB bus=pci_0 device=7 function=1
```

ℹ In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA, and device name is EWB as there is a built-in EW-like PCI Ethernet Adapter located “closer” to CPU and therefore assigned name EWA.

AlphaServer 2100 (3 PCI slots)

In addition to 3 PCI vacant slots there are 3 PCI positions occupied by on-board devices. All 6 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	0	0	2	DEC TULIP PCI Ethernet adapter	EWA
-	0	1	0	1	NCR 53C810 PCI SCSI Adapter	PKA
-	0	2	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
0	0	6	0	0	<option>	
			1	24	<option>, function 1	
			2	26	<option>, function 2	
			3	29	<option>, function 3	
1	0	7	0	4	<option>	
			1	25	<option>, function 1	
			2	27	<option>, function 2	
			3	30	<option>, function 3	
2	0	8	0	5	<option>	
			1	20	<option>, function 1	
			2	28	<option>, function 2	
			3	31	<option>, function 3	

The IRQ stands for input line of T2 resident cascade of Intel i8259 interrupt controllers. It has nothing to do with “EISA” style interrupts.

So far the CHARON-AXP VMs do not support virtual NCR 53C810 PCI SCSI adapter. Instead, virtual QLOGIC ISP1040B PCI SCSI adapter is used.

Example 1: Loading DE500BA into slot 0

```
load DE500BA/dec21x4x EWB bus=pci_0 device=6 function=0
```

Example 2: Loading multiple DE500BA’s into slot 0, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWB bus=pci_0 device=6 function=0
load DE500BA/dec21x4x EWC bus=pci_0 device=6 function=1
load DE500BA/dec21x4x EWD bus=pci_0 device=6 function=2
load DE500BA/dec21x4x EWE bus=pci_0 device=6 function=3
```

ℹ In the above examples device name is EWB as there is a built-in EW-like PCI Ethernet Adapter located “closer” to CPU and therefore assigned name EWA.

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_0 device=7 function=0
load DE500BA/dec21x4x EWB bus=pci_0 device=7 function=1
```

ℹ In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA, and device name is EWB as there is a built-in EW-like PCI Ethernet Adapter located “closer” to CPU and therefore assigned name EWA.

AlphaServer 4000 (16 PCI slots)

In addition to 16 PCI vacant slots there are 2 PCI positions occupied by on-board devices. All 18 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI1 (bus=pci_1)						
-	1	1	0	4	NCR 53C810 PCI SCSI Adapter	PKA
1	1	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
2	1	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
3	1	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
4	1	5	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	
			3	23	<option>, function 3	
PCI0 (bus=pci_0)						
-	0	1	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
5	0	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
6	0	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
7	0	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
8	0	5	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	

			3	23	<option>, function 3	
PCI3 (bus=pci_3)						
9	3	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
10	3	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
11	3	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
12	3	5	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	
			3	23	<option>, function 3	
PCI2 (bus=pci_2)						
13	2	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
14	2	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
15	2	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
16	2	5	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	
			3	23	<option>, function 3	

So far the CHARON-AXP VMs do not support virtual NCR 53C810 PCI SCSI adapter. Instead, virtual QLOGIC ISP1040B PCI SCSI adapter is used.

Example 1: Loading DE500BA into slot 4

```
load DE500BA/dec21x4x EWA bus=pci_1 device=5 function=0
```

Example 2: Loading multiple DE500BA’s into slot 4, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_1 device=5 function=0
load DE500BA/dec21x4x EWB bus=pci_1 device=5 function=1
load DE500BA/dec21x4x EWC bus=pci_1 device=5 function=2
load DE500BA/dec21x4x EWD bus=pci_1 device=5 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_1 device=2 function=0
load DE500BA/dec21x4x EWA bus=pci_1 device=2 function=1
```

ℹ In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA.

AlphaServer 4100 (8 PCI slots)

In addition to 8 PCI vacant slots there are 2 PCI positions occupied by on-board devices. All 10 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI1 (bus=pci_1)						
-	1	1	0	4	NCR 53C810 PCI SCSI Adapter	PKA
1	1	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
2	1	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
3	1	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
4	1	5	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	
			3	23	<option>, function 3	
PCI0 (bus=pci_0)						
-	0	1	0	-	Intel i82375 PCI EISA Bridge (MERCURY)	
5	0	2	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
6	0	3	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
7	0	4	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
8	0	5	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	

	3	23	<option>, function 3	

So far the CHARON-AXP VMs do not support virtual NCR 53C810 PCI SCSI adapter. Instead, virtual QLOGIC ISP1040B PCI SCSI adapter is used.

Example 1: Loading DE500BA into slot 4

```
load DE500BA/dec21x4x EWA bus=pci_1 device=5 function=0
```

Example 2: Loading multiple DE500BA's into slot 4, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_1 device=5 function=0
load DE500BA/dec21x4x EWB bus=pci_1 device=5 function=1
load DE500BA/dec21x4x EWC bus=pci_1 device=5 function=2
load DE500BA/dec21x4x EWD bus=pci_1 device=5 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_1 device=2 function=0
load DE500BA/dec21x4x EWA bus=pci_1 device=2 function=1
```

In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA.

AlphaServer DS10 (4 PCI slots)

In addition to 4 PCI vacant slots there are 5 PCI positions occupied by on-board devices. All 9 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI1 (bus=pci_0)						
-	0	7	0	-	ALi M1543C PCI ISA bridge	
-	0	9	0	29	DECchip 21143 PCI Ethernet Adapter	EWA
-	0	11	0	30	DECchip 21143 PCI Ethernet Adapter	EWB
-	0	13	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA, DQB
1	0	14	0	35	<option>	
			1	34	<option>, function 1	
			2	33	<option>, function 2	
			3	32	<option>, function 3	
2	0	15	0	39	<option>	
			1	38	<option>, function 1	
			2	37	<option>, function 2	
			3	36	<option>, function 3	
3	0	16	0	43	<option>	
			1	42	<option>, function 1	
			2	41	<option>, function 2	
			3	40	<option>, function 3	
4	0	17	0	47	<option>	
			1	46	<option>, function 1	
			2	45	<option>, function 2	
			3	44	<option>, function 3	
-	0	19	0	11	ALi M1543C PCI USB adapter	

Example 1: Loading DE500BA into slot 1

```
load DE500BA/dec21x4x EWC bus=pci_0 device=14 function=0
```

Example 2: Loading multiple DE500BA’s into slot 1, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWC bus=pci_0 device=14 function=0
load DE500BA/dec21x4x EWD bus=pci_0 device=14 function=1
load DE500BA/dec21x4x EWE bus=pci_0 device=14 function=2
load DE500BA/dec21x4x EWF bus=pci_0 device=14 function=3
```

ℹ In the above examples device name is EWC as there are built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB.

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_0 device=14 function=0
load DE500BA/dec21x4x EWC bus=pci_0 device=14 function=1
```

ℹ In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA, as there are two built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB.

AlphaServer DS10L (1 PCI slot)

In addition to 1 PCI vacant slots there are 5 PCI positions occupied by on-board devices. All 6 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI1 (bus=pci_0)						
-	0	7	0	-	ALi M1543C PCI ISA bridge	
-	0	9	0	29	DECchip 21143 PCI Ethernet Adapter	EWA
-	0	11	0	30	DECchip 21143 PCI Ethernet Adapter	EWB
-	0	13	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA, DQB
1	0	17	0	47	<option>	
			1	46	<option>, function 1	
			2	45	<option>, function 2	
			3	44	<option>, function 3	
-	0	19	0	11	ALi M1543C PCI USB adapter	

Example 1: Loading DE500BA into slot 1

```
load DE500BA/dec21x4x EWC bus=pci_0 device=17 function=0
```

Example 2: Loading multiple DE500BA's into slot 1, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWC bus=pci_0 device=17 function=0
load DE500BA/dec21x4x EWD bus=pci_0 device=17 function=1
load DE500BA/dec21x4x EWE bus=pci_0 device=17 function=2
load DE500BA/dec21x4x EWF bus=pci_0 device=17 function=3
```

ℹ In the above examples device name is EWC as there are built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB.

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKB bus=pci_0 device=17 function=0
load DE500BA/dec21x4x EWC bus=pci_0 device=17 function=1
```

ℹ In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA, as there are two built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB

AlphaServer DS15 (4 PCI slots)

In addition to 4 PCI vacant slots there are 7 PCI positions occupied by on-board devices. All 11 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	7	0	-	ALi M1543C PCI ISA bridge	
-	0	8	0	-	Adaptec AIC-7899 (channel 0)	PKA
			1	-	Adaptec AIC-7899 (channel 1)	PKB
-	0	9	0	-	Intel i82559 PCI Ethernet Adapter	EIA (EWA)
-	0	10	0	-	Intel i82559 PCI Ethernet Adapter	EIB (EWB)
-	0	13	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA, DQB
-	0	19	0	-	ALi M1543C PCI USB adapter	
PCI2 (bus=pci_2)						
1	2	7	0	40	<option>	
			1	41	<option>, function 1	
			2	42	<option>, function 2	
			3	43	<option>, function 3	
2	2	8	0	36	<option>	
			1	37	<option>, function 1	
			2	38	<option>, function 2	
			3	39	<option>, function 3	
3	2	9	0	24	<option>	
			1	25	<option>, function 1	
			2	26	<option>, function 2	
			3	27	<option>, function 3	
4	2	10	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	
			3	23	<option>, function 3	

The IRQ stands for bit position in DRIR of TITAN chip. It has nothing to do with “ISA” style interrupts which are routed to IRQ 55 (including ALi M1543C PCI IDE/ATAPI controller).

So far the CHARON-AXP emulators do not emulate Adaptec AIC-7899. Instead, emulation of QLOGIC ISP1040B is used.

So far the CHARON-AXP emulators do not emulate Intel i82559. Instead, emulation of DECchip 21143 is used.

So far the CHARON-AXP emulators do not emulate ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 remains empty.

Example 1: Loading DE500BA into slot 1

```
load DE500BA/dec21x4x EWC bus=pci_2 device=7 function=0
```

Example 2: Loading multiple DE500BA’s into slot 2, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWC bus=pci_2 device=8 function=0
load DE500BA/dec21x4x EWD bus=pci_2 device=8 function=1
load DE500BA/dec21x4x EWE bus=pci_2 device=8 function=2
load DE500BA/dec21x4x EWF bus=pci_2 device=8 function=3
```

ℹ In the above examples device name is EWC as there are built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB.

Example 3: Loading mixture of KZPBA and DE500BA into slot 3, populating 2 functions out of 4

```
load KZPBA PKC bus=pci_2 device=9 function=0
load DE500BA/dec21x4x EWC bus=pci_2 device=9 function=1
```

ℹ In the above example device name is PKC as there are 2 built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA and PKB, as there are two built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB

AlphaServer DS20 (6 PCI slots)

In addition to 6 PCI vacant slots there are 5 PCI positions occupied by on-board devices. All 11 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI1 (bus=pci_1)						
4	1	7	0	47	<option>	
			1	46	<option>, function 1	
			2	45	<option>, function 2	
			3	44	<option>, function 3	
5	1	8	0	43	<option>	
			1	42	<option>, function 1	
			2	41	<option>, function 2	
			3	49	<option>, function 3	
6	1	9	0	39	<option>	
			1	38	<option>, function 1	
			2	37	<option>, function 2	
			3	36	<option>, function 3	
PCI0 (bus=pci_0)						
-	0	5	0	-	ALi M1543C PCI ISA bridge	
-	0	6	0	19	Adaptec AIC-7895 (channel 0)	PKA
			1	18	Adaptec AIC-7895 (channel 1)	PKB
-	0	15	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA, DQB
-	0	19	0	-	ALi M1543C PCI USB adapter	
1	0	7	0	31	<option>	
			1	30	<option>, function 1	
			2	29	<option>, function 2	
			3	28	<option>, function 3	
2	0	8	0	27	<option>	
			1	26	<option>, function 1	
			2	25	<option>, function 2	
			3	24	<option>, function 3	
3	0	9	0	23	<option>	
			1	22	<option>, function 1	
			2	21	<option>, function 2	
			3	20	<option>, function 3	

The IRQ stands for bit position in DRIR of Tsunami/Typhoon Chip. It has nothing to do with “ISA” style interrupts which are routed to IRQ 55 (including ALi M1543C PCI IDE/ATAPI controller).

Unless SCSI option is plugged into PCI slot 4, 5, or 6, the onboard SCSI controllers appear as PKA (pka7.0.0.6.0) and PKB (pkb7.0.0.106.0) respectively.

So far the CHARON-AXP VMs do not support virtual Adaptec AIC-7895 PCI SCSI adapter. Instead, virtual QLOGIC ISP1040B PCI SCSI adapter is used.

So far the CHARON-AXP eVMs do not support virtual ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 remains empty

Example 1: Loading DE500BA into slot 4

```
load DE500BA/dec21x4x EWA bus=pci_1 device=7 function=0
```

Example 2: Loading multiple DE500BA’s into slot 4, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_1 device=7 function=0
load DE500BA/dec21x4x EWB bus=pci_1 device=7 function=1
load DE500BA/dec21x4x EWC bus=pci_1 device=7 function=2
load DE500BA/dec21x4x EWD bus=pci_1 device=7 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKC bus=pci_0 device=7 function=0
load DE500BA/dec21x4x EWA bus=pci_0 device=7 function=1
```

ℹ In the above example device name is PKC as there are two built-in PK-like PCI SCSI Adapters located “closer” to CPU and therefore assigned names PKA and PKB.

AlphaServer DS25 (6 PCI slots)

In addition to 6 PCI vacant slots there are 7 PCI positions occupied by on-board devices. All 13 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	7	0	-	ALi M1543C PCI ISA bridge	
-	0	8	0	-	Intel i82559 PCI Ethernet Adapter	EIA (EWA)
1	0	9	0	24	<option>	
			1	25	<option>, function 1	
			2	26	<option>, function 2	
			3	27	<option>, function 3	
2	0	10	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
-	0	16	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA, DQB
-	0	19	1	-	ALi M1543C PCI USB adapter	
PCI1 (bus=pci_1)						
3	1	1	0	28	<option>	
			1	29	<option>, function 1	
			2	30	<option>, function 2	
			3	31	<option>, function 3	
4	1	2	0	32	<option>	
			1	33	<option>, function 1	
			2	34	<option>, function 2	
			3	35	<option>, function 3	
PCI2 (bus=pci_2)						
-	2	1	0	-	Adaptec AIC-7899 (channel 0)	PKA
			1	-	Adaptec AIC-7899 (channel 1)	PKB
-	2	5	0	-	BroadCom BCM5703 PCI Ethernet Adapter	EIB (EWB)
PCI3 (bus=pci_3)						
5	3	1	0	36	<option>	
			1	37	<option>, function 1	
			2	38	<option>, function 2	
			3	39	<option>, function 3	
6	3	2	0	40	<option>	
			1	41	<option>, function 1	
			2	42	<option>, function 2	
			3	43	<option>, function 3	

The IRQ stands for bit position in DRIR of TITAN Chip. It has nothing to do with “ISA” style interrupts which are routed to IRQ 55 (including ALi M1543C PCI IDE/ATAPI controller).

So far the CHARON-AXP VMs do not emulate Intel i82559. Instead, emulation of DECchip 21143 is used.

So far the CHARON-AXP VMs do not emulate ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 remains empty.

Unless SCSI option is plugged into PCI slot 1, 2, 3, or 4, the onboard SCSI controllers appear as PKA (pka7.0.0.1.2) and PKB (pkb7.0.0.101.2) respectively.

So far the CHARON-AXP VMs do not emulate Adaptec AIC-7899. Instead, emulation of QLOGIC ISP1040B is used.

So far the CHARON-AXP VMs do not emulate BroadCom BCM5703. Instead, emulation of DECchip 21143 is used.

Example 1: Loading DE500BA into slot 5

```
load DE500BA/dec21x4x EWC bus=pci_3 device=1 function=0
```

Example 2: Loading multiple DE500BA’s into slot 5, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWC bus=pci_3 device=1 function=0
load DE500BA/dec21x4x EWD bus=pci_3 device=1 function=1
load DE500BA/dec21x4x EWE bus=pci_3 device=1 function=2
load DE500BA/dec21x4x EWF bus=pci_3 device=1 function=3
```

ℹ In the above examples device name is EWC as there are built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB.

Example 3: Loading mixture of KZPBA and DE500BA into slot 6, populating 2 functions out of 4

```
load KZPBA PKC bus=pci_3 device=2 function=0
load DE500BA/dec21x4x EWC bus=pci_3 device=2 function=1
```

ℹ In the above example device name is PKB as there is a built-in PK-like PCI SCSI Adapter located “closer” to CPU and therefore assigned name PKA, as there are two built-in EW-like PCI Ethernet Adapters located “closer” to CPU and therefore assigned names EWA and EWB

AlphaServer ES40 (10 PCI slots)

In addition to 10 PCI vacant slots there are 3 PCI positions occupied by on-board devices. All 13 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI1 (bus=pci_1)						
5	1	1	0	24	<option>	
			1	25	<option>, function 1	
			2	26	<option>, function 2	
			3	27	<option>, function 3	
6	1	2	0	28	<option>	
			1	29	<option>, function 1	
			2	30	<option>, function 2	
			3	31	<option>, function 3	
7	1	3	0	32	<option>	
			1	33	<option>, function 1	
			2	34	<option>, function 2	
			3	35	<option>, function 3	
8	1	4	0	36	<option>	
			1	37	<option>, function 1	
			2	38	<option>, function 2	
			3	39	<option>, function 3	
9	1	5	0	40	<option>	
			1	41	<option>, function 1	
			2	42	<option>, function 2	
			3	43	<option>, function 3	
10	1	6	0	44	<option>	
			1	45	<option>, function 1	
			2	46	<option>, function 2	
			3	47	<option>, function 3	
PCI0 (bus=pci_0)						
1	0	1	0	8	<option>	
			1	9	<option>, function 1	
			2	10	<option>, function 2	
			3	11	<option>, function 3	
2	0	2	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
3	0	3	1	16	<option>	

			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
4	0	4	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	
			3	23	<option>, function 3	
-	0	5	0	-	ALi M1543C PCI ISA bridge	
-	0	15	0	-	ALi M1543C PCI ISA bridge	DQA, DQB
-	0	19	0	-	ALi M1543C PCI USB adapter	

The IRQ stands for bit position in DRIR of Tsunami/Typhoon chip. It has nothing to do with “ISA” style interrupts which are routed to IRQ 55 (including ALi M1543C PCI IDE/ATAPI controller).

So far the CHARON-AXP VMs do not support virtual ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 remains empty.

Example 1: Loading DE500BA into slot 5

```
load DE500BA/dec21x4x EWA bus=pci_1 device=1 function=0
```

Example 2: Loading multiple DE500BA’s into slot 5, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_1 device=1 function=0
load DE500BA/dec21x4x EWB bus=pci_1 device=1 function=1
load DE500BA/dec21x4x EWC bus=pci_1 device=1 function=2
load DE500BA/dec21x4x EWD bus=pci_1 device=1 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKA bus=pci_0 device=1 function=0
load DE500BA/dec21x4x EWA bus=pci_0 device=1 function=1
```

AlphaServer ES45 (10 PCI slots)

In addition to 10 PCI vacant slots there are 3 PCI positions occupied by on-board devices. All 13 PCI positions are listed in the following table in the order in which Alpha SRM console enumerates them.

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
PCI0 (bus=pci_0)						
-	0	7	0	-	ALi M1543C PCI ISA bridge	
1	0	8	0	20	<option>	
			1	21	<option>, function 1	
			2	22	<option>, function 2	
			3	23	<option>, function 3	
2	0	9	0	24	<option>	
			1	25	<option>, function 1	
			2	26	<option>, function 2	
			3	27	<option>, function 3	
3	0	10	0	12	<option>	
			1	13	<option>, function 1	
			2	14	<option>, function 2	
			3	15	<option>, function 3	
4	0	11	0	16	<option>	
			1	17	<option>, function 1	
			2	18	<option>, function 2	
			3	19	<option>, function 3	
-	0	16	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA, DQB
-	0	19	0	-	ALi M1543C PCI USB adapter	
PCI1 (bus=pci_1)						
5	1	1	0	28	<option>	
			1	29	<option>, function 1	
			2	30	<option>, function 2	
			3	31	<option>, function 3	
6	1	2	0	32	<option>	
			1	33	<option>, function 1	
			2	34	<option>, function 2	
			3	35	<option>, function 3	
PCI2 (bus=pci_2)						
7	2	1	0	0	<option>	
			1	1	<option>, function 1	
			2	2	<option>, function 2	
			3	3	<option>, function 3	
8	2	2	0	4	<option>	

			1	5	<option>, function 1	
			2	6	<option>, function 2	
			3	7	<option>, function 3	
PCI3 (bus=pci_3)						
9	3	1	0	36	<option>	
			1	37	<option>, function 1	
			2	38	<option>, function 2	
			3	39	<option>, function 3	
10	3	2	0	40	<option>	
			1	41	<option>, function 1	
			2	42	<option>, function 2	
			3	43	<option>, function 3	

The IRQ stands for bit position in DRIR of TITAN chip. It has nothing to do with “ISA” style interrupts which are routed to IRQ 55 (including ALi M1543C PCI IDE/ATAPI controller).

So far the CHARON-AXP VMs do not support virtual ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 remains empty.

Example 1: Loading DE500BA into slot 5

```
load DE500BA/dec21x4x EWA bus=pci_1 device=1 function=0
```

Example 2: Loading multiple DE500BA’s into slot 5, populating all 4 functions (gives 4 Ethernet ports)

```
load DE500BA/dec21x4x EWA bus=pci_1 device=1 function=0
load DE500BA/dec21x4x EWB bus=pci_1 device=1 function=1
load DE500BA/dec21x4x EWC bus=pci_1 device=1 function=2
load DE500BA/dec21x4x EWD bus=pci_1 device=1 function=3
```

Example 3: Loading mixture of KZPBA and DE500BA into slot 1, populating 2 functions out of 4

```
load KZPBA PKA bus=pci_0 device=8 function=0
load DE500BA/dec21x4x EWA bus=pci_0 device=8 function=1
```

AlphaServer GS80 (8 PCI busses)

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
QBB0.PCA0.PCI0 (bus=qbb_0_pca_0_pci_0)						
0/1	0	1	0	36	QLOGIC ISP1040B PCI SCSI Adapter	PKA
2	0	2	0	40	<option>	
3	0	3	0	44	<option>	
-	0	7	0	-	ALi M1543C PCI ISA bridge	
-	0	15	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA
-	0	19	0	-	ALi M1543C PCI USB adapter	
QBB0.PCA0.PCI1 (bus=qbb_0_pca_0_pci_1)						
4	1	4	0	48	<option>	
5	1	5	0	52	<option>	
6	1	6	0	56	<option>	

7	1	7	0	60	<option>	
QBB0.PCA1.PCI0 (bus=qbb_0_pca_1_pci_0)						
0/1	2	0	0	32	<option>	
2	2	2	0	40	<option>	
3	2	3	0	44	<option>	
QBB0.PCA1.PCI1 (bus=qbb_0_pca_1_pci_1)						
4	3	4	0	48	<option>	
5	3	5	0	52	<option>	
6	3	6	0	56	<option>	
7	3	7	0	60	<option>	
QBB1.PCA0.PCI0 (bus=qbb_1_pca_0_pci_0)						
0/1	8	0	0	32	<option>	
2	8	2	0	40	<option>	
3	8	3	0	44	<option>	
QBB1.PCA0.PCI1 (bus=qbb_1_pca_0_pci_1)						
4	9	4	0	48	<option>	
5	9	5	0	52	<option>	
6	9	6	0	56	<option>	
7	9	7	0	60	<option>	
QBB1.PCA1.PCI0 (bus=qbb_1_pca_1_pci_0)						
0/1	10	0	0	32	<option>	
2	10	2	0	40	<option>	
3	10	3	0	44	<option>	
QBB1.PCA1.PCI1 (bus=qbb_1_pca_1_pci_1)						
4	11	4	0	48	<option>	
5	11	5	0	52	<option>	
6	11	6	0	56	<option>	
7	11	7	0	60	<option>	

PCI 2 and 3 on each QBB are not populated.

So far the CHARON-AXP VMs do not support virtual ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 remains empty.

Total number of PCI devices configured through CFG file may not exceed 20.

Example: Loading DE500BA into slot 2 of QBB0.PCA0

```
load DE500BA/dec21x4x EWA bus=qbb_0_pca_0_pci_0 device=2 function=0
```

AlphaServer GS160 (16 PCI busses)

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
QBB0.PCA0.PCI0 (bus=qbb_0_pca_0_pci_0)						
0/1	0	1	0	36	QLOGIC ISP1040B PCI SCSI Adapter	PKA
2	0	2	0	40	<option>	
3	0	3	0	44	<option>	
-	0	7	0	-	ALi M1543C PCI ISA bridge	
-	0	15	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA
-	0	19	0	-	ALi M1543C PCI USB adapter	
QBB0.PCA0.PCI1 (bus=qbb_0_pca_0_pci_1)						
4	1	4	0	48	<option>	
5	1	5	0	52	<option>	
6	1	6	0	56	<option>	
7	1	7	0	60	<option>	
QBB0.PCA1.PCI0 (bus=qbb_0_pca_1_pci_0)						
0/1	2	0	0	32	<option>	
2	2	2	0	40	<option>	
3	2	3	0	44	<option>	
QBB0.PCA1.PCI1 (bus=qbb_0_pca_1_pci_1)						
4	3	4	0	48	<option>	
5	3	5	0	52	<option>	
6	3	6	0	56	<option>	
7	3	7	0	60	<option>	
QBB1.PCA0.PCI0 (bus=qbb_1_pca_0_pci_0)						
0/1	8	0	0	32	<option>	
2	8	2	0	40	<option>	
3	8	3	0	44	<option>	
QBB1.PCA0.PCI1 (bus=qbb_1_pca_0_pci_1)						
4	9	4	0	48	<option>	
5	9	5	0	52	<option>	
6	9	6	0	56	<option>	
7	9	7	0	60	<option>	
QBB1.PCA1.PCI0 (bus=qbb_1_pca_1_pci_0)						
0/1	10	0	0	32	<option>	
2	10	2	0	40	<option>	
3	10	3	0	44	<option>	
QBB1.PCA1.PCI1 (bus=qbb_1_pca_1_pci_1)						
4	11	4	0	48	<option>	
5	11	5	0	52	<option>	

6	11	6	0	56	<option>	
7	11	7	0	60	<option>	
QBB2.PCA0.PCI0 (bus=qbb_2_pca_0_pci_0)						
0/1	16	0	0	32	<option>	
2	16	2	0	40	<option>	
3	16	3	0	44	<option>	
QBB2.PCA0.PCI1 (bus=qbb_2_pca_0_pci_1)						
4	17	4	0	48	<option>	
5	17	5	0	52	<option>	
6	17	6	0	56	<option>	
7	17	7	0	60	<option>	
QBB2.PCA1.PCI0 (bus=qbb_2_pca_1_pci_0)						
0/1	18	0	0	32	<option>	
2	18	2	0	40	<option>	
3	18	3	0	44	<option>	
QBB2.PCA1.PCI1 (bus=qbb_2_pca_1_pci_1)						
4	19	4	0	48	<option>	
5	19	5	0	52	<option>	
6	19	6	0	56	<option>	
7	19	7	0	60	<option>	
QBB3.PCA0.PCI0 (bus=qbb_3_pca_0_pci_0)						
0/1	24	0	0	32	<option>	
2	24	2	0	40	<option>	
3	24	3	0	44	<option>	
QBB3.PCA0.PCI1 (bus=qbb_3_pca_0_pci_1)						
4	25	4	0	48	<option>	
5	25	5	0	52	<option>	
6	25	6	0	56	<option>	
7	25	7	0	60	<option>	
QBB3.PCA1.PCI0 (bus=qbb_3_pca_1_pci_0)						
0/1	26	0	0	32	<option>	
2	26	2	0	40	<option>	
3	26	3	0	44	<option>	
QBB0.PCA0.PCI1 (bus=qbb_3_pca_1_pci_1)						
4	27	4	0	48	<option>	
5	27	5	0	52	<option>	
6	27	6	0	56	<option>	
7	27	7	0	60	<option>	

PCA 2 and 3 on each QBB are not populated in emulator.

So far the CHARON-AXP VMs do not emulate ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 on QBB 0 remains empty.

Total number of PCI devices configured through CFG file may not exceed 20.

Example: Loading DE500BA into slot 2 of QBB0.PCA0

```
load DE500BA/dec21x4x EWA bus=qbb_0_pca_0_pci_0 device=2 function=0
```

AlphaServer GS320 (32 PCI busses)

Slot	pci_<N>	device	function	irq	Description	Preloaded Name
QBB0.PCA0.PCI0 (bus=qbb_0_pca_0_pci_0)						
0/1	0	1	0	36	QLOGIC ISP1040B PCI SCSI Adapter	PKA
2	0	2	0	40	<option>	
3	0	3	0	44	<option>	
-	0	7	0	-	ALi M1543C PCI ISA bridge	
-	0	15	0	-	ALi M1543C PCI IDE/ATAPI controller	DQA
-	0	19	0	-	ALi M1543C PCI USB adapter	
QBB0.PCA0.PCI1 (bus=qbb_0_pca_0_pci_1)						
4	1	4	0	48	<option>	
5	1	5	0	52	<option>	
6	1	6	0	56	<option>	
7	1	7	0	60	<option>	
QBB0.PCA1.PCI0 (bus=qbb_0_pca_1_pci_0)						
0/1	2	0	0	32	<option>	
2	2	2	0	40	<option>	
3	2	3	0	44	<option>	
QBB0.PCA1.PCI1 (bus=qbb_0_pca_1_pci_1)						
4	3	4	0	48	<option>	
5	3	5	0	52	<option>	
6	3	6	0	56	<option>	
7	3	7	0	60	<option>	
QBB1.PCA0.PCI0 (bus=qbb_1_pca_0_pci_0)						
0/1	8	0	0	32	<option>	
2	8	2	0	40	<option>	
3	8	3	0	44	<option>	
QBB1.PCA0.PCI1 (bus=qbb_1_pca_0_pci_1)						
4	9	4	0	48	<option>	
5	9	5	0	52	<option>	
6	9	6	0	56	<option>	
7	9	7	0	60	<option>	
QBB1.PCA1.PCI0 (bus=qbb_1_pca_1_pci_0)						
0/1	10	0	0	32	<option>	
2	10	2	0	40	<option>	

3	10	3	0	44	<option>	
QBB1.PCA1.PCI1 (bus=qbb_1_pca_1_pci_1)						
4	11	4	0	48	<option>	
5	11	5	0	52	<option>	
6	11	6	0	56	<option>	
7	11	7	0	60	<option>	
QBB2.PCA0.PCI0 (bus=qbb_2_pca_0_pci_0)						
0/1	16	0	0	32	<option>	
2	16	2	0	40	<option>	
3	16	3	0	44	<option>	
QBB2.PCA0.PCI1 (bus=qbb_2_pca_0_pci_1)						
4	17	4	0	48	<option>	
5	17	5	0	52	<option>	
6	17	6	0	56	<option>	
7	17	7	0	60	<option>	
QBB2.PCA1.PCI0 (bus=qbb_2_pca_1_pci_0)						
0/1	18	0	0	32	<option>	
2	18	2	0	40	<option>	
3	18	3	0	44	<option>	
QBB2.PCA1.PCI1 (bus=qbb_2_pca_1_pci_1)						
4	19	4	0	48	<option>	
5	19	5	0	52	<option>	
6	19	6	0	56	<option>	
7	19	7	0	60	<option>	
QBB3.PCA0.PCI0 (bus=qbb_3_pca_0_pci_0)						
0/1	24	0	0	32	<option>	
2	24	2	0	40	<option>	
3	24	3	0	44	<option>	
QBB3.PCA0.PCI1 (bus=qbb_3_pca_0_pci_1)						
4	25	4	0	48	<option>	
5	25	5	0	52	<option>	
6	25	6	0	56	<option>	
7	25	7	0	60	<option>	
QBB3.PCA1.PCI0 (bus=qbb_3_pca_1_pci_0)						
0/1	26	0	0	32	<option>	
2	26	2	0	40	<option>	
3	26	3	0	44	<option>	
QBB3.PCA1.PCI1 (bus=qbb_3_pca_1_pci_1)						
4	27	4	0	48	<option>	
5	27	5	0	52	<option>	
6	27	6	0	56	<option>	

7	27	7	0	60	<option>	
QBB4.PCA0.PCI0 (bus=qbb_4_pca_0_pci_0)						
0/1	32	0	0	32	<option>	
2	32	2	0	40	<option>	
3	32	3	0	44	<option>	
QBB4.PCA0.PCI1 (bus=qbb_4_pca_0_pci_1)						
4	33	4	0	48	<option>	
5	33	5	0	52	<option>	
6	33	6	0	56	<option>	
7	33	7	0	60	<option>	
QBB4.PCA1.PCI0 (bus=qbb_4_pca_1_pci_0)						
0/1	34	0	0	32	<option>	
2	34	2	0	40	<option>	
3	34	3	0	44	<option>	
QBB4.PCA1.PCI1 (bus=qbb_4_pca_1_pci_1)						
4	35	4	0	48	<option>	
5	35	5	0	52	<option>	
6	35	6	0	56	<option>	
7	35	7	0	60	<option>	
QBB5.PCA0.PCI0 (bus=qbb_5_pca_0_pci_0)						
0/1	40	0	0	32	<option>	
2	40	2	0	40	<option>	
3	40	3	0	44	<option>	
QBB5.PCA0.PCI1 (bus=qbb_5_pca_0_pci_1)						
4	41	4	0	48	<option>	
5	41	5	0	52	<option>	
6	41	6	0	56	<option>	
7	41	7	0	60	<option>	
QBB5.PCA1.PCI0 (bus=qbb_5_pca_1_pci_0)						
0/1	42	0	0	32	<option>	
2	42	2	0	40	<option>	
3	42	3	0	44	<option>	
QBB5.PCA1.PCI1 (bus=qbb_5_pca_1_pci_1)						
4	43	4	0	48	<option>	
5	43	5	0	52	<option>	
6	43	6	0	56	<option>	
7	43	7	0	60	<option>	
QBB6.PCA0.PCI0 (bus=qbb_6_pca_0_pci_0)						
0/1	48	0	0	32	<option>	
2	48	2	0	40	<option>	
3	48	3	0	44	<option>	

QBB6.PCA0.PCI1 (bus=qbb_6_pca_0_pci_1)						
4	49	4	0	48	<option>	
5	49	5	0	52	<option>	
6	49	6	0	56	<option>	
7	49	7	0	60	<option>	
QBB6.PCA1.PCI0 (bus=qbb_6_pca_1_pci_0)						
0/1	50	0	0	32	<option>	
2	50	2	0	40	<option>	
3	50	3	0	44	<option>	
QBB6.PCA1.PCI1 (bus=qbb_6_pca_1_pci_1)						
4	51	4	0	48	<option>	
5	51	5	0	52	<option>	
6	51	6	0	56	<option>	
7	51	7	0	60	<option>	
QBB7.PCA0.PCI0 (bus=qbb_7_pca_0_pci_0)						
0/1	56	0	0	32	<option>	
2	56	2	0	40	<option>	
3	56	3	0	44	<option>	
QBB7.PCA0.PCI1 (bus=qbb_7_pca_0_pci_1)						
4	57	4	0	48	<option>	
5	57	5	0	52	<option>	
6	57	6	0	56	<option>	
7	57	7	0	60	<option>	
QBB7.PCA1.PCI0 (bus=qbb_7_pca_1_pci_0)						
0/1	58	0	0	32	<option>	
2	58	2	0	40	<option>	
3	58	3	0	44	<option>	
QBB7.PCA1.PCI1 (bus=qbb_7_pca_1_pci_1)						
4	59	4	0	48	<option>	
5	59	5	0	52	<option>	
6	59	6	0	56	<option>	
7	59	7	0	60	<option>	

PCA 2 and 3 on each QBB are not populated in emulator.

So far the MSC/AXP emulators do not emulate ALi M1543C PCI USB adapter. So position of the device 19, function 0 on the PCI 0 on QBB 0 remains empty.

Total number of PCI devices configured through CFG file may not exceed 20.

Example: Loading DE500BA into slot 2 of QBB0.PCA0

```
load DE500BA/dec21x4x EWA bus=qbb_0_pca_0_pci_0 device=2 function=0
```

Disks and tapes

Contents

KZPBA PCI SCSI adapter

Table of Contents

General description

KZPBA is a PCI SCSI adapter based on the QLogic ISP1040 Fast Wide SCSI adapter chip for HP Alpha.

In CHARON Virtual Machine (VM) environment it supports up to 120 disks and tapes.

For systems with more than 16 heavily used units it is recommended to configure several virtual KZPBA PCI SCSI adapters and distribute the heavily loaded units evenly between the adapters.

Loading KZPBA storage adapter

Syntax for loading KZPBA storage adapter:

```
load KZPBA <name>
```

Example:

```
load KZPBA PKA
```

In AlphaStation 400 configuration use the following syntax for KZPBA storage adapter loading:

```
load KZPBA PKB irq_bus = isa
```

The adapter instance name ("PKA" in the example above) is used then for parametrization, for example:

```
set PKA container[602]="C:\My disks\vms_distribution.vdisk"
```

The numbers in the square brackets represent SCSI ID and LUN of the devices on the virtual KZPBA SCSI bus.

They have the following format: **XXYY**, where:

Parameter	Range	Description
XX	0..15	SCSI ID
YY	00..07	LUN

By default KZPBA adapter uses first available PCI slot. If instead some particular slot is needed, refer to this section for details of specific placement of PCI peripherals on CHARON Virtual Machine (VM) PCI bus.

By default each loaded KZPBA SCSI PCI adapter has SCSI ID=7. This setting can be changed with "scsi_id" parameter, for example:

```
set PKA scsi_id=0
```

ℹ CHARON-AXP HP Alpha models may have one or two KZPBA adapters preloaded.

Configuration parameters

The KZPBA PCI SCSI adapter emulation has the following configuration parameters:

scsi_id

Parameter	scsi_id
Type	Numeric
Value	Specifies SCSI ID of KZPBA PCI SCSI Adapter in a range 0..7 By default the "scsi_id" configuration parameter is set to 7. **Example**: `set PKA scsi_id=6`

host, port

Parameter	host, port
Type	Text string

Value	These parameters are used in SCSI cluster configurations.
	● Specifies remote end-point (remote host name and, optionally, TCP/IP port on remote host) of SCSI connection between this KZPBA PCI SCSI adapter and remote KZPBA PCI SCSI adapter on some host.
	● Specifies local end-point (TCP/IP port on local host) of SCSI connection between this KZPBA PCI SCSI adapter and remote KZPBA PCI SCSI adapter on some host.
	By default the "host" and "port" configuration options are not specified.
	Syntax:
	`port[connection-number]=<local port> host[connection-number]="<host-name{:tcpip-port-no}>"`
	where: connection-number = remote_scsi_id * 100 + lun_id
	Example - 2 members cluster on the same Charon server - Node 1:
	`set PKA scsi_id=6`
	`set PKA port[700]=11067 host[700]="localhost:11076"`
	Example - 2 members cluster on the same Charon server - Node 2:
	`set PKA scsi_id=7`
	`set PKA port[600]=11076 host[600]="localhost:11067"`

container

Parameter	container[N] N is "XXYY" number, where XX = SCSI ID (0..15) and YY = LUN (00..07)
Type	Text string
Value	Possible values of the parameter are strings in one of the following forms:

- **Physical disk**
  - "\\.\PhysicalDrive<X>", where X is 0, 1, …

    ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.
    These disks must not be formatted by the host OS.
    Example:

    ```
    set PKA container[0]="\\.\PhysicalDrive1"
    ```

- **Physical disk by its WWID**
  - "\\.\PhysicalDrive(DevID=XXX-...-XXXX)"

    ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.

    These disks must not be formatted by the host OS.

    DevID addresses the target physical disk by its WWID (hexadecimal 128-bit identifier assigned to the disk drive by its manufacturer/originator).

    Example:

    ```
    set PKA container[100]="\\.\PhysicalDrive(DevID=6008-05F3-0005-2950-BF8E-0B86-A0C7-0001)"
    ```

    The WWID values can be obtained from "Host Device Check" utility ("All drives" section)

    ⚠ If the "Host Device Check" utility does not display any WWID, this means the target disk does not have one. Use the "\\.\PhysicalDrive<N>" mapping in this case.

- **iSCSI disks**
  - "\\.\PhysicalDrive(iScsiTarget = <iSCSI target>, LUN = <LUN number>)"

    iScsiTarget addresses the disk by its iSCSI target name.

    LUN specifies LUN on connected iSCSI disk.

    Example:

    ```
    set PKA container[200]="\\.\PhysicalDrive(iScsiTarget=iqn.2008-04:iscsi.charon-target-test1, LUN= 1)"
    ```

- **Tape device**
  - "\\.\Tape<X>", where X is 0, 1, …
    Example:

    ```
    set PKA container[600]="\\.\Tape0"
    ```

- **Tape changer**
  - "\\.\Changer<X>", where X is 0, 1, …

- **Floppy drive**
  - "\\.\A:"
  - "\\.\B:"

  Example:

  ```
  set PKA container[300]="\\.\A:"
  ```

- **CDROM device**
  - "\\.\CdRom<X>", where X is 0, 1, …

  Example:

  ```
  set PKA container[400]="\\.\CdRom0"
  ```

- **ISO file for reading distribution CD-ROM image**
  - [<drive>":\"<path-name>"\"]<file-name>[".iso”]
    Mapping may also include the full path (recommended), for example: "C:\My disks\vms_distribution.iso"

  Example:

  ```
  set PKA container[600]="C:\My disks\vms_distribution.iso"
  ```

- **File representing a physical disk of the HP Alpha system (disk image)**
  - [<drive>":\"<path-name>"\"]<file-name>[".vdisk"]
    These files can be created from scratch with "MkDisk" utility. Data and OS disks backups are transferred from the original system via tapes or network and restored into these container files.
    Mapping may also include the full path (recommended), for example: "C:\My disks\my_boot_disk.vdisk"
    Example:

  ```
  set PKA container[401]="tru64-v51-system.vdisk"
  ```

  ☒ Using compressed folders to store virtual disks and tapes is not supported

- **File representing the tape (tape image)**
  - [<drive>":\"<path-name>"\"]<file-name>".vtape"
    The container-file to which an emulated tape drive is mapped is created automatically when the emulator starts, and when the device is accessed from within the guest operating system.

    We recommend specifying the full path to the container-file, for example: "C:\MyTapes\backup.vtape"

    Example:

    ```
    set PKA container[500]="E:\Tapes\backup.vtape"
    ```

    If the "CHARON Guest Utilities for OpenVMS" (CHARONCP) package is used, the syntax is different. Please read the corresponding chapter.

    Using compressed folders to store virtual disks and tapes is not supported

How the Emulator Maps Guest-OS Operations to the Virtual Tape Drive

Guest-OS Operation	Emulator Action
Open device for writing	Create a container file if necessary; open for writing and lock the container file
Open device for reading	Create a container file if none exists. open for reading and lock container file
Unload (eject) tape from drive	Close a container file if open and unlock it - this allows copy/move/delete operations on CHARON host

The container file associated with a virtual tape drive can be compared to the tape cartridge used in a physical tape drive. Both store the data written to the tape device by the guest OS.

The size of virtual tape container files is limited only by space available in the emulator host file system.

⚠ Prerequisite to the examples below: a virtual tape device has been configured in the CHARON configuration file and it is not in use by the guest OS.

To perform backup:

1. The tape device may be issued the "unload" command and the container-file moved/deleted to insure proper status
2. Initialize the tape device using standard guest OS procedure.
3. Perform backup.
4. Issue "unload" command to the tape device in the guest OS.
5. On the emulator host, move the *.vtape container file containing backup data for storage or further backup.

To restore from a backup:

1. The tape device may be issued the "unload" command to insure proper status.
2. On the emulator host, move or copy a *.vtape container file containing backup data onto the filename specified in the CHARON configuration file.
3. Perform restore.
4. Issue the "unload" command to the tape device in the guest OS.
5. Delete or move the container file in preparation for the next vtape operation.

CHARON does not support muti-volume backup for tape images. If some mutli-volume set (in form of tape images) has to be restored it is recommended to configure several tape drives in CHARON VM configuration file, assign each tape image to each tape drive and use them in the following way (OpenVMS example):

```
$ BACKUP MKA100:BACKUP.BCK,MKA200,MKA300,MKA4000/SAVE_SET DKA0:...
```

	- **Other type of drive, for example magneto-optical drive** - "\\.\<N>:" **Example**: `set PKA container[300]="\\.\Z:"` ℹ This parameter is initially not set, thus creating NO storage elements on the controller.

media_type

Parameter	media_type[N] N is "XXYY" number, where XX = SCSI ID (0..15) and YY = LUN (00..07)
Type	Text string
Value	Instructs CHARON VM to use the supplied value as the PRODUCT field in the SCSI INQUIRY data returned to a software running on virtual HP Alpha system in response to SCSI INQUIRY command. If not specified, CHARON VM attempts to guess the SCSI INQUIRY data based on virtual SCSI device type and underlying container (which is specified in the corresponding container configuration parameter). Initially is not specified. **Example**: `set PKA media_type[0]="HSZ70"`

removable

Parameter	removable[N] N is "XXYY" number, where XX = SCSI ID (0..15) and YY - LUN (00..07)
Type	Boolean
Value	When set to "true", the removable configuration parameter instructs CHARON VM to report the corresponding virtual SCSI device as removable. Note to set this parameter to "true" if this disk storage element is: - Mapped to a host removable device - Mapped to a disk/tape image located on a host removable device - Mapped to a disk/tape image that has to be renamed/moved/deleted right after dismounting it in the guest OS By default the removable configuration parameter is set to "false". **Example**: `set PKA removable[400]=true` ℹ Note that virtual SCSI tapes and CD-ROM devices are always reported as removable regardless of the "removable" configuration parameter.

geometry

Parameter	geometry [N] N is "XXYY" number, where XX = SCSI ID (0..15) and YY - LUN (00..07)
Type	Text String

Value

This formatted string value specifies the explicit geometry of the disk storage element. This parameter is not applicable to tape storage elements.

The string format is <X>”/”<Y>[“/”<Z>][“/”<B>] or <X>”,”<Y>[“,”<Z>][“,”<B>] where:

Parameter	Description
X	The number of sectors per track
Y	The number of tracks per cylinder
Z	The number of cylinders on the unit. If omitted, Z is calculated based on X, Y and the total number of sectors on the unit that reflects the size of the disk storage element. This is an optional parameter.
B	The total size of the disk (in blocks) reported to the guest OS. If omitted it is calculated automatically. This is an optional parameter.

If this parameter is not set, CHARON VM will configure the geometry based on the most probable disk type.

Initially not set.

It is possiblle to specify each parameter independently of another one. The following syntax is used for that:

```
set PKA geometry[300]="*,*,*,16777210"
```

The syntax described above is applicable only to disk storage elements. If the container is a tape image, the following format is used instead:

Syntax:

```
"<image-size>[, <early-warning-zone-size>]"
```

where:

Parameter	Description
image-size	The tape size in MB
early-warning-zone-size	The size (in KB) of the space left on the tape when a warning to the OS is issued. If omitted, 64K is assumed.

Example:

```
set PKA geometry[603] = "255/255"
```

use_io_file_buffering

Parameter	use_io_file_buffering[N] N is "XXYY" number, where XX = SCSI ID (0..15) and YY = LUN (00..07)
Type	Text String
Value	Instructs CHARON VM to enable host operating system I/O cache on reading/writing operations. The following values are possible: - "true" or "write-back" - the "write back" caching mode is used - "write-through" - the "write through" caching mode is used - "false" - caching is switched off ℹ Note that this caching has a significant effect only in case of mapping to disk and tape containers, not physical drives. When enabled, host operating system I/O cache may significantly improve I/O performance of the virtual system. At the same time maintaining I/O cache requires additional host resources (CPU and memory) which may negatively affect overall performance of the virtual system. Initially is set to "false". **Example**: `set PKA use_io_file_buffering[603]=true`

io_queue_depth

Parameter	io_queue_depth[N] N is "XXYY" number, where: - XX - SCSI ID (0..15) - YY - LUN (00..07)
Type	Numeric
Value	Specifies KZPBA I/O requests (read or write) for a given unit in a range 2..128 Setting this parameter enables KZPBA instance to run up-to the specifiied numbers of I/O requests (read or write) for unit N in parallel, thus improving the performance. The default value set by controller is optimal for most of the cases. It may be needed to enlarge this number if guest OS I/O queue for a certain unit contains too much pending entries. In this case the value should be equal to an average size of the queue, collected statistically. Please do not set this parameter without clear understanding the purpose. By default parallel execution of I/O requests is disabled. **Example**: `set PKA io_queue_depth[603]=4`

min_n_of_threads

Parameter	min_n_of_threads
Type	Numeric
Value	Instructs KZPBA I/O to reserve a given number of working threads in a range 1..64, thus improving the performance. All units of KZPBA instance share the I/O threads. The default value is equal to number of units plus 2. For optimization it is possible to set this parameter to sum of the "io_queue_depth" parameters for each unit plus 2. This assumption seems optimal for most of the cases. Please do not set this parameter without clear understanding the purpose. **Example**: `set PKA min_n_of_threads=16`

When a tape or disk image connected to an emulated KZPBA controller is dismounted by OpenVMS, it is disconnected from CHARON VM and can be manipulated. It can be replaced with a different disk image if it keeps the same name. This capability may be useful when designing back-up and restore procedures. When copying CHARON-AXP disk images while CHARON VM is running, please take care to minimize the risk of overloading a heavily loaded CHARON host system. For example, using a sequential series of simple ftp binary copies is less resource intensive and thus less disruptive than multiple, simultaneous copies.

Empty disk images are created with the "MkDisk" utility. Tape images ("*.vtape") will be created automatically if they don't exist (no utility needed).

CHARON-AXP is able to boot from disk images of any OpenVMS/Alpha and Tru64 version.

> The virtual KZPBA storage controller examines the file extension `(vdisk or vtape)` to distinguish between a disk image and a tape image.
>
> Configured physical devices or tape/disk images that do not exist on the host system will, in general, cause OpenVMS/Alpha to report the unit offline. In some cases this will result in a VMS BUG CHECK. In this case, an error message will be written to the log file.

KGPSA-CA PCI Fibre Channel adapter

Table of Contents

General description

CHARON-AXP supports emulation of DEC-KGPSA-CA PCI Fibre Channel adapter.

Every instance of KGPSA-CA works in one of the three following modes:

- Fabric virtualization mode (mapping to disk images and host/SAN physical disks). This is default mode.
- Usage of "presentation mode" of external storage controllers to automatically configure KGPSA-CA disks correspondent to the LUNs provided by the external storages
- Pass Through mode (using a specific CHARON PCI Pass Through driver to work through the EMULEX LightPulse PCI/PCI-X/PCIe FC adapter plugged into host)

Loading KGPSA storage adapter

Syntax for loading KGPSA-CA storage adapter:

```
load KGPSA <name>
```

Example:

```
load KGPSA FGA
```

⚠ In AlphaStation 400 configuration use the following syntax for KGPSA-CA storage adapter loading:

```
load KGPSA FGA irq_bus = isa
```

The adapter instance name ("FGA" in the example above) is used then for parametrization, for example:

```
set FGA container[100]="C:\My disks\vms_distributive.vdisk"
```

Numbers in the square brackets represent KGPSA-CA units. They can be in the range 0..32766, but no more than 255 units can be configured on a single controller.

By default KGPSA-CA adapter uses first available PCI slot. If instead some particular slot is needed, refer to this section for details of specific placement of PCI peripherals on CHARON Virtual Machine (VM) PCI bus.

Configuration parameters

The KGPSA-CA PCI FC adapter emulation has the following configuration parameters:

storage_controller_path_id

Parameter	storage_controller_path_id
Type	Text String

Value	Instructs the CHARON VM to create a set of virtual FC devices and connect to the virtual system through the virtual KGPSA FC Adapter.
	ℹ In this mode WWID and UDID values are taken from the storage controller directly. Note that some storage controllers may not support aquiring UDID, in this case this way of mapping cannot be used in case of OpenVMS (Tru64 Unix is Ok)!
	Syntax:
	`load KGPSA <controller name> storage_controller_path_id = <Storage controller path ID>`
	where the "Storage controller path ID" parameter is a storage (for example SAN) controller path ID. This ID can be obtained from the "Host Device Check" utility ("Storage Controllers" section).
	Once specified, all the disks attached to the storage are automatically mapped as disk units to CHARON VM.
	Example:
	`load KGPSA FGA storage_controller_path_id = 5008-05F3-0005-2950-5008-05F3-0005-2951`
	It is also possible to use wildcards for specifying the ID number:
	Example:
	`load KGPSA FGA storage_controller_path_id = 5008-05F3-0005-2950-*-05F3-0005-*`
	In this case CHARON will collect the LUNs from all the matching paths.
	This syntax works disregarding whether Windows MPIO is active or not. If it is active, CHARON VM uses "active" path (because it works through Windows), if Windows MPIO is OFF, CHARON VM selects the first matching path (and warns you in the LOG file).
	ℹ Note that LUNs obtained by usage of "storage_controller_path_id" parameter is not re-enumerated on reboot, so this mode is possible to use in case of shared disks clusters.

host_bus_location

Parameter	host_bus_location
Type	Text String

Value	Establish connection between virtual DEC-KGPSA-CA PCI FC adapter and physical EMULEX LightPulse PCI/PCI-X/PCIe FC adapter (pass through mode)
	Syntax:
	`load KGPSA <controller name> host_bus_location="PCI bus X, device Y, function Z"`
	where X, Y, and Z describe location of physical EMULEX LightPulse PCI/PCI-X/PCIe FC adapter in the host computer (see Pass Through mode for details).
	Example:
	`load KGPSA FGA host_bus_location="PCI bus 3, device 1, function 0"`

wwid

Parameter	wwid[N] N is 0..32766 (no more than 255 units)
Type	Text String

Value	Sets WWID for emulated KGPSA adapter unit in case if the WWID can not be obtained directly from the device CHARON VM is mapped to.
	For example in case of disk images or local physical drives CHARON VM cannot get its WWID from the the host system, so it is automaticaly introduce some generated WWID. In case if this WWID is not acceptable it can be replaced with the custom one using the "wwid" parameter.
	Syntax:
	`set <controller name> wwid[unit-number]="XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX"`
	Example:
	`set FGA wwid[2]="6008-05F3-0005-2950-BF8E-0B86-A0C7-0001"`

container

Parameter	container[N] N is 0..32766 (no more than 255 units)
Type	Text String

Value	Possible values of the parameter are strings in one of the following forms:
	▪ **Physical disk**
	▪ "\\.\PhysicalDrive<X>", where X is 0, 1, …
	⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.
	These disks must not be formatted by the host OS.
	ℹ In this mode WWID is generated by CHARON and UDID is defined by the index of the "container" parameter.
	Example:
	`set FGA container[0]=”\\.\PhysicalDrive1"`
	⚠ In case "\\.\PhysicalDrive<N>" points to some external iSCSI or FC disk note that the disks re-enumeration may appear on CHARON host reboot, for example an external disk originally referenced as "\\.\PhysicalDrive3" may become "\\.\PhysicalDrive1" etc. Especially it is important in shared disks cluster configurations!
	So it is stricty recommended to use "Mapping by WWID" / "Mapping iSCSI disks" ways of mapping in these situations (see below). The mapping by using "storage_controller_path_id" (see above) is acceptable as well, since it is not re-enumerating LUNs on each re-boot or CHARON VM restart.
	▪ **Physical disk by its WWID**
	▪ "\\.\PhysicalDrive(DevID =XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX)"
	⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.
	These disks must not be formatted by the host OS.
	DevID addresses the target physical disk by its WWID (hexadecimal 128-bit identifier assigned to the disk drive by its manufacturer/originator).
	ℹ In this mode WWID is generated by CHARON VM and UDID is defined by the index of the "container" parameter.
	Example:
	`set FGA container[100]="\\.\PhysicalDrive(DevID= 6008-05F3-0005-2950-BF8E-0B86-A0C7-0001)"`

The WWID values can be obtained from "Host Device Check" utility ("All drives" section).

> ⚠ If the "Host Device Check" utility does not display any WWID, this means the target disk does not have one. Use the "\\.\PhysicalDrive<N>" mapping in this case.

- **iSCSI disks**
  - "\\.\PhysicalDrive(iSCSITarget = <iSCSI target>, LUN = <LUN number>)"
    iSCSITarget addresses the disk by its iSCSI target name. LUN specifies LUN on connected iSCSI disk.
    ℹ In this mode WWID is generated by CHARON VM and UDID is defined by the index of the "container" parameter.
    Example:

    ```
    set FGA container[200]="\\.\PhysicalDrive(iSCSITarget= iqn.2008-04:iSCSI.charon-target-test1, LUN= 1)"
    ```

- **File representing a physical disk of the HP Alpha system (disk image)**
  - [<drive>":\"<path-name>"\"]<file-name>[".vdisk"]

    These files can be created from scratch with "MkDisk" utility. Data and OS disks backups are transferred from the original system via tapes or network and restored into these container files.

    Mapping may also include the full path (recommended), for example: "C:\My disks\my_boot_disk.vdisk"
    Example:

    ```
    set FGA container[401]="my_dka401.vdisk"
    ```

    > ⊗ Using compressed folders to store virtual disks and tapes is not supported

ℹ This parameter is initially not set, thus creating NO storage elements on the controller.

media_type

Parameter	media_type[N] N is 0..32766 (no more than 255 units)
Type	Text String
Value	Instructs CHARON VM to use the supplied value as the PRODUCT field in the FC INQUIRY data returned to a software running on virtual HP Alpha system in response to FC INQUIRY command. If not specified, CHARON VM attempts to guess the FC INQUIRY data based on virtual FC device type and underlying container (which is specified in the corresponding container configuration parameter). Initially is not specified. **Example**: `set FGA media_type[0]="HSZ70"`

removable

<table>
<tr><td><b>Parameter</b></td><td>removable[N]
N is 0..32766 (no more than 255 units)</td></tr>
<tr><td><b>Type</b></td><td>Boolean</td></tr>
<tr><td><b>Value</b></td><td>When set to "true", the removable configuration parameter instructs CHARON VM to report the corresponding virtual FC device as removable.
By default the removable configuration parameter is set to "false".
<b>Example</b>:
<pre>set FGA removable[400]=true</pre></td></tr>
</table>

geometry

<table>
<tr><td><b>Parameter</b></td><td>geometry [N]
N is 0..32766 (no more than 255 units)</td></tr>
<tr><td><b>Type</b></td><td>Text String</td></tr>
<tr><td><b>Value</b></td><td>This formatted string value specifies the explicit geometry of the disk storage element.
The string format is <X>”/”<Y>[“/”<Z>][“/”<B>] or <X>”,”<Y>[“,”<Z>][“,”<B>] where:
<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>X</td><td>The number of sectors per track</td></tr>
<tr><td>Y</td><td>The number of tracks per cylinder</td></tr>
<tr><td>Z</td><td>The number of cylinders on the unit.
If omitted, Z is calculated based on X, Y and the total number of sectors on the unit that reflects the size of the disk storage element.
This is an optional parameter.</td></tr>
<tr><td>B</td><td>The total size of the disk (in blocks) reported to the guest OS.
If omitted it is calculated automatically.
This is an optional parameter.</td></tr>
</table>
If this parameter is not set, CHARON VM will configure the geometry based on the most probable disk type.
Initially not set.
<b>Example</b>:
<pre>set FGA geometry[201] = "255/255"</pre>
It is possiblle to specify each parameter independently of another one. The following syntax is used for that:
<pre>set FGA geometry[300]="*,*,*,16777210"</pre></td></tr>
</table>

use_io_file_buffering

Parameter	use_io_file_buffering[N] N is 0..32766 (no more than 255 units)
Type	Text String
Value	Instructs CHARON VM to enable host operating system I/O cache on reading/writing operations. The following values are possible: ● "true" or "write-back" - the "write back" caching mode is used ● "write-through" - the "write through" caching mode is used ● "false" - caching is switched off ℹ Note this caching has a significant effect only in case of mapping to disk containers, not physical drives. When enabled, host operating system I/O cache may significantly improve I/O performance of the virtual system. At the same time maintaining I/O cache requires additional host resources (CPU and memory) which may negatively affect overall performance of the virtual system. Initially is set to "false". **Example**: `set FGA use_io_file_buffering[300]=true`

io_queue_depth

Parameter	io_queue_depth[N] N is "XXYY" number, where: ● XX - SCSI ID (0..15) ● YY - LUN (00..07)
Type	Numeric
Value	Specifies KZPBA I/O requests (read or write) for a given unit in a range 2..128 Setting this parameter enables KZPBA instance to run up-to the specifiied numbers of I/O requests (read or write) for unit N in parallel, thus improving the performance. The default value set by controller is optimal for most of the cases. It may be needed to enlarge this number if guest OS I/O queue for a certain unit contains too much pending entries. In this case the value should be equal to an average size of the queue, collected statistically. Please do not set this parameter without clear understanding the purpose. By default parallel execution of I/O requests is disabled. **Example**: `set PKA io_queue_depth[603]=4`

min_n_of_threads

Parameter	min_n_of_threads
Type	Numeric
Value	Instructs KZPBA I/O to reserve a given number of working threads in a range 1..64, thus improving the performance. All units of KZPBA instance share the I/O threads. The default value is equal to number of units plus 2. For optimization it is possible to set this parameter to sum of the "io_queue_depth" parameters for each unit plus 2. This assumption seems optimal for most of the cases. Please do not set this parameter without clear understanding the purpose. **Example**: `set PKA min_n_of_threads=16`

When a disk image connected to an emulated KGPSA-CA controller is dismounted by OpenVMS, it is disconnected from CHARON VM and can be manipulated. It can be replaced with a different disk image if it keeps the same name. This capability may be useful when designing back-up and restore procedures. When copying CHARON disk images while CHARON VM is running, please take care to minimize the risk of overloading a heavily loaded CHARON host system. For example, using a sequential series of simple ftp binary copies is less resource intensive and thus less disruptive than multiple, simultaneous copies.

Empty disk images are created with the "MkDisk" utility.

CHARON-AXP is able to boot from disk images of any OpenVMS/Alpha and Tru64 version.

Mapping to host resources

There are 3 modes of KGPSA-CA mapping to system resources:

Mode	Description	Pros	Cons
Fabric virtualization mode	Virtual KGPSA-CA PCI FC adapter is mapped to physical disks (both local, FC and iSCSI) and disk images ℹ This is default mode, suitable for most cases	• High I/O performance using modern local SSD disks.	• Requires CHARON VM reconfiguration and restart on any change to the mapped disk images and physical drives • Disk images cannot be used in case of Tru64 cluster, but acceptable for OpenVMS cluster.
"Presentation" mode	CHARON VM automatically creates /removes a set of virtual FC devices on a virtual KGPSA-CA FC adapter correspondent to available external SAN LUNs ℹ This mode is recommended in case of working with SAN that may change LUN configuration - so CHARON VM will reflect it on-fly w/o reconfiguration and restarting.	• No reconfiguration and restart of CHARON VM is needed on change to the virtual FC drives provided as LUNs by the connected SAN. • Effectively any SAN FC system could be used, that means newer, faster, larger, FC HBA controllers and device drivers supported by newer, faster host server platforms and operating systems - it offers significant performance capabilities and performance improvements.	• Target configurations are restricted to the SAN models capable to work with HW Alphas (for example aquiring UDID must be supported in case of OpenVMS). This restriction comes from the fact that different SAN controllers could have different level of SCSI-3 protocol support, and if apparently some individual SAN model does not properly support complete set of SCSI-3 commands used by OpenVMS & Tru64 KGPSA-CA drivers, then with high probability such SAN Controller will not be able to work with CHARON-AXP in "presentation" (as well as in Pass Through) Mode.
Pass Through mode	This mode allows connection between virtual KGPSA-CA FC adapter and physical EMULEX LightPulse PCI/PCI-X/PCIe FC adapter plugged into host's PCI/PCI-X/PCIe slot ℹ This mode is recommended for cluster setups that include HW Alphas	• High performance • Support of shared disks and cluster configuration that includes HW Alphas	• Cannot be used in VMware environment • Obsolete PCI-X cards are not available anymore, HBA list is restricted to several EMULEX HBA models only. No way to use HBA from other vendors. • Target configurations are restricted to SAN models capable to work with HW Alphas. • As EMULEX LightPulse PCI/PCI-X/PCIe FC adapters have been never used on Alphas, formally there is a probability that some compatibility problems may be detected.

⚠ All the described modes can be used in case of a cluster including HW Alphas and shared SAN, but pay attention that all the disks must look absolutely the same to the operating systems on all the cluster nodes, including CHARON: same WWID, same UDID (in case of OpenVMS), same size, same geometry etc.

Fabric virtualization mode

In this mode KGPSA-CA PCI FC adapter can be directly mapped to physical disks (both local and iSCSI) and disk images as shown in the following example:

```
set FGA container[0]="C:\My disks\my_dka401.vdisk"
set FGA container[100]="\\.\PhysicalDrive1"
set FGA container[200]="\\.\PhysicalDrive(DevID= 6008-05F3-0005-2950-BF8E-0B86-A0C7-0001)"
set FGA container[300]="\\.\PhysicalDrive(iSCSITarget= iqn.2008-04:iSCSI.charon-target-test1, LUN= 1)"
```

⚠ Use only "Mapping by WWID" and "Mapping iSCSI disks" syntax in case of the mapped physical disk located on some external disk controller (SAN, etc) since the "\\.\PhysicalDrive<N>" re-enumeration may happen on CHARON host reboot.

ℹ Note that WWID and UDID is generated by CHARON VM in its mode. It may be important in case of shared disks cluster configurations.

See the "Containers" section for details.

Usage of "presentation mode"

CHARON-AXP can utilize so called "presentation mode" of the storage controller it maps to.

In this mode CHARON VM creates a set of virtual FC devices and connects to the SAN system through the virtual KGPSA FC adapter.

The main benefit of this mode is a flexible way of CHARON-AXP virtual disks management depending on the mapped storage controller configuration. LUN parameters of any available to CHARON host storage controller specified in CHARON VM configuration file via "storage_controller_path_id" parameter are automatically scanned and then assigned as ‘virtual’ FC drives which guest OS can see, no need to manually change/redefine/modify virtual LUN parameters in emulator.

For example if an extra disk has been added to the storage controller it will automatically appear as a new disk unit on the corresponding virtual KGPSA-CA virtual controller mapped to that storage controller.

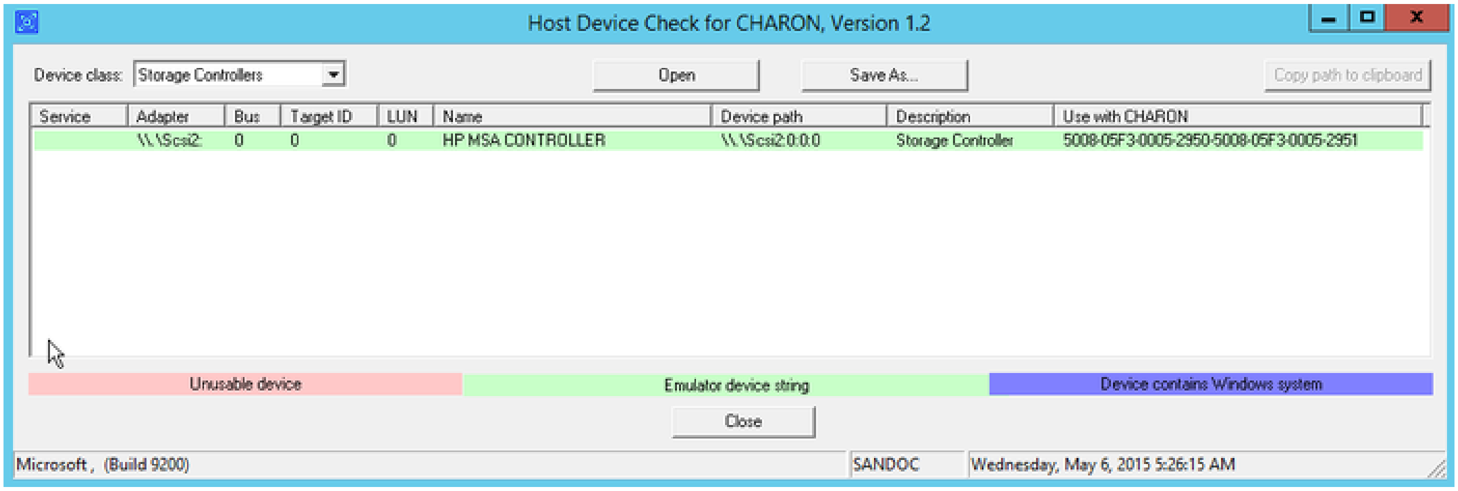
In "presentation mode" CHARON-AXP supports the following operations with FC disks (similar to ones supported in KGPSA FC Pass Through mode) w/o need of CHARON VM restart:

- Dynamically allocation (retranslation) of new created SAN LUN to virtual Alpha configuration
- Scan and translation of SAN LUN parameters to virtual Alpha’s KGPSA DGxx: virtual drive parameters
- Propagation of SAN LUN size change to virtual Alpha’s KGPSA virtual drive parameters
- Automatically deallocation from virtual Alpha deleted SAN LUN

Example of configuration:

```
load KGPSA FGA storage_controller_path_id = 5008-05F3-0005-2950-5008-05F3-0005-2951
```

The ID number specified in the example above is a storage (for example SAN) controller path ID. This ID can be obtained from the "Host Device Check" utility ("Storage Controllers" section):


Host Device Check for CHARON, Version 1.2
Device class: Storage Controllers
Open
Save As...
Copy path to clipboard
Unusable device
Emulator device string
Device contains Windows system
Close
Microsoft , (Build 9200)
SANDOC
Wednesday, May 6, 2015 5:26:15 AM

Service	Adapter	Bus	Target ID	LUN	Name	Device path	Description	Use with CHARON
	\\.\Scsi2:	0	0	0	HP MSA CONTROLLER	\\.\Scsi2:0:0:0	Storage Controller	5008-05F3-0005-2950-5008-05F3-0005-2951

Once specified, all the disks attached to the storage are automatically mapped as disk units to CHARON VM.

It is also possible to use wildcards for specifying the ID number:

```
load KGPSA FGA storage_controller_path_id = 5008-05F3-0005-2950-*-05F3-0005-*
```

In this case CHARON VM will collect the LUNs from all the matching paths.

This syntax works disregarding whether Windows MPIO is active or not. If it is active, CHARON VM uses "active" path (because it works through Windows), if Windows MPIO is OFF, CHARON VM selects the first matching path (and warns you in the LOG file).

ⓘ Usage of LUNs in cluster configuration:

Note that PATHs (on OpenVMS level) do not affect OpenVMS cluster. What really makes sense is LUN size, geometry, WWI, etc. CHARON VM obtains these properties from the LUN (within the limits established by Windows), so LUNs should appear similar to all cluster members.

ⓘ Note that LUNs obtained by usage of "storage_controller_path_id" parameter is not re-enumerated on reboot, so this mode is possible to use in case of shared disks clusters.

ⓘ Note that the WWID and UDID are automatically obtained from disk server (SAN) in this mode - it is very convenient in case of shared disks cluster configurations. Also note that some storage controllers may not support aquiring UDID - in this case this way of mapping cannot be used in case of OpenVMS (Tru64 Unix is Ok)!

See the "Presentation mode" section for details.

Pass Through mode

The CHARON PCI Pass Through mode allows connection between virtual DEC-KGPSA-CA PCI FC adapter and physical EMULEX LightPulse PCI/PCI-X/PCIe FC adapter plugged into host’s PCI/PCI-X/PCIe slot.

Syntax:

```
load <controller name> host_bus_location="PCI bus X, device Y, function Z"
```

Example:

```
load KGPSA FGA host_bus_location="PCI bus 3, device 1, function 0"
```

The "host_bus_location" parameter addresses the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter in the following way:

Parameters	Description
"PCI bus X"	PCI bus number of the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter
"device Y"	PCI bus device number of the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter
"function Z"	The "function" parameter of the the host EMULEX LightPulse PCI/PCI-X/PCIe FC adapter

The following is a list of EMULEX LightPulse PCI/PCI-X/PCIe FC adapters supported by CHARON PCI Pass Through driver and suitable for emulation of KGPSA-CA PCI FC adapter in CHARON PCI Pass Through mode:

Supported	Not Supported	Not tested
LP8000 LP9000 LP9002 LP9802 LP10000 LP10000DC LP10000-S LPX1000 LP11002 LPe11002 (FC2242SR, A8003A) LPe1105 LPe12002 (AJ762B)	LPe1150 (FC2142SR, A8002A)	LPe11000

Also see the "host_bus_location" section for details

Installation of EMULEX LightPulse PCI/PCI-X/PCIe FC adapter driver

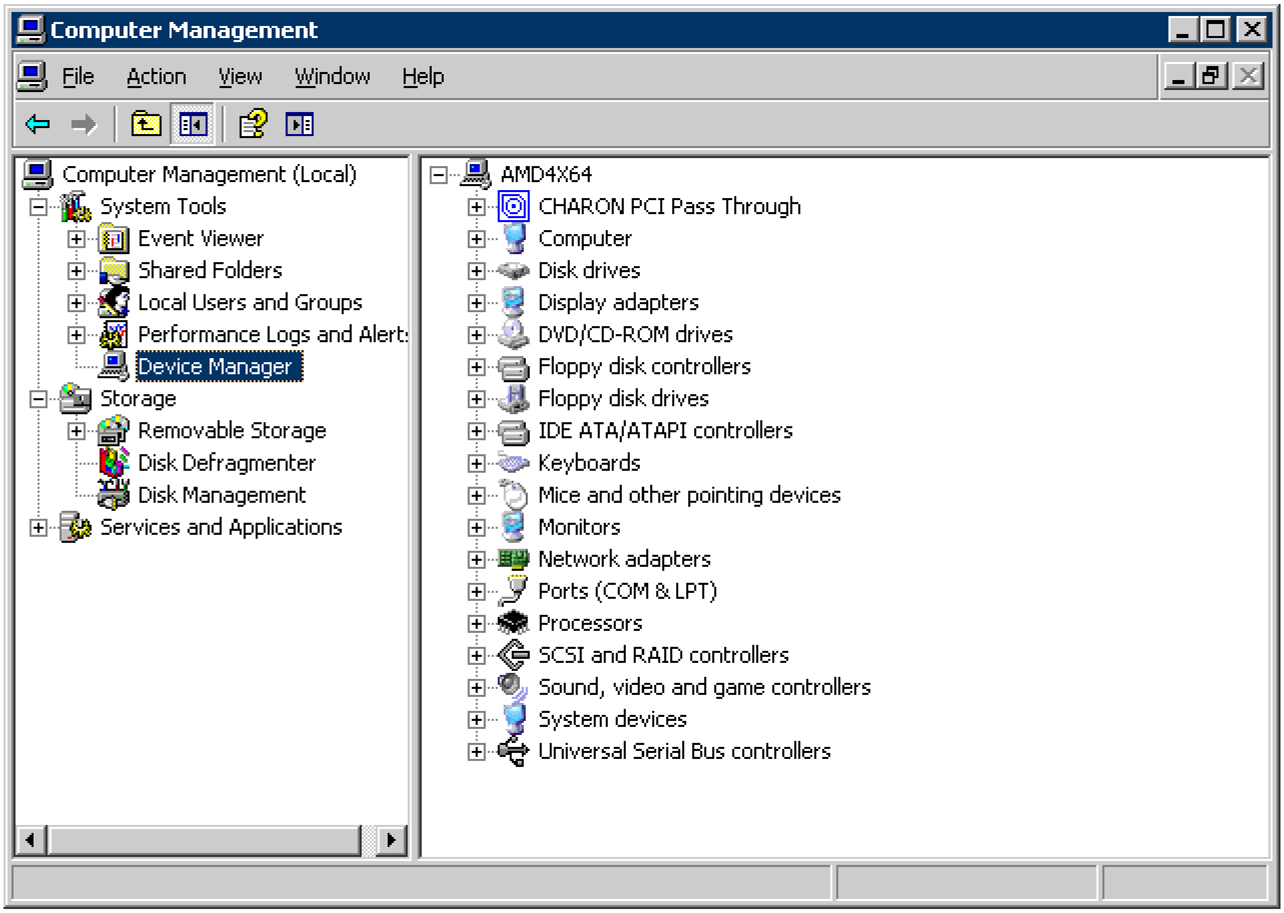
1. Install the EMULEX LightPulse PCI/PCI-X/PCIe FC adapter (see below for a list of supported models) to some spare PCI/PCI-X/PCIe slot of the host system
2. Boot a Windows operating system
3. Install the EMULEX LightPulse PCI/PCI-X/PCIe FC adapter driver from the following directory "C:\Program Files\CHARON\Drivers\EMULEX_X.X.0.XXXXX" by choosing the "Install from a list or specific location (Advanced)" option and then selecting the "emulex_lp_ppt_amd64.inf" file.
4. Direct Windows to use this custom driver instead of the default one:
   a. Type "gpedit.msc" in the "Search programs and files" field under "Start" menu, press "Enter"
   b. In the appearing applet choose: Administrative Templates -> System -> Device Installation -> Device Installation Restrictions -> Prevent Installation of Devices not described by other policy settings
   c. Change the default "Not configured" to "Disabled"; press "Ok" to apply,
5. Reboot the host

Collecting the parameters for mapping

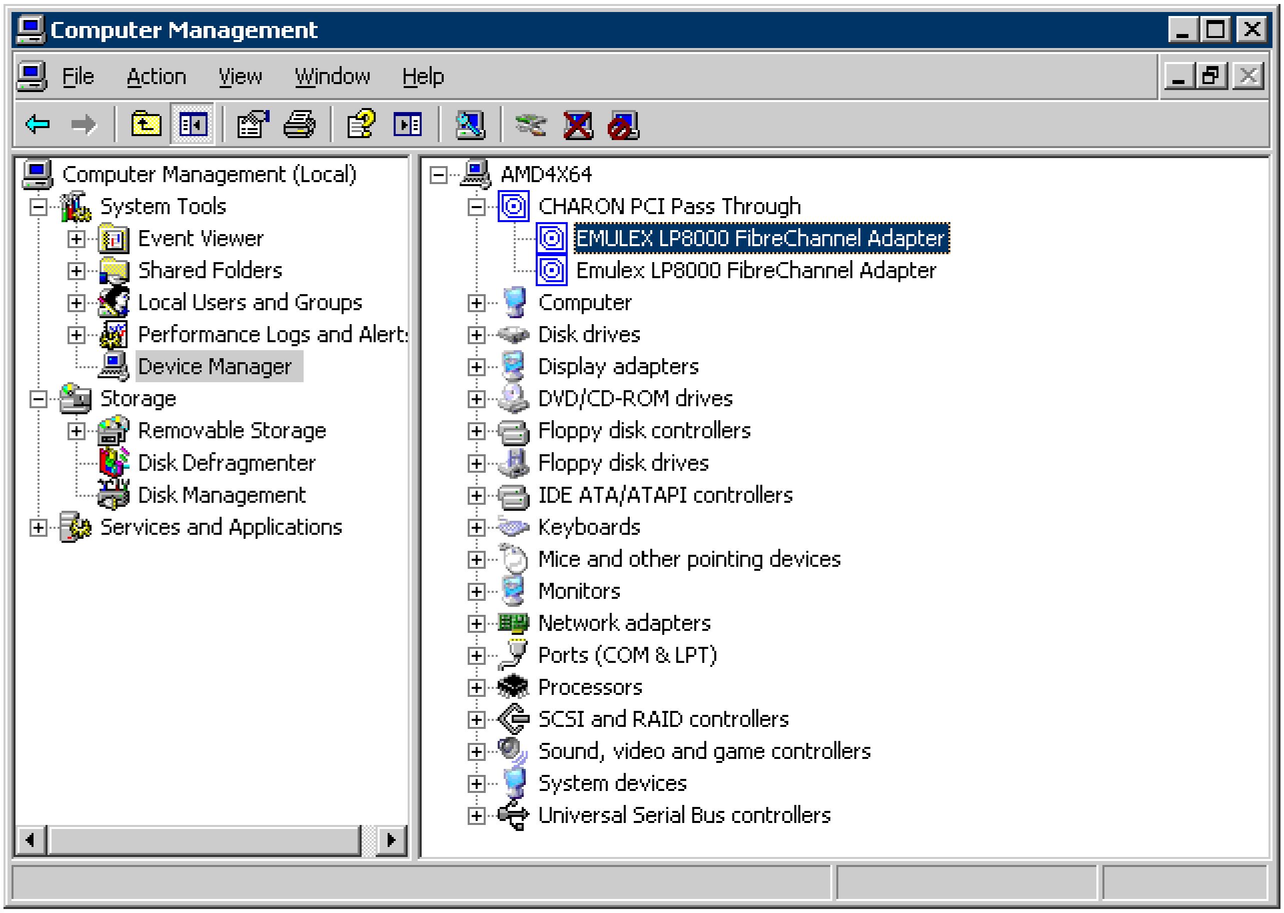
There are 2 ways of getting the required parametrs for mapping virtual KGPSA-CA to EMULEX LightPulse PCI/PCI-X/PCIe FC adapter plugged into host's PCI/PCI-X/PCIe slot:

1. Usage of "HOST Device Check" utility. Follow the link for details.
2. Collecting the parameters directly using "Device Manager" applet

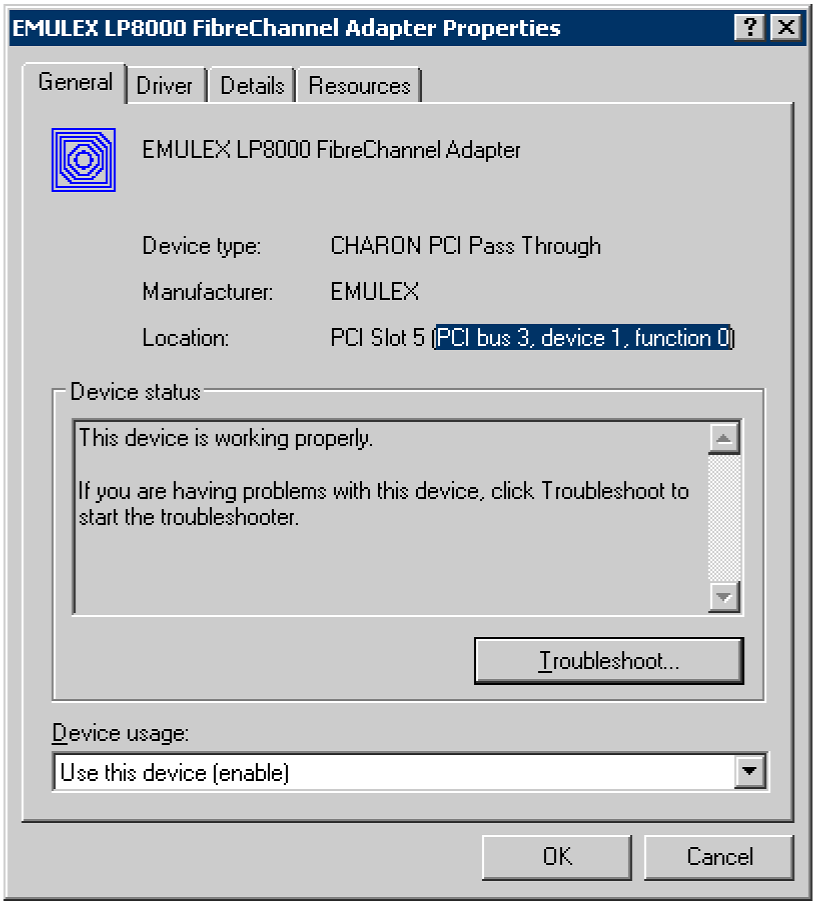
To collect the parameters directly using "Device Manager" applet, open “Computer Management” application and select “Device Manager”:


Computer Management
File
Action
View
Window
Help
Computer Management (Local)
System Tools
Event Viewer
Shared Folders
Local Users and Groups
Performance Logs and Alert:
Device Manager
Storage
Removable Storage
Disk Defragmenter
Disk Management
Services and Applications
AMD4X64
CHARON PCI Pass Through
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Floppy disk controllers
Floppy disk drives
IDE ATA/ATAPI controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
Processors
SCSI and RAID controllers
Sound, video and game controllers
System devices
Universal Serial Bus controllers

In the right panel select desired physical EMULEX LP FibreChannel adapter under "CHARON PCI Pass Through":



Open its properties sheet by double-clicking on the selected adapter:



EMULEX LP8000 FibreChannel Adapter Properties

EMULEX LP8000 FibreChannel Adapter

Device type: CHARON PCI Pass Through

Manufacturer: EMULEX

Location: PCI Slot 5 (PCI bus 3, device 1, function 0)

Device status

This device is working properly.

If you are having problems with this device, click Troubleshoot to start the troubleshooter.

Device usage: Use this device (enable)

The “Location:” on the above picture gives X, Y, and Z for the "host_bus_location" parameter, for example:

```
load KGPSA FGA host_bus_location = "PCI bus 3, device 1, function 0"
```

⚠ Non-US-EN installations of Windows may present “Location:” string in local language, but "host_bus_location" parameter requires English notation, so the words “PCI”, “bus”, “device”, and “function” must be specified in English.

Configuration of KGPSA-CA in pass through mode

FCMGR utility description

To configure KGPSA-CA adapter in pass through mode a special SRM console utility "FCMGR" is used (it has the same functionality as the "WWIDMGR" utility of the native HP Alpha hardware).

It provides the following functionality:

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td><b>fc rescan {/verbose}</b></td><td>Scans connected SAN using FC adapters, discovers FC ports, storage controllers, logical units and then builds volatile FC database.
The "/verbose" qualifier enables FC communication trace on console (for diagnostic and troubleshooting).</td></tr>
<tr><td><b>fc show {adapter | port | device}</b></td><td>Displays corresponding part of volatile FC database.</td></tr>
<tr><td><b>fc set {boot | dump} udid &lt;X&gt;</b></td><td>Fills the environment variables wwid0..wwid3 and n1..n4 to identify path(s) to logical unit with the specified UDID.
These variables are later used by "INIT" to create device database entries and by OpenVMS/Tru64 to get access to boot and dump disks.
This command does NOT make any change to other environment variables.</td></tr>
<tr><td><b>fc set {boot | dump} wwid &lt;X&gt;</b></td><td>Fills the environment variables wwid0..wwid3 and n1..n4 to identify path(s) to logical unit with the specified WWID.
These variables are later used by "INIT" to create device database entries and by OpenVMS/Tru64 to get access to boot and dump disks.
This command does NOT make any change to other environment variables.
This parameter is useful if UDID is absent.
Only right part of the displayed WWID is used for specification, for example:
<pre>
P00>>>fc res
polling for units on kgpsa0, slot 2, bus 0, hose 0 ...
    pga0.0.0.2.0   PGA0   F/W Rev 2.72A2
                                               WWN 1000-0000-0263-0040
           fabric   WWN 2003-0060-0263-0040
                directory   WWN 20fc-0060-0263-0040
                port 020100   CED 8GSH 0 F88V
                                               WWN 5000-1fe0-0000-0bf1
                  lun 0000000000000000   DEC HSG80CCL V88F
             UDID:-1   WWID:01000010:6000-1fe0-0000-0bf0-3030-
3030-373f-3f3f
                  lun 0000000000000100   COMPAQ RZ1ED 0000
             UDID:-1   WWID:01000010:6000-1fe0-0000-0bf0-3030-
3030-3030-3030
P00>>>fc set boot wwid 6000-1fe0-0000-0bf0-3030-3030-3030-3030
</pre></td></tr>
<tr><td><b>fc clear</b></td><td>Clears environment variables wwid0..wwid3 and n1..n4, which automatically disable (but do NOT delete) device database entries representing FC attached devices.
This command does NOT affect volatile FC database.</td></tr>
</table>

Example of usage:

```
P00>>>fc show devices
     UDID:110 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0081 (ev:none)
                      via adapter     via fc_port         con
[0]                   pga0.0.0.5.1    5000-1fe1-000b-6bf1 yes (ev:none)
[1]                   pga0.0.0.5.1    5000-1fe1-000b-6bf4 yes (ev:none)
     UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039 (ev:none)
                      via adapter     via fc_port         con
[12]                  pga0.0.0.5.1    5000-1fe1-000b-6bf1 yes (ev:none)
[13]                  pga0.0.0.5.1    5000-1fe1-000b-6bf4 yes (ev:none)
```

Configuration steps using FCMGR utility

Once the configuration steps described above are done, start the CHARON VM and wait for the **P00>>>** prompt.

Please refer to the following example with two FC adapters PGA and PGB defined:

```
initializing ...

polling for units on kzpba0, slot 4, bus 0, hose 0 ...
   pka0.0.0.4.0         PKA0            Q-Logic/ISP PCI SCSI HBA

polling for units on kgpsa0, slot 5, bus 0, hose 0 ...
   pga0.0.0.5.0         PGA0            WWN 1000-0000-C92E-97C9
      fabric                            WWN 2003-0060-6920-4682
         directory                      WWN 20fc-0060-6920-4682
         port 021400                    WWN 5000-1fe1-000b-6bf1
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000

         port 021500                    WWN 5000-1fe1-000b-6bf4
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000
```

```
polling for units on kgpsa1, slot 6, bus 0, hose 0 ...
   pgb0.0.0.6.0         PGB0            WWN 1000-0000-C92D-8D00
      fabric                            WWN 2003-0060-6920-45ff
         directory                      WWN 20fc-0060-6920-45ff
         port 011400                    WWN 5000-1fe1-000b-6bf2
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000
         port 011500                    WWN 5000-1fe1-000b-6bf3
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000
         port 011100                    failed port login

... enter console

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P00>>>
```

The next step is to configure paths for the FC storage:

```
P00>>>fc show devices

     UDID:100 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038 (ev:none)
                        via adapter     via fc_port         con
[0]                     pga0.0.0.5.0    5000-1fe1-000b-6bf1 no (ev:none)
[1]                     pga0.0.0.5.0    5000-1fe1-000b-6bf4 yes (ev:none)
[2]                     pgb0.0.0.6.0    5000-1fe1-000b-6bf2 no (ev:none)
[3]                     pgb0.0.0.6.0    5000-1fe1-000b-6bf3 yes (ev:none)
     UDID:200 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074 (ev:none)
                        via adapter     via fc_port         con
[4]                     pga0.0.0.5.0    5000-1fe1-000b-6bf1 no (ev:none)
[5]                     pga0.0.0.5.0    5000-1fe1-000b-6bf4 yes (ev:none)
[6]                     pgb0.0.0.6.0    5000-1fe1-000b-6bf2 no (ev:none)
[7]                     pgb0.0.0.6.0    5000-1fe1-000b-6bf3 yes (ev:none)
     UDID:300 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b (ev:none)
                        via adapter     via fc_port         con
[8]                     pga0.0.0.5.0    5000-1fe1-000b-6bf1 no (ev:none)
[9]                     pga0.0.0.5.0    5000-1fe1-000b-6bf4 yes (ev:none)
[10]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf2 no (ev:none)
[11]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf3 yes (ev:none)
     UDID:400 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080 (ev:none)
                        via adapter     via fc_port         con
[12]                    pga0.0.0.5.0    5000-1fe1-000b-6bf1 no (ev:none)
[13]                    pga0.0.0.5.0    5000-1fe1-000b-6bf4 yes (ev:none)
[14]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf2 no (ev:none)
[15]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf3 yes (ev:none)
     UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039 (ev:none)
                        via adapter     via fc_port         con
[16]                    pga0.0.0.5.0    5000-1fe1-000b-6bf1 yes (ev:none)
[17]                    pga0.0.0.5.0    5000-1fe1-000b-6bf4 no (ev:none)
[18]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf2 yes (ev:none)
[19]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf3 no (ev:none)
     UDID:208 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a (ev:none)
                        via adapter     via fc_port         con
[20]                    pga0.0.0.5.0    5000-1fe1-000b-6bf1 yes (ev:none)
[21]                    pga0.0.0.5.0    5000-1fe1-000b-6bf4 no (ev:none)
[22]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf2 yes (ev:none)
[23]                    pgb0.0.0.6.0    5000-1fe1-000b-6bf3 no (ev:none)

P00>>>fc set boot udid 400

P00>>>INIT

initializing ...

polling for units on kzpba0, slot 4, bus 0, hose 0 ...
   pka0.0.0.4.0         PKA0            Q-Logic/ISP PCI SCSI HBA
```

```
polling for units on kgpsa0, slot 5, bus 0, hose 0 ...
   pga0.0.0.5.0         PGA0            WWN 1000-0000-C92E-97C9
      fabric                            WWN 2003-0060-6920-4682
         directory                      WWN 20fc-0060-6920-4682
         port 021400                    WWN 5000-1fe1-000b-6bf1
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000
         port 021500                    WWN 5000-1fe1-000b-6bf4
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100       WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200       WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000

polling for units on kgpsa1, slot 6, bus 0, hose 0 ...
   pgb0.0.0.6.0         PGB0            WWN 1000-0000-C92D-8D00
      fabric                            WWN 2003-0060-6920-45ff
         directory                      WWN 20fc-0060-6920-45ff
         port 011400                    WWN 5000-1fe1-000b-6bf2
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000
         port 011500                    WWN 5000-1fe1-000b-6bf3
            lun 0000000000000100        DEC     HSG80           V88F
         UDID:100 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0038
            lun 0000000000000200        DEC     HSG80           V88F
         UDID:200 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0074
            lun 0000000000000300        DEC     HSG80           V88F
         UDID:300 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-007b
            lun 0000000000000400        DEC     HSG80           V88F
         UDID:400 WWID:01000010:6000-1fe1-000b-6bf0-0009-9081-1283-0080
            lun 0000000000006c00        DEC     HSG80           V88F
         UDID:108 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-0039
            lun 0000000000006d00        DEC     HSG80           V88F
         UDID:208 WWID:01000010:6000-1fe1-000b-6bf0-0009-0440-4014-003a
            lun 0000000000000000
         port 011100                    failed port login

... enter console

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```

```
P00>>>SHOW DEV

sys0.0.0.0.0            SYS0          System ROOT Device
ewa0.0.0.3.0            EWA0          00-51-71-F5-8E-D8
pka0.0.0.4.0            PKA0          Q-Logic/ISP PCI SCSI HBA
pga0.0.0.5.0            PGA0          WWN 1000-0000-C92E-97C9
pgb0.0.0.6.0            PGB0          WWN 1000-0000-C92D-8D00
pqa0.0.0.15.0           PQA0          ALi 1553C Integrated IDE Controller
pqb0.0.1.15.0           PQB0          ALi 1553C Integrated IDE Controller
dqa0.0.0.15.0           DQA0          Virtual ATAPI - TEAC DW-224E-V
dka0.0.0.4.0            DKA0          Virtual SCSI Disk (C)SRI
dga400.1001.0.5.0       $1$DGA400     DEC     HSG80           V88F
dga400.1002.0.5.0       $1$DGA400     DEC     HSG80           V88F
dgb400.1003.0.6.0       $1$DGA400     DEC     HSG80           V88F
dgb400.1004.0.6.0       $1$DGA400     DEC     HSG80           V88F

P00>>>BOOT $1$DGA400

dga400.1001.0.5.0: failed to open device
(boot dga400.1002.0.5.0)
jumping to bootstrap code

    OpenVMS (TM) Alpha Operating System, Version V7.3-2
      © Copyright 1976-2003 Hewlett-Packard Development Company, L.P.
%SMP-I-CPUTRN, CPU #02 has joined the active set.
%SMP-I-CPUTRN, CPU #03 has joined the active set.
%SMP-I-CPUTRN, CPU #01 has joined the active set.
Please enter date and time (DD-MMM-YYYY HH:MM)
```

Acer Labs 1543C IDE/ATAPI CD-ROM adapter

Table of Contents

General description

CHARON-AXP supports emulation of an integrated virtual Acer Labs 1543C IDE/ATAPI controller.

Loading Acer Labs 1543C IDE/ATAPI adapter

By default the integrated virtual Acer Labs 1543C IDE/ATAPI controller is preloaded with a name "ide".

Example:

```
set ide container="\\.\CdRom0"
```

Configuration parameters

The Acer Labs 1543C IDE/ATAPI adapter emulation has only one configuration parameter:

container

Parameter	container
Type	Text String
Value	Specifies the name of ATAPI or SATA CD/DVD-ROM drive attached to the host system. The supported values are of the form “\\.\CdRomN”, where N is 0, 1, 2… In most cases 0 is the only meaningful value for N, because usually the host system has only one CD/DVD-ROM drive. By default it is left unspecified.

Example

```
set ide container="\\.\CdRom0"
```

When running HP OpenVMS/Alpha Operating System on CHARON VM the specified CD/DVD-ROM drive is available as DQA0: device.

CHARON-AXP is able to boot any OpenVMS/Alpha and Tru64 version from Acer Labs 1543C IDE/ATAPI CD-ROM.

Virtual Acer Labs 1543C IDE/ATAPI can me mapped only to physical CD-ROM drives. If a CD-ROM container or an ISO file should be used, it is required to utilize KZPBA-CA controller as it offers full support of both physical and virtual mappings to system resources.

PCI I/O Bypass controller

Table of Contents

General description

CHARON-AXP supports PCI I/O bypass controller for accessing to disk images and host physical disks. PCI I/O bypass controller requires a specific driver to be installed.

PCI I/O bypass controller support is available only for OpenVMS guest operating system.

Prerequisites

This release supports VMS version V6.2-1H3 and higher. Bypass disks can not be used as a boot device in V6.2-1H3, higher versions do not have this restriction.

Make sure that the latest Bypass controller kit has been installed, especially for VMS versions before V7.3-2.

Installation

1. Open your VM configuration and attach the virtual disk "ovms_tool.vdisk" located by default in the "C:\Program Files\CHARON\Virtual Disk Images\OpenVMS tools package" directory:

   ```
   set PKA container[400] = "C:\Program Files\CHARON\Virtual Disk Images\OpenVMS tools package\ovms_tools.
   vdisk"
   ```

2. Run VM, boot guest OpenVMS operating system.
3. Use the POLYCENTER Software Installation (PCSI) utility to install the Bypass Driver. The following example demonstrates the "PCSI `PRODUCT INSTALL`" command to execute and the expected output (the example assumes the utilities virtual disk image is attached as `DKA400:`):

```
$ PRODUCT INSTALL CHARON_DISK/SOURCE=DKA400:[BYPASS]
%PCSI-I-CANNOTVAL, cannot validate DKA400:[BYPASS]SRI-AXPVMS-CHARON_DISK-V0104--1.PCSI;1
-PCSI-I-NOTSIGNED, product kit is not signed and therefore has no manifest file

The following product has been selected:
    SRI AXPVMS CHARON_DISK V1.4 Layered Product

Do you want to continue? [YES] YES

Configuration phase starting ...

You will be asked to choose options, if any, for each selected product and for any products that may be
installed to satisfy software dependency requirements.

SRI AXPVMS CHARON_DISK V1.4: Charon disk driver V1.4 for OpenVMS Alpha.

    Copyright (C) 1976, 2009 Software Resources International

    CHARON_DISK was produced by Software Resources International

* This product does not have any configuration options.

Execution phase starting ...

The following product will be installed to destination:
    SRI AXPVMS CHARON_DISK V1.4 DISK$TARDISSYSTEM:[VMS$COMMON.]

Portion done: 0%...10%...20%...80%...100%

The following product has been installed:
    SRI AXPVMS CHARON_DISK V1.4 Layered Product
```

Loading PCI I/O bypass controller

Syntax for loading PCI I/O bypass storage adapter:

```
load pci_io_bypass <name>
```

The <name> can be DI<x>, DR<x> or DU<x>

where x is selected according to VMS naming scheme, i.e. A stands for the first controller of given type, B - for the second, etc.

Example:

```
load pci_io_bypass DIA
```

⚠ In AlphaStation 400 configuration use the following syntax for PCI I/O bypass storage loading:

```
load pci_io_bypass DIA irq_bus = isa
```

The adapter instance name ("DIA" in the example above) is used then for parametrization, for example:

```
set DIA container[0]="C:\My disks\vms_distribution.vdisk"
```

The numbers in the square brackets represent a number of device on PCI I/O Bypass controller.

The maximum number of I/O Bypass controller devices is 64.

By default I/O Bypass controller uses PCI slot corresponded to the <x> parameter (see above). If instead some particular slot is needed, refer to this section for details of specific placement of PCI peripherals on CHARON Virtual Machine (VM) PCI bus (note that "irq_bus" and "irq" parameters are ignored for I/O Bypass controller). In this case the <x> will be changed automatically according to custom position of I/O Bypass controller on PCI bus.

ℹ I/O Bypass controller is implemented for OpenVMS only.

Configuration parameters

The I/O Bypass controller has the following configuration parameters:

container

Parameter	container[N] N is 0..32766 (no more than 64 units)
Type	Text string

Value

Possible values of the parameter are strings in one of the following forms:

- **Physical disk**
  - "\\.\PhysicalDrive<X>", where X is 0, 1, …
    ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.
    These disks must not be formatted by the host OS.
    Example:

    ```
    set DIA container[0]="\\.\PhysicalDrive1"
    ```

- **Physical disk by its WWID**
  - "\\.\PhysicalDrive(DevID=XXX-...-XXXX)"

    ⚠ Be careful not to destroy all the information from the disk dedicated to CHARON VM by mistake.

    These disks must not be formatted by the host OS.

    DevID addresses the target physical disk by its WWID (hexadecimal 128-bit identifier assigned to the disk drive by its manufacturer/originator).

    Example:

    ```
    set DIA container[100]="\\.\PhysicalDrive(DevID=6008-05F3-0005-2950-BF8E-0B86-A0C7-0001)"
    ```

- **iSCSI disks**
  - "\\.\PhysicalDrive(iScsiTarget = <iSCSI target>, LUN = <LUN number>)"

    iScsiTarget addresses the disk by its iSCSI target name.

    LUN specifies LUN on connected iSCSI disk.

    Example:

    ```
    set DIA container[200]="\\.\PhysicalDrive(iScsiTarget=iqn.2008-04:iscsi.charon-target-test1, LUN= 1)"
    ```

- **File representing a physical disk of the HP Alpha system (disk image)**
  - [<drive>":\"<path-name>"\"]<file-name>[".vdisk"]
    These files can be created from scratch with "MkDisk" utility. Data and OS disks backups are transferred from the original system via tapes or network and restored into these container files.
    Mapping may also include the full path (recommended), for example: "C:\My disks\my_boot_disk.vdisk"
    Example:

    ```
    set DIA container[401]="tru64-v51-system.vdisk"
    ```

    ⊗ Using compressed folders to store virtual disks and tapes is not supported

- **Other type of drive, for example magneto-optical drive**
  - "\\.\<N>:"
    Example:

    ```
    set DIA container[300]="\\.\Z:"
    ```

    ⊗ Using compressed folders to store virtual disks and tapes is not supported

ℹ This parameter is initially not set, thus creating NO storage elements on the controller.

removable

Parameter	removable[N] N is 0..32766 (no more than 64 units)
Type	Boolean
Value	When set to "true", the removable configuration parameter instructs CHARON VM to report the corresponding virtual disk as removable. Note to set this parameter to "true" if this disk storage element is: ● Mapped to a host removable device ● Mapped to a disk image located on a host removable device ● Mapped to a disk image that has to be renamed/moved/deleted right after dismounting it in the guest OS By default the removable configuration parameter is set to "false". **Example**: `set DIA removable[400]=true`

geometry

Parameter	geometry [N] N is 0..32766 (no more than 64 units)
Type	Text String
Value	This formatted string value specifies the explicit geometry of the disk storage element. This parameter is not applicable to tape storage elements. The string format is "*/*/*/<B>" or "*,*,*<B>" where B is the total size of the disk (in blocks) reported to the guest OS. If omitted it is calculated automatically. If this parameter is not set, CHARON VM will configure the geometry based on the most probable disk type. Initially not set.

use_io_file_buffering

Parameter	use_io_file_buffering[N] N is 0..32766 (no more than 64 units)
Type	Text String
Value	Instructs CHARON VM to enable host operating system I/O cache on reading/writing operations. The following values are possible: ● "true" or "write-back" - the "write back" caching mode is used ● "write-through" - the "write through" caching mode is used ● "false" - caching is switched off ℹ Note that this caching has a significant effect only in case of mapping to disk and tape containers, not physical drives. When enabled, host operating system I/O cache may significantly improve I/O performance of the virtual system. At the same time maintaining I/O cache requires additional host resources (CPU and memory) which may negatively affect overall performance of the virtual system. Initially is set to "false". **Example**: `set DIA use_io_file_buffering[603]=true`

When a disk image connected to an I/O Bypass controller is dismounted by OpenVMS, it is disconnected from CHARON VM and can be manipulated. It can be replaced with a different disk image if it keeps the same name. This capability may be useful when designing back-up and restore procedures. When copying CHARON-AXP disk images while CHARON VM is running, please take care to minimize the risk of overloading a heavily loaded CHARON host system. For example, using a sequential series of simple ftp binary copies is less resource intensive and thus less disruptive than multiple, simultaneous copies.

Empty disk images are created with the "MkDisk" utility.

CHARON-AXP is able to boot from disk images of any OpenVMS/Alpha version.

Deinstallation

1. Do a conversational boot. Please refer to your OpenVMS system administration guide for instructions.
2. Set the `NOAUTOCONFIG` system parameter to `1`
3. Boot OpenVMS
4. Remove the product with the "`$ PRODUCT REMOVE CHARON_DISK`" command.
5. Set the `NOAUTOCONFIG` system parameter to `0` and reboot.

Networking

Table of Contents

General description

CHARON-AXP supports emulation of the following network adapters:

- DE435
- DE450
- DE500AA
- DE500BA
- DE602
- DE602AA

Each of them is a PCI Ethernet adapter based on the DEC21040 (DE435, DE450, DE500AA and DE500BA) and the Intel i8255x (DE602 and DE602AA) PCI Ethernet adapter chips for the HP Alpha.

CHARON Virtual Machine (VM) maps the virtual adapter to a dedicated Ethernet adapter in the Windows host system.

All the emulated controllers are loaded and configured in the same way.

⚠ The Ethernet adapter in the Windows host system must support dynamic changes of its MAC address (i.e. no reboot of the host system is required to change the MAC address), which is the case with nearly all modern Ethernet adapters.

ℹ By default the PCI Ethernet adapters use first available PCI slot. If instead some particular slot is needed, refer to this section for details of specific placement of PCI peripherals on CHARON VM PCI bus.

⚠ Network booting is not currently supported.

Configuration steps

To configure CHARON VM networking, follow these 3 steps:

1. **Load network adapter (if required)**

   Use the "load" command as shown below.

   Example:

For DEC21040 adapters	For Intel i8255x adapters
`load DE500BA/dec21x4x NIC`	`load DE602/i8255x NIC`

   By default each loaded virtual network adapter uses first available PCI slot. If instead some particular slot is neded, refer to this section for details of specific placement of PCI peripherals on CHARON VM PCI bus.

   In AlphaStation 400 configuration use the following syntax for network adapter loading:

   ```
   load DE500AA/dec21x4x NIC irq_bus = isa
   ```

2. **Load "packet_port"**

   Load "packet_port" to connect network adapter to the host hardware network card (or to a virtual network interface).

   Example:

   ```
   load packet_port/chnetwrk NDIS interface = "connection:Charon"
   ```

3. **Connect the loaded "packet_port" to the loaded virtual network adapter**

   Connect the network adapter to the "packet_port" by setting the interface name.

   Example:

   ```
   set NIC interface = NDIS
   ```

The interface name can be either "`(disabled)`" for a disabled interface or "`connection:`*`<Windows network interface name>`*"

Examples:

```
load packet_port/chnetwrk NIC1 interface="(disabled)"
load packet_port/chnetwrk NIC2 interface="connection:CHARON_NIC"
```

The AlphaServer DS15 and DS25 contain two built-in PCI Ethernet adapters. Models and names (EI* or EW*) of them depend on configuration addon. Choose one of the two or none, but not both. The first instantiates onboard network interfaces as EIA and EWA. While the second - EWA and EWB (enabled by default for backward compatibility)

Example:

```
#include ds25-onboard-nics.icfg
include ds25-onboard-nics-ew.icfg
```

⚠ Specification of "chnetwrk" is not mandatory, but it is still used for compatibility

Configuration parameters

Each virtual network controller has the following parameters that are specified with the "set" command:

interface

Parameter	interface
Type	Text string.
Value	Name of the corresponding instance of the "packet_port" component

station_address

Parameter	station_address
Type	Text String

Value	The "station_address" provides the ability to configure the adapter's permanent address. By default the adapter's permanent address is read from the host system's NIC.
	Format:
	`XX-XX-XX-XX-XX-XX`
	or
	`XX:XX:XX:XX:XX:XX`
	Example:
	`set EWA station_address="AF:01:AC:78:1B:CC"`

rx_fifo_size

Parameter	rx_fifo_size
Type	Numeric
Value	"rx_fifo_size" sets the receive FIFO size. The value is specified in Kb and, by default, is pre-calculated from the connected port's size of the receive queue. Typically, you do not need to change the "rx_fifo_size" parameter. It is available for extended tuning and debugging purposes.

adapter_mode

Parameter	adapter_mode
Type	Text String
Value	Assigns the link speed and the duplex settings of the virtual network adapter (except for DE602/DE602AA - see DE602 and DE602AA network adapters link speed and duplex settings).

The values are:

Parameter	Description
"Auto"	Auto-negotiate (default)
"10BaseT-HD"	10Mbps half duplex
"10BaseT-FD"	10Mbps full duplex
"100BaseT-HD"	100Mbps half duplex
"100BaseT-FD"	100Mbps full duplex

Example:

```
set EWA adapter_mode="100BaseT-HD"
```

Please note that this parameter controls only the setting which the emulated network adapter reports to the guest operating system running on CHARON VM. It does not change any settings of the host adapter mapped to the virtual adapter! In case if the settings of the host adapter have to be changed please refer to the host Operating System User's Guide for details on how to do it.

In case if "Auto" value is set CHARON VM collects the settings from the mapped host network adapter directly, assuming that all speeds above 100Mbps are represented as 100Mbps (maximum value). The resulting duplex setting corresponds to the duplex setting of the mapped host network adapter.

Example

```
load packet_port/chnetwrk EWA0 interface = "connection:Charon"
set EWA interface = EWA0
set EWA station_address="0C:FE:35:AA:67:3B"
```

DE602 and DE602AA network adapters link speed and duplex settings

Regardless of the "adapter_mode" setting in CHARON VM configuration file (see above), DE602 and DE602AA network adapters remains in "Auto-negotiation" mode, since the EIDRIVER of OpenVMS checks for EIx0_MODE environment variable when configuring the network card.

So mode propagation is implemented in CHARON-AXP via SRM console EIx0_MODE environment variable ("x" is A, B, C... depending on CHARON VM configuration), for example:

```
>>>help set

usage: set <variable-name> <value>
set <variable-name> ""

set eia0_mode { Twisted | Full | Fast | FastFD | Auto* }

>>>
```

⚠ The EIx0_MODE variable name is case insensitive, while its values are case sensitive! This is feature of OpenVMS EIDRIVER.

The values are:

Parameter	Description
"Auto"	Auto-negotiate (default)
"Twisted"	10Mbps half duplex
"Full"	10Mbps full duplex
"Fast"	100Mbps half duplex
"FastFD"	100Mbps full duplex

Example:

```
>>>set eia0_mode FastFD
```

✖ Please note that EIx0_MODE environment variable controls only the setting which the emulated network adapter reports to the guest operating system running on CHARON VM. It does not change any settings of the host adapter mapped to the virtual adapter! In case if the settings of the host adapter have to be changed please refer to the host Operating System User's Guide for details on how to do it.

In case if "Auto" value is set CHARON VM collects the settings from the mapped host network adapter directly, assuming that all speeds above 100Mbps are represented as 100Mbps (maximum value). The resulting duplex setting corresponds to the duplex setting of the mapped host network adapter.

Packet Port

The CHARON-specific "packet_port" interface establishes a connection between an Ethernet adapter in the Windows host system and a network adapter in the virtual HP Alpha system.

For every virtual adapter instance loaded, one dedicated host Ethernet physical adapter is required.

To create instances of the "packet_port", use the “load” command in the configuration file as follows:

```
load packet_port/chnetwrk <instance-name>
```

Example:

```
load packet_port/chnetwrk NDIS
```

"packet_port" uses several configuration parameters to control its behavior.

interface

Parameter	interface
Type	Text string

Value	This parameter identifies an Ethernet adapter of the host system dedicated to CHARON VM. The leading keyword "`connection:`" is mandatory except if the interface is to be disabled.
	Syntax:
	`set <name> interface="connection:<adapter>"`
	Example:
	`set NDIS interface="connection:Charon"`

port_enable_mac_addr_change

Parameter	port_enable_mac_addr_change
Type	Boolean
Value	If "true" is specified (default value), CHARON VM sets the appropriate Ethernet address automatically. If "false" is specified, set the Ethernet address manually. **Example**: `set NDIS port_enable_mac_addr_change=false`

port_retry_on_tx

Parameter	port_retry_on_tx
Type	Numeric
Value	The "port_retry_on_tx" parameter controls the number of times a port will attempt to transmit a packet before giving up. By default, the value is 3. Increasing this value may introduce problems in carrier loss logic, because not all NIC drivers support a carrier status query. Typically, you do not need to increase the value. **Example**: `set NDIS port_retry_on_tx=8`

port_pending_rx_number

Parameter	port_pending_rx_number
Type	Numeric
Value	The "port_pending_rx_number" parameter sets the number of pending receive buffers. The default value is 63. The maximum value allowed is 195. You may want to increase the "port_pending_rx_number" when you have very busy networking and experience problems like losing connections not related to the carrier loss. Typically, you do not need to change this parameter. **Example**: `set NDIS port_pending_rx_number=128`

port_pending_tx_number

Parameter	port_pending_tx_number
Type	Numeric
Value	The "port_pending_tx_number" parameter sets the number of buffers the port uses to transmit. The default value is 62. You may want to increase the "port_pending_tx_number" value if the log file indicates dropped TX packets due to TX queue overflow. Typically, you do not need to change this parameter. **Example**: `set NDIS port_pending_tx_number=128`

suspend_msg_on_mac_change

Parameter	suspend_msg_on_mac_change
Type	Boolean
Value	To avoid confusion arising from non critical errors during a MAC address change, logging is by default suppressed (default value is "true"). To enable tracing during a MAC address change set this parameter to "false" **Example**: `set NDIS suspend_msg_on_mac_change=false`

log

Parameter	log
Type	Text string

Value	If this parameter is set to some valid file name or a directory where the log files for each individual session will be stored CHARON VM logs Recv and Xmit packets at the emulated port layer.
	If an existing directory is specified, CHARON VM automatically enables creation of individual log files, one for each session using the same scheme as used for the generation of the rotating log files. If the "log" parameter is omitted, CHARON VM does not create log.
	In certain situations enabling this parameter may help to detect loss of packets.
	Example:
	`set NDIS log="ndis.log"`
	`set NDIS log="C:\Charon\Logs"`
	⚠ Only existing directory can be used as a value of the "log" parameter.

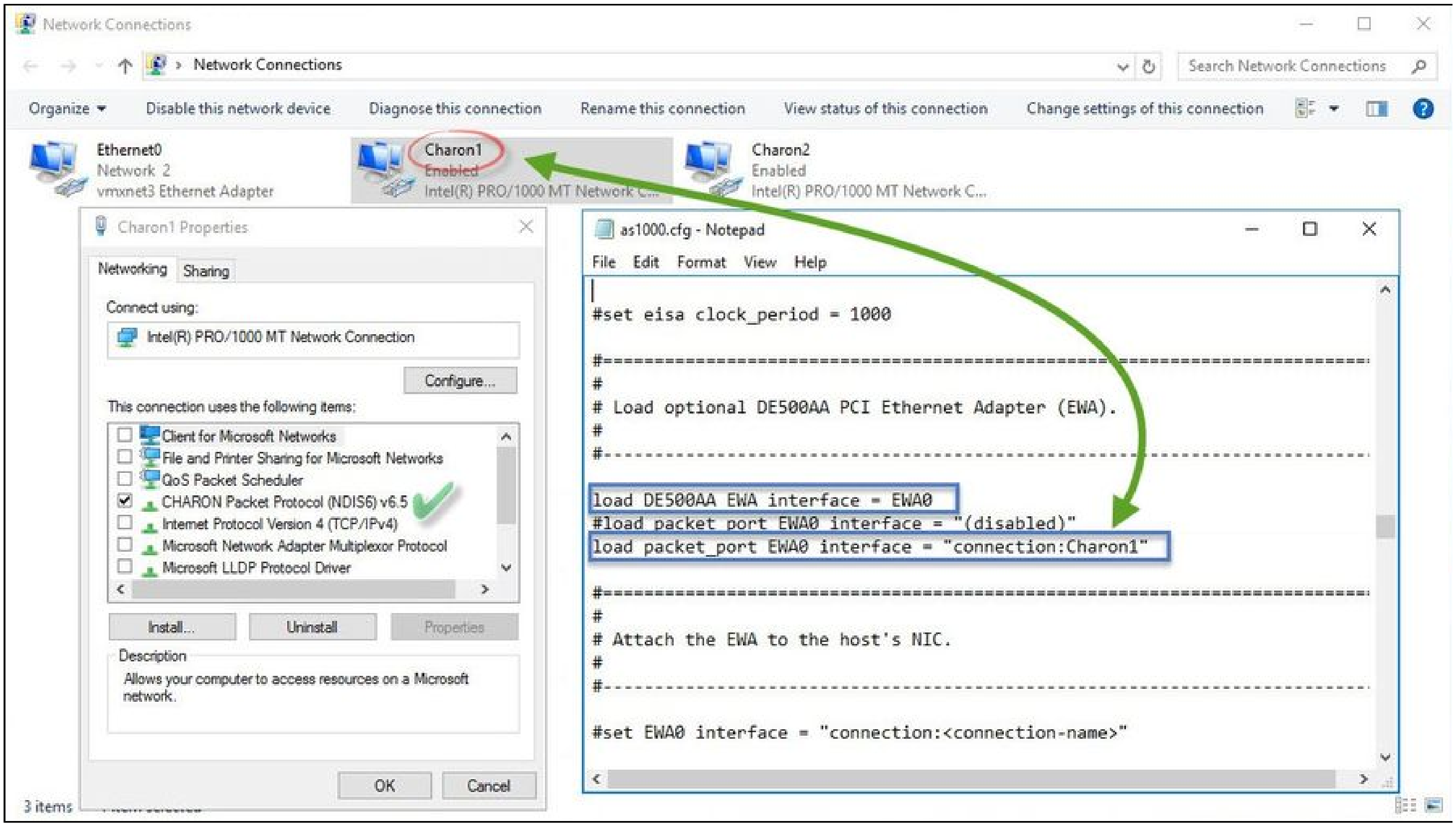
log_flush_period

Parameter	log_flush_period
Type	Numeric
Value	• <period-in-seconds> Defines a period of flushing log to disk. Default period is 60 seconds (it means that every manite log file is flushed to disk) **Examples**: `set NDIS log_flush_period=30`

legacy_mode

Parameter	legacy_mode
Type	Boolean
Value	If this parameter is set to "true" CHARON VM tries to use very first implementation of "packet_port" having certain restrictions such as inability to automatically change MAC address on given interface etc. This setting may be needed if CHARON VM runs in VMware environment for example and you do not want to allow promiscuous mode. In other situations please do not change its default value ("false"). **Example**: `set NDIS legacy_mode=true` This parameter is required only if you do not want to allow promiscuous traffic for the VMware adapter/port. In this mode, CHARON VM uses legacy MAC address change logic, so use of this option is not desirable. Thus for ESXi networking configuration: 1. Create the port; 2. Enable the promiscuous traffic; 3. Do not use legacy_mode option in Charon's configuration file TruCluster alias vMAC option may not operate correctly in combination with "legacy_mode=true" when host is VMware virtual machine. This is because vMAC option sets adapter to promiscuous mode which does not seem operating correctly on VMware adapters.

Example



Connect using:

Intel(R) PRO/1000 MT Network Connection

This connection uses the following items:

- ☐ Client for Microsoft Networks
- ☐ File and Printer Sharing for Microsoft Networks
- ☐ QoS Packet Scheduler
- ☑ CHARON Packet Protocol (NDIS6) v6.5
- ☐ Internet Protocol Version 4 (TCP/IPv4)
- ☐ Microsoft Network Adapter Multiplexor Protocol
- ☐ Microsoft LLDP Protocol Driver

Description

Allows your computer to access resources on a Microsoft network.

```
#set eisa clock_period = 1000

#=============================================================================
#
# Load optional DE500AA PCI Ethernet Adapter (EWA).
#
#-----------------------------------------------------------------------------

load DE500AA EWA interface = EWA0
#load packet_port EWA0 interface = "(disabled)"
load packet_port EWA0 interface = "connection:Charon1"

#=============================================================================
#
# Attach the EWA to the host's NIC.
#
#-----------------------------------------------------------------------------

#set EWA0 interface = "connection:<connection-name>"
```

CHARON-AXP supports VLAN adapters. If for some reasons you are going to use them, proceed with their installation and configuration according to the network adapter's vendor's User's Guide and then use the resulting VLAN interface the same way as the regular network interface.

DEFPA PCI FDDI adapter

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General description

CHARON-AXP supports emulation of DEFPA PCI FDDI adapter via CHARON PCI Pass Through mode (using a specific CHARON PCI Pass Through driver).

CHARON PCI Pass Through mode enables connection between the virtual DEFPA PCI FDDI adapter and the physical DEFPA PCI FDDI adapter plugged into a hosting server PCI bus.

Loading DEFPA PCI FDDI adapter

Syntax for loading DEFPA PCI FDDI adapter:

```
load defpa <name>
```

Example:

```
load defpa FDDI
```

By default DEFPA adapter uses first available PCI slot. If instead some particular slot is needed, refer to this section for details of specific placement of PCI peripherals on CHARON Virtual Machine (VM) PCI bus.

⚠ In AlphaStation 400 configuration use the following syntax for DEFPA PCI FDDI adapter loading:

```
load defpa FDDI irq_bus = isa
```

Configuration parameters

The DEFPA PCI FDDI adapter emulation has only one configuration parameter:

host_bus_location

<table>
<tr><td><b>Parameter</b></td><td>host_bus_location</td></tr>
<tr><td><b>Type</b></td><td>Text String</td></tr>
<tr><td><b>Value</b></td><td>Establish connection between virtual DEFPA PCI FDDI adapter and physical DEFPA PCI FDDI adapter installed on CHARON host (pass through mode)
Syntax:
<code>load defpa <controller name> host_bus_location="PCI bus X, device Y, function Z"</code>
where:
<table>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>"PCI bus X"</td><td>PCI bus number of the host DEFPA PCI FDDI adapter</td></tr>
<tr><td>"device Y"</td><td>PCI bus device number of the host DEFPA PCI FDDI adapter</td></tr>
<tr><td>"function Z"</td><td>The "function" parameter of the the host DEFPA PCI FDDI adapter</td></tr>
</table>
<b>Example</b>:
<code>load defpa FDDI host_bus_location="PCI bus 3, device 1, function 0"</code></td></tr>
</table>

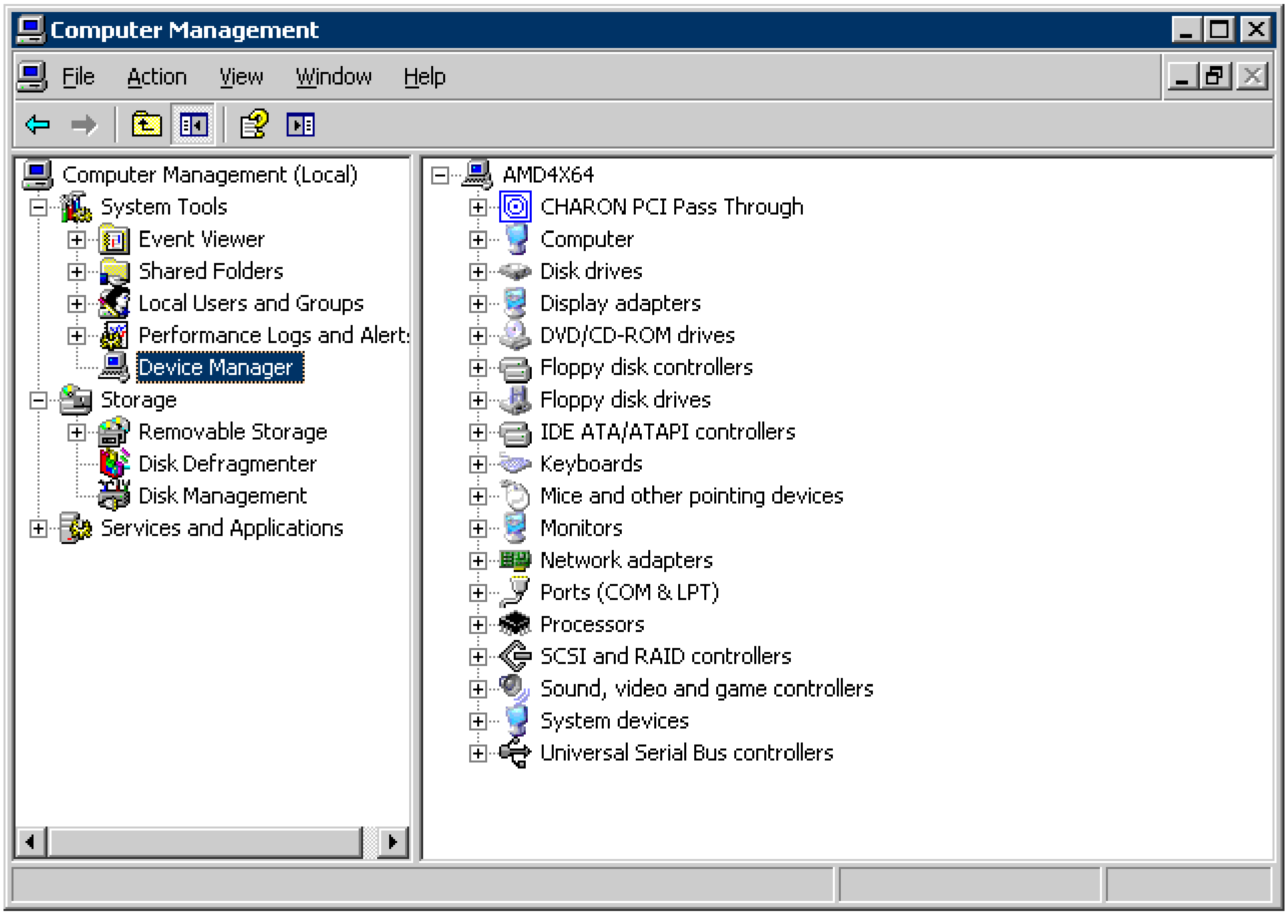
Installation of DEFPA PCI FDDI adapter

1. Install the DEFPA PCI FDDI adapter to some spare PCI slot of the host system
2. Boot a Windows operating system
3. Open “Computer Management”
4. Select “Device Manager”
5. In the right window select the desired physical FDDI adapter connected to the system, right-click the mouse button, and the corresponding menu will appear.
6. From the menu select “Update driver…”. Windows will show “Hardware Upgrade Wizard”
7. Select “No, not this time”, click “Next”
8. Select “Install from a list or specific location (Advanced)”, click “Next”
9. Select “Don’t search. I will choose the driver to install”, click “Next”
10. Click “Have Disk…”. Windows shows dialog “Install From Disk”
11. Instead of “A:\”, click “Browse” and select path to the folder in which driver’s INF file is located (typically "C:\Program Files\CHARON\Drivers\DEFPA_X.X.0.XXXXX"), select “defpa_ppt_amd64.inf”, and click “Open”
12. The “Hardware Upgrade Wizard” should have “CHARON DEFPA FDDI adapter”. Select it, and click “Next”
13. There will be one or two more dialogs, but they are usual for device driver installation.
14. Reboot the host

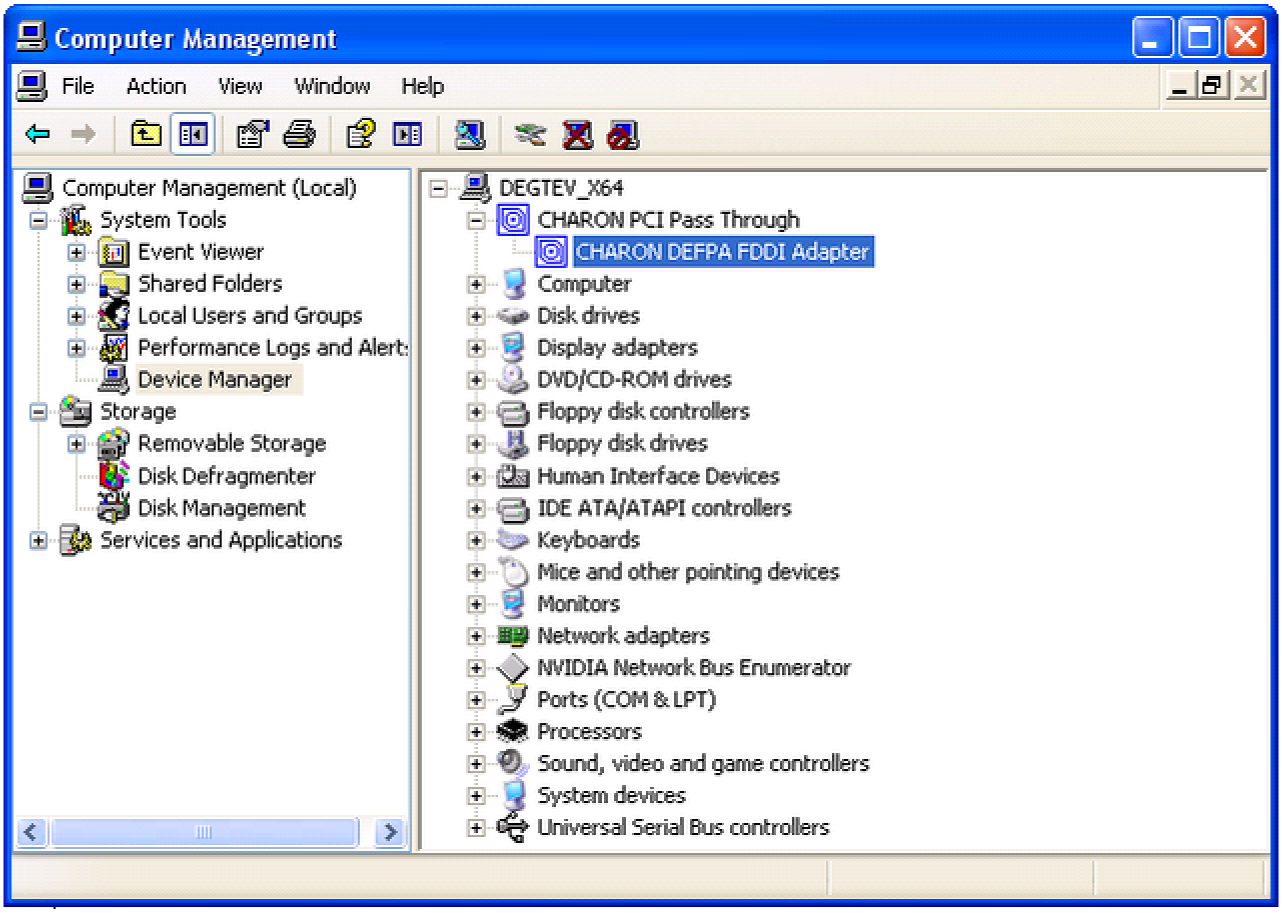
Upon completion, a new device will appear in the device manager with the CHARON logo on it.

Mapping to host DEFPA PCI FDDI adapter

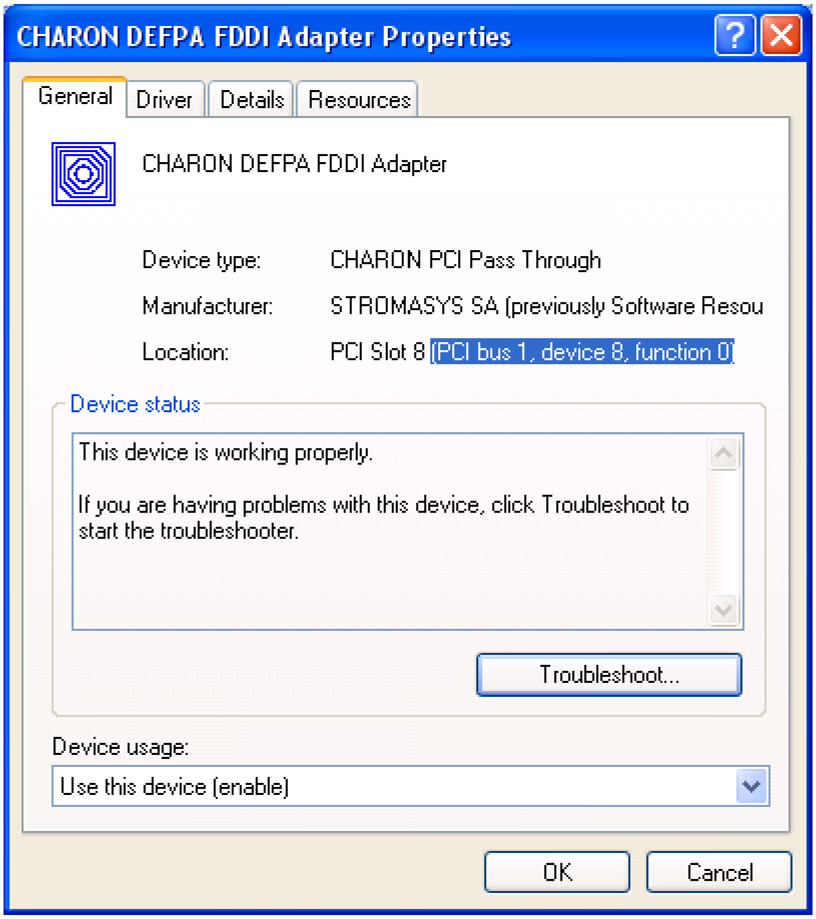
Open “Computer Management” application and select “Device Manager”:



In the right panel select the installed DEFPA PCI FDDI adapter:



Open its properties sheet by double-clicking on the selected adapter:



CHARON DEFPA FDDI Adapter

Device type: CHARON PCI Pass Through

Manufacturer: STROMASYS SA (previously Software Resou

Location: PCI Slot 8 (PCI bus 1, device 8, function 0)

This device is working properly.

If you are having problems with this device, click Troubleshoot to start the troubleshooter.

Device usage: Use this device (enable)

The “Location:” on the above picture gives X, Y, and Z for the "host_bus_location" parameter, for example:

```
set FDDI host_bus_location = "PCI bus 1, device 8, function 0"
```

⚠ Non-US-EN installations of Windows may present “Location:” string in local language, but "host_bus_location" parameter requires English notation, so the words “PCI”, “bus”, “device”, and “function” must be specified in English.

PBXDA-xx series PCI serial adapters

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General description

CHARON-AXP supports emulation of PBXDA-xx family PCI serial adapter based on DIGI AccelePort serial adapters via CHARON PCI Pass Through mode (using a specific CHARON PCI Pass Through driver) and by direct virtualization.

CHARON PCI Pass Through mode enables connection between the virtual PBXDA-xx PCI serial adapter and the physical DIGI AccelePort PCI serial adapter plugged into a hosting server PCI bus whether as the direct virtualization may address the host serial port or TCP/IP port.

Virtual PBXDA-xx PCI serial adapter

Loading virtual PBXDA-xx serial lines adapter

Syntax for loading PBXDA (AccelePort 2r 920) serial lines adapter:

```
load PBXDA/DIGI <name>
```

Syntax for loading PBXDA_BA (AccelePort 4r 920) serial lines adapter:

```
load PBXDA_BA/DIGI <name>
```

Syntax for loading PBXDA_BB (AccelePort 8r 920) serial lines adapter:

```
load PBXDA_BB/DIGI <name>
```

Syntax for loading PBXDA_AC (AccelePort Xem) serial lines adapter:

```
load PBXDA_AC/DIGI <name>
```

Example:

```
load PBXDA/DIGI TXA
```

The adapter instance name ("TXA" in the example above) is used then for parametrization, for example:

```
set TXA line[2]="COM1:"
```

The numbers in the square brackets represent line number on the virtual PBXDA-xx adapter starting from 0.

Controller type	Maximum number of lines
PBXDA	2
PBXDA_BA	4
PBXDA_BB	8
PBXDA_AC	16

All the parameters described in the "Placement of peripheral devices on PCI bus" chapter, such as "bus", "device", "function", "irq", "irq_bus" are applicable for PBXDA-xx controller.

DIGI drivers for OpenVMS and Tru64 are sensitive to PBXDA-xx location on PCI, therefore it is recommended to fix PBXDA-xx location with explicit configuration.

Example:

```
load PBXDA TXA bus=pci_1 device=4 function=0
```

Configuration parameters

The PBXDA-xx serial lines adapter emulation has the following configuration parameters:

port

Parameter	port
Type	Text String

Value	Specifies a local port for incoming telnet connections
	By default the "port" configuration option is not specified.
	Syntax:
	`port[line-number]=<local port>`
	Example:
	`set TXA port[2]=17060`

line

Parameter	line
Type	Text string
Value	A defined COM port on host system: **Example:** `set TXA line[2]="COM2:"`

Pass-through mode

Loading PBXDA-xx PCI serial adapter in pass-through mode

Note the model of DIGI AccelePort PCI serial adapter for emullation of a particular model of PBXDA-xx family PCI serial adapter:

DEC PBXDA-xx adapter	Name of the device to map to	Controller	Vendor ID	Device ID
PBXDA-BA	DIGI AccelePort 4r 920	ASIC PCI	114Fh	0026h
PBXDA-BB	DIGI AccelePort 8r 920	ASIC PCI	114Fh	0027h
PBXDA-AC	DIGI AccelePort Xem	ASIC PCI	114Fh	0004h
PBXDA-AC	DIGI AccelePort Xem	ASIC PCI	114Fh	0008h

Syntax for loading PBXDA-xx PCI serial adapter:

```
load digi <name>
```

Example:

```
load digi SERIAL_A
```

By default PBXDA-xx adapter uses first available PCI slot. If instead some particular slot is needed, refer to this section for details of specific placement of PCI peripherals on CHARON Virtual Machine (VM) PCI bus.

In AlphaStation 400 configuration use the following syntax for PBXDA-xx PCI serial adapter loading:

```
load digi SERIAL_A irq_bus = isa
```

Configuration parameters

The PBXDA-xx PCI serial adapter emulation has only one configuration parameter:

host_bus_location

Parameter	host_bus_location
Type	Text String

Value	Establish connection between virtual PBXDA-xx PCI serial adapter and physical DIGI AccelePort PCI serial adapter installed on CHARON host (pass through mode)
	Syntax:
	`load digi <controller name> host_bus_location="PCI bus X, device Y, function Z"`
	where:
	Parameter / **Description**:
	"PCI bus X" – PCI bus number of the host DIGI AccelePort PCI serial adapter
	"device Y" – PCI bus device number of the host DIGI AccelePort PCI serial adapter
	"function Z" – The "function" parameter of the the host DIGI AccelePort PCI serial adapter
	Example:
	`load digi SERIAL_A host_bus_location="PCI bus 3, device 1, function 0"`

Syntax:

```
load digi <controller name> host_bus_location="PCI bus X, device Y, function Z"
```

where:

Parameter	Description
"PCI bus X"	PCI bus number of the host DIGI AccelePort PCI serial adapter
"device Y"	PCI bus device number of the host DIGI AccelePort PCI serial adapter
"function Z"	The "function" parameter of the the host DIGI AccelePort PCI serial adapter

Example:

```
load digi SERIAL_A host_bus_location="PCI bus 3, device 1, function 0"
```

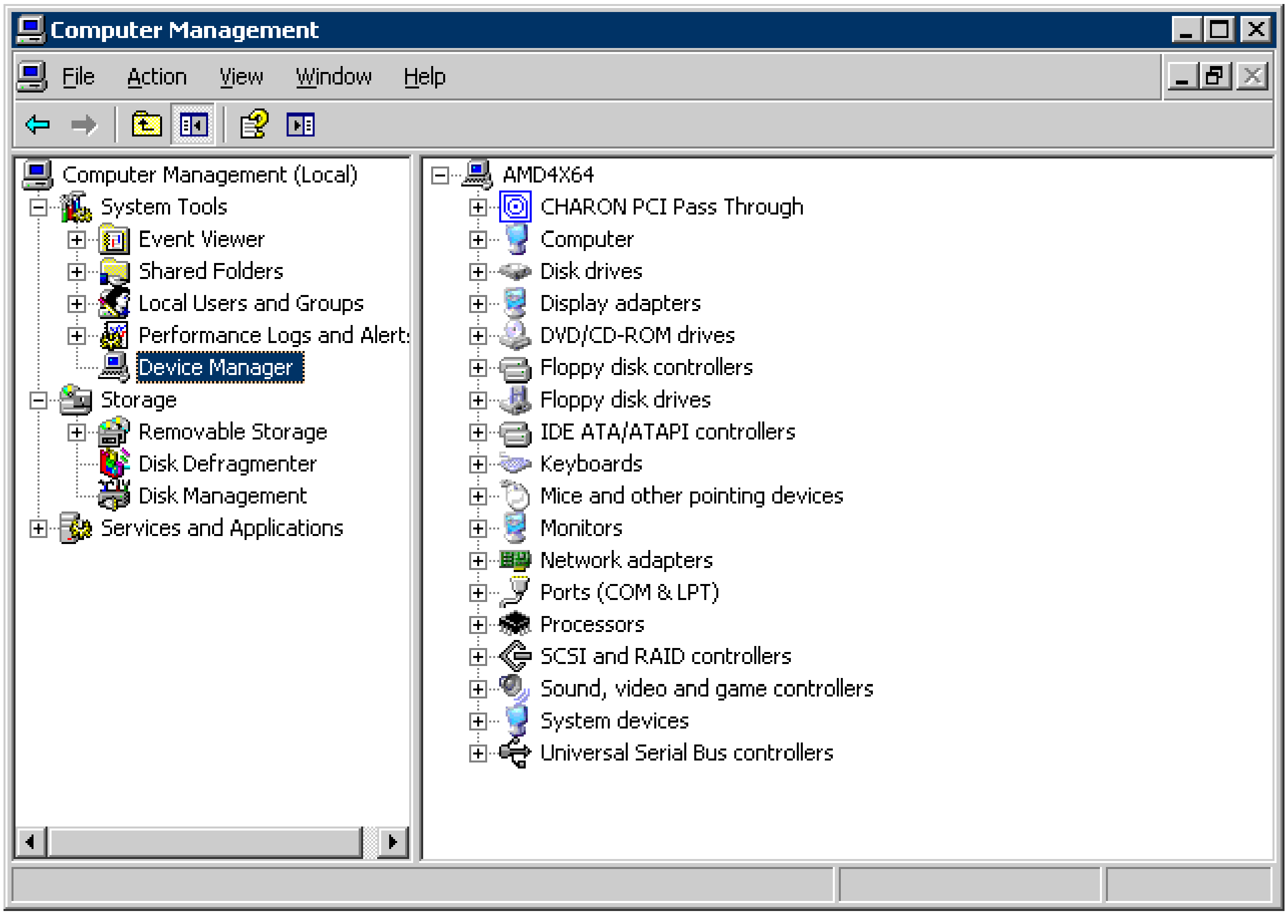
Installation of DIGI AccelePort PCI serial adapter

1. Install the DIGI AccelePort PCI serial adapter to some spare PCI slot of the host system
2. Boot a Windows operating system
3. Open “Computer Management”
4. Select “Device Manager”
5. In the right window select the desired physical serial adapter connected to the system, right-click the mouse button, and the corresponding menu will appear.
6. From the menu select “Update driver…”. Windows will show “Hardware Upgrade Wizard”
7. Select “No, not this time”, click “Next”
8. Select “Install from a list or specific location (Advanced)”, click “Next”
9. Select “Don’t search. I will choose the driver to install”, click “Next”
10. Click “Have Disk…”. Windows shows dialog “Install From Disk”
11. Instead of “A:\”, click “Browse” and select path to the folder in which driver’s INF file is located (typically "C:\Program Files\CHARON\Drivers\DIGI_X.X.0.XXXXX"), select “digi_ppt_amd64.inf”, and click “Open”
12. The “Hardware Upgrade Wizard” should have “CHARON DIGI adapter”. Select it, and click “Next”
13. There will be one or two more dialogs, but they are usual for device driver installation.
14. Reboot the host

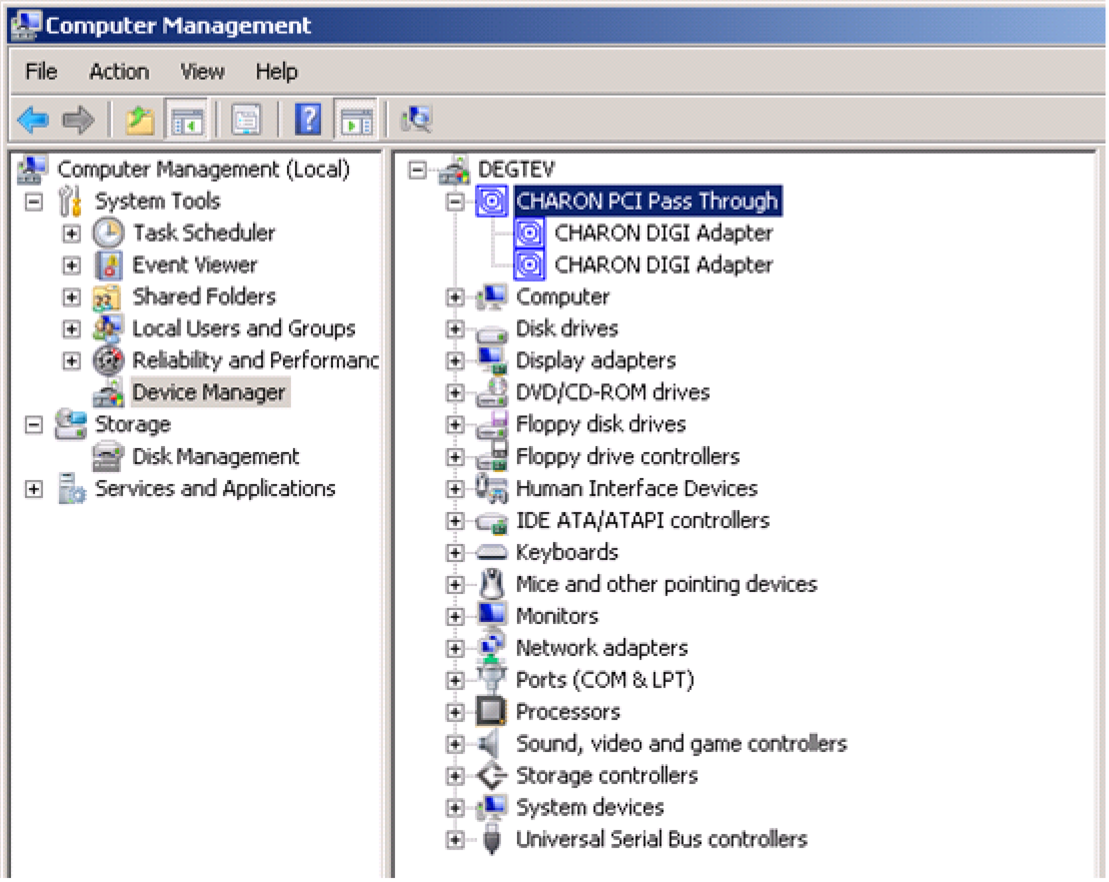
Upon completion, a new device will appear in the device manager with the CHARON logo on it.

Mapping to host DIGI AccelePort PCI serial adapter

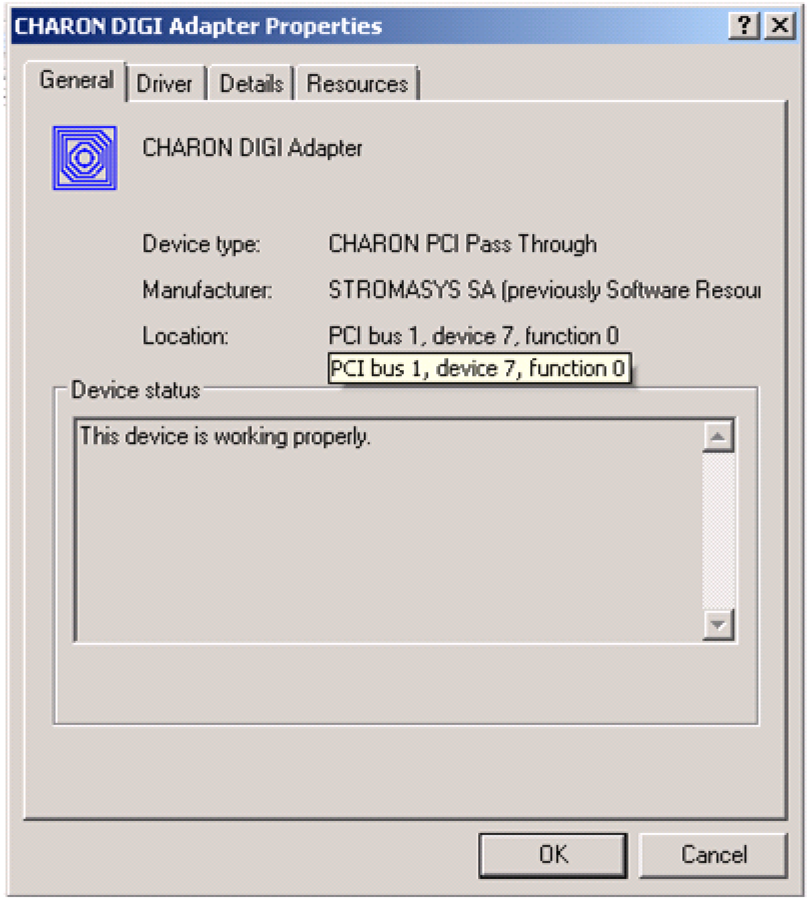
Open “Computer Management” application and select “Device Manager”:



In the right panel select proper physical DIGI adapter:



Open its properties sheet by double-clicking on the selected adapter:



CHARON DIGI Adapter Properties

CHARON DIGI Adapter

Device type: CHARON PCI Pass Through

Manufacturer: STROMASYS SA (previously Software Resou

Location: PCI bus 1, device 7, function 0

PCI bus 1, device 7, function 0

Device status

This device is working properly.

The “Location:” on the above picture gives X, Y, and Z for the "host_bus_location" parameter, for example:

```
set PBXDA host_bus_location = "PCI bus 1, device 7, function 0"
```

⚠ Non-US-EN installations of Windows may present “Location:” string in local language, but "host_bus_location" parameter requires English notation, so the words “PCI”, “bus”, “device”, and “function” must be specified in English.

Sample configuration files

Contents

HP AlphaServer 800 configuration file

```
#
# Copyright (C) 1999-2019 STROMASYS
# All rights reserved.
#
# The software contained on this media is proprietary to and embodies
# the confidential technology of STROMASYS. Possession, use, duplication,
# or dissemination of the software and media is authorized only pursuant
# to a valid written license from STROMASYS.
#
#=============================================================================
#
# Sample configuration file for AlphaServer 800 machines.
#
#-----------------------------------------------------------------------------

set session hw_model = AlphaServer_800

#=============================================================================
#
# Choose a name for the instance, if needed, to differentiate it among other
# instances running on the same host.
#
#-----------------------------------------------------------------------------

include configuration_name.icfg

#=============================================================================
#
# Use the following commands to disable the rotating LOG files and enable
# a single LOG file. Select either append or overwrite (for each time the
# instance starts) and specify desired log path and file name.
#
#-----------------------------------------------------------------------------

set session log_method = append
#set session log_method = overwrite
#set session log = AlphaServer_800.log

#=============================================================================
#
# Overrides system assigned process's CPU affinity. The session changes
# the process's CPU affinity to the one specified.
#
#-----------------------------------------------------------------------------

#set session affinity="0, 1, 2, 3"

#=============================================================================
#
# The 'n_of_io_cpus' option overrides number of host CPU cores reserved for
# I/O processing. If omitted the session reserves 33% of available host CPU
# cores for I/O processing. Note that total amount of available host CPU
# cores is determined based on process's CPU affinity.
#
#-----------------------------------------------------------------------------

#set session n_of_io_cpus=1
#set session n_of_io_cpus=2
#set session n_of_io_cpus=...

#=============================================================================
#
# AlphaServer 800 5/333
#
#-----------------------------------------------------------------------------

set ace cpu_architecture = EV56
set rom dsrdb[0] = 1310 system_name = "AlphaServer 800 5/333"

#============================================================================
#
# AlphaServer 800 5/400
#
#----------------------------------------------------------------------------

#set ace cpu_architecture = EV56
#set rom dsrdb[0] = 1584 system_name = "AlphaServer 800 5/400"

#============================================================================
#
# AlphaServer 800 5/500
#
#----------------------------------------------------------------------------

#set ace cpu_architecture = EV56
#set rom dsrdb[0] = 1585 system_name = "AlphaServer 800 5/500"

#============================================================================
#
# Override default System Serial Number.
#
#----------------------------------------------------------------------------

#set rom system_serial_number = SN01234567

#============================================================================
#
# Specify size of RAM from 256MB up to 8192MB (8GB) in 256MB extents.
#
#----------------------------------------------------------------------------

#set ram size=256
#set ram size=512
#set ram size=1024
#set ram size=4096
#set ram size=8192

#============================================================================
#
# Uncomment to allow the virtual SRM console environment be preserved across
# emulator restarts.
#
#----------------------------------------------------------------------------

#set rom container="AlphaServer_800.bin"

#============================================================================
#
# Uncomment to allow saving CMOS NVRAM content, so that to preserve
# Time & Date information.
#
#----------------------------------------------------------------------------

#set toy container="AlphaServer_800.dat"

#============================================================================
#
# Select the connection method for the console serial line OPA0.
#
#----------------------------------------------------------------------------

#set COM1 alias = OPA0 line = "COM1:"
#set COM1 alias = OPA0 port = 10003
#set COM1 alias = OPA0 port = 10003 application = "opa0.ht"
set COM1 alias = OPA0 port = 10003 application = "putty -load OPA0 -P 10003"
#set COM1 alias = OPA0 port = 10003 application = "c:\kea\user\opa0.ktc"

# ... fallback to legacy mode ...
#load physical_serial_line OPA0 line="COM1:"
```

```
#load virtual_serial_line OPA0 port=10003
#load virtual_serial_line OPA0 port=10003 application="opa0.ht"
#load virtual_serial_line OPA0 port=10003 application="putty -load OPA0"
#load virtual_serial_line OPA0 port=10003 application="c:\kea\user\opa0.ktc"

#----------------------------------------------------------------------------
#
# Uncomment to allow 'F6' to terminate the running emulator. Closing console
# satellite application may also be used for that.
#
#----------------------------------------------------------------------------

#set OPA0 stop_on = "F6"
#set OPA0 stop_on = "Application"
#set OPA0 stop_on = "F6, Application"

#============================================================================
#
# Select connection for the serial line TTA0.
#
#----------------------------------------------------------------------------

#set COM2 alias = TTA0 line = "COM2:"
#set COM2 alias = TTA0 port = 10000
#set COM2 alias = TTA0 port = 10000 application = "tta0.ht"
#set COM2 alias = TTA0 port = 10000 application = "putty -load TTA0 -P 10000"
#set COM2 alias = TTA0 port = 10000 application = "c:\kea\user\tta0.ktc"

# ... fallback to legacy mode ...
#load physical_serial_line TTA0 line="COM2:"
#load virtual_serial_line TTA0 port=10000
#load virtual_serial_line TTA0 port=10000 application="tta0.ht"
#load virtual_serial_line TTA0 port=10000 application="putty -load TTA0"
#load virtual_serial_line TTA0 port=10000 application="c:\kea\user\tta0.ktc"

#============================================================================
#
# If TTA0 is loaded in legacy mode, attach it to the secondary serial line
# controller COM2.
#
# ATTENTION: Only when TTA0 (COM2) is in legacy mode! Keep the line commented
# out otherwise!
#
#----------------------------------------------------------------------------

#set COM2 line = TTA0

#============================================================================
#
# Improve granularity of emulated AXP timer.
#
#----------------------------------------------------------------------------

#set eisa clock_period = 1000

#============================================================================
#
# Load optional DE500BA PCI Ethernet Adapter (EWA).
#
#----------------------------------------------------------------------------

#load DE500BA EWA interface = EWA0
#load packet_port EWA0 interface = "(disabled)"

#============================================================================
#
# Attach the EWA to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWA0 interface = "connection:<connection-name>"
```

```
#=============================================================================
#
# The AlphaServer 800 contains built-in PCI SCSI adapter called PKA within
# the configuration file.
#
#-----------------------------------------------------------------------------
#
# Uncomment to connect the emulator's DKA0 to the disk image.
#
#-----------------------------------------------------------------------------

#set PKA container[0] = "<file-name>.vdisk"

#=============================================================================
#
# Uncomment to connect the emulator's DKA100 to a host disk drive.
#
#-----------------------------------------------------------------------------

#set PKA container[100]="\\.\PhysicalDrive0"
#set PKA container[100]="\\.\PhysicalDrive<N>"

#=============================================================================
#
# Uncomment to connect the emulator's DKA300 to the host's CD/DVD-ROM drive.
#
#-----------------------------------------------------------------------------

#set PKA container[300]="\\.\CdRom0"
#set PKA container[300]="\\.\CdRom<N>"

#=============================================================================
#
# Uncomment to connect the emulator's DKA400 to an .ISO file (CD/DVD image).
#
#-----------------------------------------------------------------------------

#set PKA container[400] = "<file-name>.iso"

#=============================================================================
#
# Uncomment to connect the emulator's MKA500 to the host's SCSI tape drive.
#
#-----------------------------------------------------------------------------

#set PKA container[500]="\\.\Tape0"
#set PKA container[500]="\\.\Tape<N>"

#=============================================================================
#
# Uncomment to connect the emulator's MKA600 to a .VTAPE file (tape image).
#
#-----------------------------------------------------------------------------

#set PKA container[600] = "<file-name>.vtape"

#=============================================================================
#
# Uncomment to connect the emulator's DKA600 to host's 3.5" FDD. Uncomment
# the next line for the FDD to appear as DEC RX23 (otherwise it appears as
# DEC RX26).
#
# Either "A:" or "B:" may be used in container specification.
#
#-----------------------------------------------------------------------------

#set PKA container[600]="\\.\A:"
#set PKA media_type[600]="RX23"

#=============================================================================
#
# Uncomment to enable emulation of secondary DEC-KZPBA SCSI controller (PKB).
```

```
#
#-----------------------------------------------------------------------------

#load KZPBA PKB scsi_id = 7

#=============================================================================
#
# Uncomment to connect the emulator's DKB0 to the disk image.
#
#-----------------------------------------------------------------------------

#set PKB container[0] = "<file-name>.vdisk"

#=============================================================================
#
# Uncomment to connect the emulator's DKB100 to a host disk drive.
#
#-----------------------------------------------------------------------------

#set PKB container[100]="\\.\PhysicalDrive0"
#set PKB container[100]="\\.\PhysicalDrive<N>"

#=============================================================================
#
# Uncomment to connect the emulator's DKB300 to the host's CD/DVD-ROM drive.
#
#-----------------------------------------------------------------------------

#set PKB container[300]="\\.\CdRom0"
#set PKB container[300]="\\.\CdRom<N>"

#=============================================================================
#
# Uncomment to connect the emulator's DKB400 to an .ISO file (CD/DVD image).
#
#-----------------------------------------------------------------------------

#set PKB container[400] = "<file-name>.iso"

#=============================================================================
#
# Uncomment to connect the emulator's MKB500 to the host's SCSI tape drive.
#
#-----------------------------------------------------------------------------

#set PKB container[500]="\\.\Tape0"
#set PKB container[500]="\\.\Tape<N>"

#=============================================================================
#
# Uncomment to connect the emulator's MKB600 to a .VTAPE file (tape image).
#
#-----------------------------------------------------------------------------

#set PKB container[600] = "<file-name>.vtape"

#=============================================================================
#
# Uncomment to connect the emulator's DKB600 to host's 3.5" FDD. Uncomment
# the next line for the FDD to appear as DEC RX23 (otherwise it appears as
# DEC RX26).
#
# Either "A:" or "B:" may be used in container specification.
#
#-----------------------------------------------------------------------------

#set PKB container[600]="\\.\A:"
#set PKB media_type[600]="RX23"

#=============================================================================
#
# Uncomment to enable emulation of DEC-KGPSA-CA PCI FC Adapter.
```

```
#
#----------------------------------------------------------------------------

#load KGPSA FGA

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA0 to the disk image.
#
#----------------------------------------------------------------------------

#set FGA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set FGA container[100] = "\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to enable emulation of secondary DEC-KGPSA-CA PCI FC Adapter.
#
#----------------------------------------------------------------------------

#load KGPSA FGB

#============================================================================
#
# Uncomment to enable PCI Pass Through access to physical EMULEX LP FC HBA,
# use two adapters to provide multipath with failover.
#
#----------------------------------------------------------------------------

#set FGA host_bus_location = "PCI bus X, device Y, function Z"
#set FGB host_bus_location = "PCI bus A, device B, function C"

# this is the end of the configuration file #################################
```

HP AlphaServer 4000 configuration file

```
#
# Copyright (C) 1999-2019 STROMASYS
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#
# The software contained on this media is proprietary to and embodies
# the confidential technology of STROMASYS. Possession, use, duplication,
# or dissemination of the software and media is authorized only pursuant
# to a valid written license from STROMASYS.
#
#============================================================================
#
# Sample configuration file for AlphaServer 4000 machines.
#
#----------------------------------------------------------------------------

set session hw_model = AlphaServer_4000

#============================================================================
#
# Choose a name for the instance, if needed, to differentiate it among other
# instances running on the same host.
#
#----------------------------------------------------------------------------

include configuration_name.icfg

#============================================================================
#
# Use the following commands to disable the rotating LOG files and enable
# a single LOG file. Select either append or overwrite (for each time the
# instance starts) and specify desired log path and file name.
#
#----------------------------------------------------------------------------

set session log_method = append
#set session log_method = overwrite
#set session log = AlphaServer_4000.log

#============================================================================
#
# Overrides system assigned process's CPU affinity. The session changes
# the process's CPU affinity to the one specified.
#
#----------------------------------------------------------------------------

#set session affinity="0, 1, 2, 3"

#============================================================================
#
# The 'n_of_io_cpus' option overrides number of host CPU cores reserved for
# I/O processing. If omitted the session reserves 33% of available host CPU
# cores for I/O processing. Note that total amount of available host CPU
# cores is determined based on process's CPU affinity.
#
#----------------------------------------------------------------------------

#set session n_of_io_cpus=1
#set session n_of_io_cpus=2
#set session n_of_io_cpus=...

#============================================================================
#
# AlphaServer 4000 5/300
#
#----------------------------------------------------------------------------

#set ace cpu_architecture = EV5
```

```
#set rom dsrdb[0] = 1450 system_name = "AlphaServer 4000 5/300"

#=============================================================================
#
# AlphaServer 4000 5/400
#
#-----------------------------------------------------------------------------

set ace cpu_architecture = EV56
set rom dsrdb[0] = 1454 system_name = "AlphaServer 4000 5/400"

#=============================================================================
#
# The 'n_of_cpus' option reduces number of emulated Alpha CPUs in the
# configuration.
#
#-----------------------------------------------------------------------------

#set session n_of_cpus=1

#=============================================================================
#
# Override default System Serial Number.
#
#-----------------------------------------------------------------------------

#set rom system_serial_number = SN01234567

#=============================================================================
#
# Specify size of RAM from 256MB up to 32768MB (32GB) in 256MB extents.
#
#-----------------------------------------------------------------------------

#set ram size=256
#set ram size=512
#set ram size=1024
#set ram size=4096
#set ram size=32768

#=============================================================================
#
# Uncomment to allow the SRM console environment be preserved across
# emulator restarts.
#
#-----------------------------------------------------------------------------

#set rom container="AlphaServer_4000.bin"

#=============================================================================
#
# Uncomment to allow saving CMOS NVRAM content, so that to preserve
# Time & Date information.
#
#-----------------------------------------------------------------------------

#set toy container="AlphaServer_4000.dat"

#=============================================================================
#
# Select the connection method for the console serial line OPA0.
#
#-----------------------------------------------------------------------------

#set COM1 alias = OPA0 line = "COM1:"
#set COM1 alias = OPA0 port = 10003
#set COM1 alias = OPA0 port = 10003 application = "opa0.ht"
set COM1 alias = OPA0 port = 10003 application = "putty -load OPA0 -P 10003"
#set COM1 alias = OPA0 port = 10003 application = "c:\kea\user\opa0.ktc"

# ... fallback to legacy mode ...
#load physical_serial_line OPA0 line="COM1:"
```

```
#load virtual_serial_line OPA0 port=10003
#load virtual_serial_line OPA0 port=10003 application="opa0.ht"
#load virtual_serial_line OPA0 port=10003 application="putty -load OPA0"
#load virtual_serial_line OPA0 port=10003 application="c:\kea\user\opa0.ktc"

#-----------------------------------------------------------------------------
#
# Uncomment to allow 'F6' to terminate the running emulator. Closing console
# satellite application may also be used for that.
#
#-----------------------------------------------------------------------------

#set OPA0 stop_on = "F6"
#set OPA0 stop_on = "Application"
#set OPA0 stop_on = "F6, Application"

#=============================================================================
#
# Select connection for the serial line TTA0.
#
#-----------------------------------------------------------------------------

#set COM2 alias = TTA0 line = "COM2:"
#set COM2 alias = TTA0 port = 10000
#set COM2 alias = TTA0 port = 10000 application = "tta0.ht"
#set COM2 alias = TTA0 port = 10000 application = "putty -load TTA0 -P 10000"
#set COM2 alias = TTA0 port = 10000 application = "c:\kea\user\tta0.ktc"

#=============================================================================
#
# Improve granularity of emulated AXP timer.
#
#-----------------------------------------------------------------------------

#set eisa clock_period = 1000

#=============================================================================
#
# Load optional DE500BA PCI Ethernet Adapter (EWA).
#
#-----------------------------------------------------------------------------

#load DE500BA EWA interface = EWA0
#load packet_port EWA0 interface = "(disabled)"

#=============================================================================
#
# Attach the EWA to the host's NIC.
#
#-----------------------------------------------------------------------------

#set EWA0 interface = "connection:<connection-name>"

#=============================================================================
#
# Load another optional DE500BA PCI Ethernet Adapter (EWB).
#
#-----------------------------------------------------------------------------

#load DE500BA EWB interface = EWB0
#load packet_port EWB0 interface = "(disabled)"

#=============================================================================
#
# Attach the EWB to the host's NIC.
#
#-----------------------------------------------------------------------------

#set EWB0 interface = "connection:<connection-name>"

#=============================================================================
#
```

```
# Load another optional DE500BA PCI Ethernet Adapter (EWC).
#
#----------------------------------------------------------------------------

#load DE500BA EWC interface = EWC0
#load packet_port EWC0 interface = "(disabled)"

#============================================================================
#
# Attach the EWC to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWC0 interface = "connection:<connection-name>"

#============================================================================
#
# The AlphaServer 4000 contains built-in PCI SCSI adapter, called PKA within
# the configuration file.
#
#----------------------------------------------------------------------------
#
# Uncomment to connect the emulator's DKA0 to the disk image.
#
#----------------------------------------------------------------------------

#set PKA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's DKA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set PKA container[100]="\\.\PhysicalDrive0"
#set PKA container[100]="\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA300 to the host's CD/DVD-ROM drive.
#
#----------------------------------------------------------------------------

#set PKA container[300]="\\.\CdRom0"
#set PKA container[300]="\\.\CdRom<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA400 to an .ISO file (CD/DVD image).
#
#----------------------------------------------------------------------------

#set PKA container[400] = "<file-name>.iso"

#============================================================================
#
# Uncomment to connect the emulator's MKA500 to the host's SCSI tape drive.
#
#----------------------------------------------------------------------------

#set PKA container[500]="\\.\Tape0"
#set PKA container[500]="\\.\Tape<N>"

#============================================================================
#
# Uncomment to connect the emulator's MKA600 to a .VTAPE file (tape image).
#
#----------------------------------------------------------------------------

#set PKA container[600] = "<file-name>.vtape"

#============================================================================
#
# Uncomment to connect the emulator's DKA600 to host's 3.5" FDD. Uncomment
# the next line for the FDD to appear as DEC RX23 (otherwise it appears as
# DEC RX26).
#
# Either "A:" or "B:" may be used in container specification.
#
#-----------------------------------------------------------------------------

#set PKA container[600]="\\.\A:"
#set PKA media_type[600]="RX23"

#=============================================================================
#
# Uncomment to enable emulation of DEC-KGPSA-CA PCI FC Adapter.
#
#-----------------------------------------------------------------------------

#load KGPSA FGA

#=============================================================================
#
# Uncomment to connect the emulator's $1$DGA0 to the disk image.
#
#-----------------------------------------------------------------------------

#set FGA container[0] = "<file-name>.vdisk"

#=============================================================================
#
# Uncomment to connect the emulator's $1$DGA100 to a host disk drive.
#
#-----------------------------------------------------------------------------

#set FGA container[100] = "\\.\PhysicalDrive<N>"

#=============================================================================
#
# Uncomment to enable emulation of secondary DEC-KGPSA-CA PCI FC Adapter.
#
#-----------------------------------------------------------------------------

#load KGPSA FGB

#=============================================================================
#
# Uncomment to enable PCI Pass Through access to physical EMULEX LP FC HBA,
# use two adapters to provide multipath with failover.
#
#-----------------------------------------------------------------------------

#set FGA host_bus_location = "PCI bus X, device Y, function Z"
#set FGB host_bus_location = "PCI bus A, device B, function C"

# this is the end of the configuration file ##################################
```

HP AlphaServer DS20 configuration file

```
#
# Copyright (C) 1999-2019 STROMASYS
# All rights reserved.
#
# The software contained on this media is proprietary to and embodies
# the confidential technology of STROMASYS. Possession, use, duplication,
# or dissemination of the software and media is authorized only pursuant
# to a valid written license from STROMASYS.
#
#=============================================================================
#
# Sample configuration file for AlphaServer DS20 machines.
#
#-----------------------------------------------------------------------------

set session hw_model = AlphaServer_DS20

#=============================================================================
#
# Choose a name for the instance, if needed, to differentiate it among other
# instances running on the same host.
#
#-----------------------------------------------------------------------------

include configuration_name.icfg

#=============================================================================
#
# Use the following commands to disable the rotating LOG files and enable
# a single LOG file. Select either append or overwrite (for each time the
# instance starts) and specify desired log path and file name.
#
#-----------------------------------------------------------------------------

set session log_method = append
#set session log_method = overwrite
#set session log = AlphaServer_DS20.log

#=============================================================================
#
# Overrides system assigned process's CPU affinity. The session changes
# the process's CPU affinity to the one specified.
#
#-----------------------------------------------------------------------------

#set session affinity="0, 1, 2, 3"

#=============================================================================
#
# The 'n_of_io_cpus' option overrides number of host CPU cores reserved for
# I/O processing. If omitted the session reserves 33% of available host CPU
# cores for I/O processing. Note that total amount of available host CPU
# cores is determined based on process's CPU affinity.
#
#-----------------------------------------------------------------------------

#set session n_of_io_cpus=1
#set session n_of_io_cpus=2
#set session n_of_io_cpus=...

#=============================================================================
#
# AlphaServer DS20 6/500
#
#-----------------------------------------------------------------------------

#set ace cpu_architecture = EV6
```

```
#set rom dsrdb[0] = 1920 system_name = "AlphaServer DS20 6/500"

#============================================================================
#
# AlphaServer DS20E 67/667
#
#----------------------------------------------------------------------------

set ace cpu_architecture = EV67
set rom dsrdb[0] = 1940 system_name = "AlphaServer DS20E 67/667"

#============================================================================
#
# The 'n_of_cpus' option reduces number of emulated Alpha CPUs in the
# configuration.
#
#----------------------------------------------------------------------------

#set session n_of_cpus=1

#============================================================================
#
# Override default System Serial Number.
#
#----------------------------------------------------------------------------

#set rom system_serial_number = SN01234567

#============================================================================
#
# Specify size of RAM from 256MB up to 32768MB (32GB) in 256MB extents.
#
#----------------------------------------------------------------------------

#set ram size=256
#set ram size=512
#set ram size=1024
#set ram size=4096
#set ram size=32768

#============================================================================
#
# Uncomment to allow the virtual SRM console environment be preserved across
# emulator restarts.
#
#----------------------------------------------------------------------------

#set rom container="AlphaServer_DS20.bin"

#============================================================================
#
# Uncomment to allow saving CMOS NVRAM content, so that to preserve
# Time & Date information.
#
#----------------------------------------------------------------------------

#set toy container="AlphaServer_DS20.dat"

#============================================================================
#
# Select the connection method for the console serial line OPA0.
#
#----------------------------------------------------------------------------

#set COM1 alias = OPA0 line = "COM1:"
#set COM1 alias = OPA0 port = 10003
#set COM1 alias = OPA0 port = 10003 application = "opa0.ht"
set COM1 alias = OPA0 port = 10003 application = "putty -load OPA0 -P 10003"
#set COM1 alias = OPA0 port = 10003 application = "c:\kea\user\opa0.ktc"

# ... fallback to legacy mode ...
#load physical_serial_line OPA0 line="COM1:"
```

```
#load virtual_serial_line OPA0 port=10003
#load virtual_serial_line OPA0 port=10003 application="opa0.ht"
#load virtual_serial_line OPA0 port=10003 application="putty -load OPA0"
#load virtual_serial_line OPA0 port=10003 application="c:\kea\user\opa0.ktc"

#----------------------------------------------------------------------------
#
# Uncomment to allow 'F6' to terminate the running emulator. Closing console
# satellite application may also be used for that.
#
#----------------------------------------------------------------------------

#set OPA0 stop_on = "F6"
#set OPA0 stop_on = "Application"
#set OPA0 stop_on = "F6, Application"

#============================================================================
#
# Select connection for the serial line TTA0.
#
#----------------------------------------------------------------------------

#set COM2 alias = TTA0 line = "COM2:"
#set COM2 alias = TTA0 port = 10000
#set COM2 alias = TTA0 port = 10000 application = "tta0.ht"
#set COM2 alias = TTA0 port = 10000 application = "putty -load TTA0 -P 10000"
#set COM2 alias = TTA0 port = 10000 application = "c:\kea\user\tta0.ktc"

#============================================================================
#
# Improve granularity of emulated AXP timer.
#
#----------------------------------------------------------------------------

#set isa clock_period = 1000

#============================================================================
#
# Uncomment to connect the emulator's DQA0 to host's ATAPI CD/DVD-ROM drive.
#
#----------------------------------------------------------------------------

#set ide container="\\.\CdRom0"

#============================================================================
#
# Load optional DE500BA PCI Ethernet Adapter (EWA).
#
#----------------------------------------------------------------------------

#load DE500BA EWA interface = EWA0
#load packet_port EWA0 interface = "(disabled)"

#============================================================================
#
# Attach the EWA to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWA0 interface = "connection:<connection-name>"

#============================================================================
#
# Load another optional DE500BA PCI Ethernet Adapter (EWB).
#
#----------------------------------------------------------------------------

#load DE500BA EWB interface = EWB0
#load packet_port EWB0 interface = "(disabled)"

#============================================================================
#
```

```
# Attach the EWB to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWB0 interface = "connection:<connection-name>"

#============================================================================
#
# Load another optional DE500BA PCI Ethernet Adapter (EWC).
#
#----------------------------------------------------------------------------

#load DE500BA EWC interface = EWC0
#load packet_port EWC0 interface = "(disabled)"

#============================================================================
#
# Attach the EWC to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWC0 interface = "connection:<connection-name>"

#============================================================================
#
# The AlphaServer DS20 contains two built-in PCI SCSI adapters called PKA and
# PKB within the configuration file.
#
#----------------------------------------------------------------------------
#
# Uncomment to connect the emulator's DKA0 to the disk image.
#
#----------------------------------------------------------------------------

#set PKA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's DKA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set PKA container[100] = "\\.\PhysicalDrive0"
#set PKA container[100] = "\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA300 to the host's CD/DVD-ROM drive.
#
#----------------------------------------------------------------------------

#set PKA container[300] = "\\.\CdRom0"
#set PKA container[300] = "\\.\CdRom<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA400 to an .ISO file (CD/DVD image).
#
#----------------------------------------------------------------------------

#set PKA container[400] = "<file-name>.iso"

#============================================================================
#
# Uncomment to connect the emulator's MKA500 to the host's SCSI tape drive.
#
#----------------------------------------------------------------------------

#set PKA container[500] = "\\.\Tape0"
#set PKA container[500] = "\\.\Tape<N>"

#============================================================================
#
# Uncomment to connect the emulator's MKA600 to a .VTAPE file (tape image).
#
#---------------------------------------------------------------------------

#set PKA container[600] = "<file-name>.vtape"

#===========================================================================
#
# Uncomment to connect the emulator's DKA600 to host's 3.5" FDD. Uncomment
# the next line for the FDD to appear as DEC RX23 (otherwise it appears as
# DEC RX26).
#
# Either "A:" or "B:" may be used in container specification.
#
#---------------------------------------------------------------------------

#set PKA container[600] = "\\.\A:"
#set PKA media_type[600] = "RX23"

#===========================================================================
#
# Uncomment to connect the emulator's DKB0 to the disk image.
#
#---------------------------------------------------------------------------

#set PKB container[0] = "<file-name>.vdisk"

#===========================================================================
#
# Uncomment to connect the emulator's DKB100 to a host disk drive.
#
#---------------------------------------------------------------------------

#set PKB container[100] = "\\.\PhysicalDrive0"
#set PKB container[100] = "\\.\PhysicalDrive<N>"

#===========================================================================
#
# Uncomment to connect the emulator's DKB300 to the host's CD/DVD-ROM drive.
#
#---------------------------------------------------------------------------

#set PKB container[300] = "\\.\CdRom0"
#set PKB container[300] = "\\.\CdRom<N>"

#===========================================================================
#
# Uncomment to connect the emulator's DKB400 to an .ISO file (CD/DVD image).
#
#---------------------------------------------------------------------------

#set PKB container[400] = "<file-name>.iso"

#===========================================================================
#
# Uncomment to connect the emulator's MKB500 to the host's SCSI tape drive.
#
#---------------------------------------------------------------------------

#set PKB container[500] = "\\.\Tape0"
#set PKB container[500] = "\\.\Tape<N>"

#===========================================================================
#
# Uncomment to connect the emulator's MKB600 to a .VTAPE file (tape image).
#
#---------------------------------------------------------------------------

#set PKB container[600] = "<file-name>.vtape"

#===========================================================================
#
# Uncomment to connect the emulator's DKB600 to host's 3.5" FDD. Uncomment
# the next line for the FDD to appear as DEC RX23 (otherwise it appears as
# DEC RX26).
#
# Either "A:" or "B:" may be used in container specification.
#
#----------------------------------------------------------------------------

#set PKB container[600] = "\\.\A:"
#set PKB media_type[600] = "RX23"

#============================================================================
#
# Uncomment to enable emulation of DEC-KGPSA-CA PCI FC Adapter.
#
#----------------------------------------------------------------------------

#load KGPSA FGA

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA0 to the disk image.
#
#----------------------------------------------------------------------------

#set FGA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set FGA container[100] = "\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to enable emulation of secondary DEC-KGPSA-CA PCI FC Adapter.
#
#----------------------------------------------------------------------------

#load KGPSA FGB

#============================================================================
#
# Uncomment to enable PCI Pass Through access to physical EMULEX LP FC HBA,
# use two adapters to provide multipath with failover.
#
#----------------------------------------------------------------------------

#set FGA host_bus_location = "PCI bus X, device Y, function Z"
#set FGB host_bus_location = "PCI bus A, device B, function C"

# this is the end of the configuration file #################################
```

HP AlphaServer ES40 configuration file

```
#
# Copyright (C) 1999-2019 STROMASYS
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#
# The software contained on this media is proprietary to and embodies
# the confidential technology of STROMASYS. Possession, use, duplication,
# or dissemination of the software and media is authorized only pursuant
# to a valid written license from STROMASYS.
#
#============================================================================
#
# Sample configuration file for AlphaServer ES40 machines.
#
#----------------------------------------------------------------------------

set session hw_model = AlphaServer_ES40

#============================================================================
#
# Choose a name for the instance, if needed, to differentiate it among other
# instances running on the same host.
#
#----------------------------------------------------------------------------

include configuration_name.icfg

#============================================================================
#
# Use the following commands to disable the rotating LOG files and enable
# a single LOG file. Select either append or overwrite (for each time the
# instance starts) and specify desired log path and file name.
#
#----------------------------------------------------------------------------

set session log_method = append
#set session log_method = overwrite
#set session log = AlphaServer_ES40.log

#============================================================================
#
# Overrides system assigned process's CPU affinity. The session changes
# the process's CPU affinity to the one specified.
#
#----------------------------------------------------------------------------

#set session affinity="0, 1, 2, 3"

#============================================================================
#
# The 'n_of_io_cpus' option overrides number of host CPU cores reserved for
# I/O processing. If omitted the session reserves 33% of available host CPU
# cores for I/O processing. Note that total amount of available host CPU
# cores is determined based on process's CPU affinity.
#
#----------------------------------------------------------------------------

#set session n_of_io_cpus=1
#set session n_of_io_cpus=2
#set session n_of_io_cpus=...

#============================================================================
#
# AlphaServer ES40 6/500
#
#----------------------------------------------------------------------------

#set ace cpu_architecture = EV6
```

```
#set rom dsrdb[0] = 1816 system_name = "AlphaServer ES40 6/500"
#set rom version[1] = 1.98-4 version[2] = 1.92-5

#============================================================================
#
# AlphaServer ES40 6/667
#
#----------------------------------------------------------------------------

set ace cpu_architecture = EV67
set rom dsrdb[0] = 1820 system_name = "AlphaServer ES40 6/667"

#============================================================================
#
# The 'n_of_cpus' option reduces number of emulated Alpha CPUs in the
# configuration.
#
#----------------------------------------------------------------------------

#set session n_of_cpus=1
#set session n_of_cpus=2
#set session n_of_cpus=3

#============================================================================
#
# Override default System Serial Number.
#
#----------------------------------------------------------------------------

#set rom system_serial_number = SN01234567

#============================================================================
#
# Specify size of RAM from 256MB up to 32768MB (32GB) in 256MB extents.
#
#----------------------------------------------------------------------------

#set ram size=256
#set ram size=512
#set ram size=1024
#set ram size=4096
#set ram size=32768

#============================================================================
#
# Uncomment to allow the SRM console environment be preserved across
# emulator restarts.
#
#----------------------------------------------------------------------------

#set rom container="clipper.bin"

#============================================================================
#
# Uncomment to allow saving CMOS NVRAM content, so that to preserve
# Time & Date information.
#
#----------------------------------------------------------------------------

#set toy container="clipper.dat"

#============================================================================
#
# Select the connection method for the console serial line OPA0.
#
#----------------------------------------------------------------------------

#set COM1 alias = OPA0 line = "COM1:"
#set COM1 alias = OPA0 port = 10003
#set COM1 alias = OPA0 port = 10003 application = "opa0.ht"
set COM1 alias = OPA0 port = 10003 application = "putty -load OPA0 -P 10003"
#set COM1 alias = OPA0 port = 10003 application = "c:\kea\user\opa0.ktc"
```

```
# ... fallback to legacy mode ...
#load physical_serial_line OPA0 line="COM1:"
#load virtual_serial_line OPA0 port=10003
#load virtual_serial_line OPA0 port=10003 application="opa0.ht"
#load virtual_serial_line OPA0 port=10003 application="putty -load OPA0"
#load virtual_serial_line OPA0 port=10003 application="c:\kea\user\opa0.ktc"

#-----------------------------------------------------------------------------
#
# Uncomment to allow 'F6' to terminate the running emulator. Closing console
# satellite application may also be used for that.
#
#-----------------------------------------------------------------------------

#set OPA0 stop_on = "F6"
#set OPA0 stop_on = "Application"
#set OPA0 stop_on = "F6, Application"

#=============================================================================
#
# Select connection for the serial line TTA0.
#
#-----------------------------------------------------------------------------

#set COM2 alias = TTA0 line = "COM2:"
#set COM2 alias = TTA0 port = 10000
#set COM2 alias = TTA0 port = 10000 application = "tta0.ht"
#set COM2 alias = TTA0 port = 10000 application = "putty -load TTA0 -P 10000"
#set COM2 alias = TTA0 port = 10000 application = "c:\kea\user\tta0.ktc"

#=============================================================================
#
# Improve granularity of emulated AXP timer.
#
#-----------------------------------------------------------------------------

#set isa clock_period = 1000

#=============================================================================
#
# Uncomment to connect the emulator's DQA0 to host's ATAPI CD/DVD-ROM drive.
#
#-----------------------------------------------------------------------------

#set ide container="\\.\CdRom0"

#=============================================================================
#
# Load optional DE500BA PCI Ethernet Adapter (EWA).
#
#-----------------------------------------------------------------------------

#load DE500BA EWA interface = EWA0
#load packet_port EWA0 interface = "(disabled)"

#=============================================================================
#
# Attach the EWA to the host's NIC.
#
#-----------------------------------------------------------------------------

#set EWA0 interface = "connection:<connection-name>"

#=============================================================================
#
# Load another optional DE500BA PCI Ethernet Adapter (EWB).
#
#-----------------------------------------------------------------------------

#load DE500BA EWB interface = EWB0
#load packet_port EWB0 interface = "(disabled)"
```

```
#============================================================================
#
# Attach the EWB to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWB0 interface = "connection:<connection-name>"

#============================================================================
#
# Load another optional DE500BA PCI Ethernet Adapter (EWC).
#
#----------------------------------------------------------------------------

#load DE500BA EWC interface = EWC0
#load packet_port EWC0 interface = "(disabled)"

#============================================================================
#
# Attach the EWC to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWC0 interface = "connection:<connection-name>"

#============================================================================
#
# Uncomment to enable emulation of DEC-KZPBA SCSI controller.
#
#----------------------------------------------------------------------------

#load KZPBA PKA scsi_id = 7

#============================================================================
#
# Uncomment to connect the emulator's DKA0 to the disk image.
#
#----------------------------------------------------------------------------

#set PKA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's DKA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set PKA container[100]="\\.\PhysicalDrive0"
#set PKA container[100]="\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA300 to the host's CD/DVD-ROM drive.
#
#----------------------------------------------------------------------------

#set PKA container[300]="\\.\CdRom0"
#set PKA container[300]="\\.\CdRom<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA400 to an .ISO file (CD/DVD image).
#
#----------------------------------------------------------------------------

#set PKA container[400] = "<file-name>.iso"

#============================================================================
#
# Uncomment to connect the emulator's MKA500 to the host's SCSI tape drive.
#
```

```
#----------------------------------------------------------------------------

#set PKA container[500]="\\.\Tape0"
#set PKA container[500]="\\.\Tape<N>"

#============================================================================
#
# Uncomment to connect the emulator's MKA600 to a .VTAPE file (tape image).
#
#----------------------------------------------------------------------------

#set PKA container[600] = "<file-name>.vtape"

#============================================================================
#
# Uncomment to connect the emulator's DKA600 to host's 3.5" FDD. Uncomment
# the next line for the FDD to appear as DEC RX23 (otherwise it appears as
# DEC RX26).
#
# Either "A:" or "B:" may be used in container specification.
#
#----------------------------------------------------------------------------

#set PKA container[600]="\\.\A:"
#set PKA media_type[600]="RX23"

#============================================================================
#
# Uncomment to enable emulation of DEC-KGPSA-CA PCI FC Adapter.
#
#----------------------------------------------------------------------------

#load KGPSA FGA

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA0 to the disk image.
#
#----------------------------------------------------------------------------

#set FGA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set FGA container[100] = "\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to enable emulation of secondary DEC-KGPSA-CA PCI FC Adapter.
#
#----------------------------------------------------------------------------

#load KGPSA FGB

#============================================================================
#
# Uncomment to enable PCI Pass Through access to physical EMULEX LP FC HBA,
# use two adapters to provide multipath with failover.
#
#----------------------------------------------------------------------------

#set FGA host_bus_location = "PCI bus X, device Y, function Z"
#set FGB host_bus_location = "PCI bus A, device B, function C"

# this is the end of the configuration file #################################
```

HP AlphaServer GS80 configuration file

```
#
# Copyright (C) 1999-2019 STROMASYS
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#
# The software contained on this media is proprietary to and embodies
# the confidential technology of STROMASYS. Possession, use, duplication,
# or dissemination of the software and media is authorized only pursuant
# to a valid written license from STROMASYS.
#
#===========================================================================
#
# Sample configuration file for AlphaServer GS80 machines.
#
#---------------------------------------------------------------------------

set session hw_model = AlphaServer_GS80

#===========================================================================
#
# Choose a name for the instance, if needed, to differentiate it among other
# instances running on the same host.
#
#---------------------------------------------------------------------------

include configuration_name.icfg

#===========================================================================
#
# Use the following commands to disable the rotating LOG files and enable
# a single LOG file. Select either append or overwrite (for each time the
# instance starts) and specify desired log path and file name.
#
#---------------------------------------------------------------------------

set session log_method = append
#set session log_method = overwrite
#set session log = AlphaServer_GS80.log

#===========================================================================
#
# Overrides system assigned process's CPU affinity. The session changes
# the process's CPU affinity to the one specified.
#
#---------------------------------------------------------------------------

#set session affinity="0, 1, 2, 3"

#===========================================================================
#
# The 'n_of_io_cpus' option overrides number of host CPU cores reserved for
# I/O processing. If omitted the session reserves 33% of available host CPU
# cores for I/O processing. Note that total amount of available host CPU
# cores is determined based on process's CPU affinity.
#
#---------------------------------------------------------------------------

#set session n_of_io_cpus=1
#set session n_of_io_cpus=2
#set session n_of_io_cpus=...

#===========================================================================
#
# AlphaServer GS80 67/728
#
#---------------------------------------------------------------------------

set ace cpu_architecture = EV67
set rom dsrdb[0] = 1967 system_name = "AlphaServer GS80 67/728"

#============================================================================
#
# "Turn" it into 8 CPU capable AlphaServer GS1280. Make sure to has even
# number of CPUs (2, 4, 6, ... 8). This is to reflect that fact that on real
# MARVELL platform CPUs are plugged in pairs (dual-cpu boards).
#
#----------------------------------------------------------------------------

#set ace cpu_architecture = EV67
#set rom system_name = "AlphaServer GS1280"
#set rom dsrdb[0] = 2038 dsrdb[4] = 3050 dsrdb[11] = 1300 dsrdb[12] = 1300

#============================================================================
#
# The 'n_of_cpus' option reduces number of emulated Alpha CPUs in the
# configuration.
#
#----------------------------------------------------------------------------

#set session n_of_cpus=1
#set session n_of_cpus=2
#set session n_of_cpus=...
#set session n_of_cpus=7

#============================================================================
#
# Override default System Serial Number.
#
#----------------------------------------------------------------------------

#set rom system_serial_number = SN01234567

#============================================================================
#
# Specify size of RAM from 256MB up to 65536MB (64GB) in 256MB extents.
#
#----------------------------------------------------------------------------

#set ram size=256
#set ram size=512
#set ram size=1024
#set ram size=4096
#set ram size=65536

#============================================================================
#
# Uncomment to allow the SRM console environment be preserved across
# emulator restarts.
#
#----------------------------------------------------------------------------

#set rom container="AlphaServer_GS80.bin"

#============================================================================
#
# Uncomment to allow saving CMOS NVRAM content, so that to preserve
# Time & Date information.
#
#----------------------------------------------------------------------------

#set toy container="AlphaServer_GS80.dat"

#============================================================================
#
# Select the connection method for the console serial line OPA0.
#
#----------------------------------------------------------------------------

#set COM1 alias = OPA0 line = "COM1:"
#set COM1 alias = OPA0 port = 10003
```

```
#set COM1 alias = OPA0 port = 10003 application = "opa0.ht"
set COM1 alias = OPA0 port = 10003 application = "putty -load OPA0 -P 10003"
#set COM1 alias = OPA0 port = 10003 application = "c:\kea\user\opa0.ktc"

# ... fallback to legacy mode ...
#load physical_serial_line OPA0 line="COM1:"
#load virtual_serial_line OPA0 port=10003
#load virtual_serial_line OPA0 port=10003 application="opa0.ht"
#load virtual_serial_line OPA0 port=10003 application="putty -load OPA0"
#load virtual_serial_line OPA0 port=10003 application="c:\kea\user\opa0.ktc"

#-----------------------------------------------------------------------------
#
# Uncomment to allow 'F6' to terminate the running emulator. Closing console
# satellite application may also be used for that.
#
#-----------------------------------------------------------------------------

#set OPA0 stop_on = "F6"
#set OPA0 stop_on = "Application"
#set OPA0 stop_on = "F6, Application"

#=============================================================================
#
# Select connection for the serial line TTA0.
#
#-----------------------------------------------------------------------------

#set COM2 alias = TTA0 line = "COM2:"
#set COM2 alias = TTA0 port = 10000
#set COM2 alias = TTA0 port = 10000 application = "tta0.ht"
#set COM2 alias = TTA0 port = 10000 application = "putty -load TTA0 -P 10000"
#set COM2 alias = TTA0 port = 10000 application = "c:\kea\user\tta0.ktc"

#=============================================================================
#
# Improve granularity of emulated AXP timer.
#
#-----------------------------------------------------------------------------

#set isa clock_period = 1000

#=============================================================================
#
# Uncomment to connect the emulator's DQA0 to host's ATAPI CD/DVD-ROM drive.
#
#-----------------------------------------------------------------------------

#set ide container="\\.\CdRom0"

#=============================================================================
#
# Load optional DE500BA PCI Ethernet Adapter (EWA).
#
#-----------------------------------------------------------------------------

#load DE500BA EWA interface = EWA0
#load packet_port EWA0 interface = "(disabled)"

#=============================================================================
#
# Attach the EWA to the host's NIC.
#
#-----------------------------------------------------------------------------

#set EWA0 interface = "connection:<connection-name>"

#=============================================================================
#
# Load another optional DE500BA PCI Ethernet Adapter (EWB).
#
#-----------------------------------------------------------------------------
```

```
#load DE500BA EWB interface = EWB0
#load packet_port EWB0 interface = "(disabled)"

#============================================================================
#
# Attach the EWB to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWB0 interface = "connection:<connection-name>"

#============================================================================
#
# Load another optional DE500BA PCI Ethernet Adapter (EWC).
#
#----------------------------------------------------------------------------

#load DE500BA EWC interface = EWC0
#load packet_port EWC0 interface = "(disabled)"

#============================================================================
#
# Attach the EWC to the host's NIC.
#
#----------------------------------------------------------------------------

#set EWC0 interface = "connection:<connection-name>"

#============================================================================
#
# The AlphaServer GS80 contains built-in PCI SCSI adapter, called PKA within
# the configuration file.
#
#----------------------------------------------------------------------------
#
# Uncomment to connect the emulator's DKA0 to the disk image.
#
#----------------------------------------------------------------------------

#set PKA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's DKA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set PKA container[100]="\\.\PhysicalDrive0"
#set PKA container[100]="\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA300 to the host's CD/DVD-ROM drive.
#
#----------------------------------------------------------------------------

#set PKA container[300]="\\.\CdRom0"
#set PKA container[300]="\\.\CdRom<N>"

#============================================================================
#
# Uncomment to connect the emulator's DKA400 to an .ISO file (CD/DVD image).
#
#----------------------------------------------------------------------------

#set PKA container[400] = "<file-name>.iso"

#============================================================================
#
# Uncomment to connect the emulator's MKA500 to the host's SCSI tape drive.
#
```

```
#----------------------------------------------------------------------------

#set PKA container[500]="\\.\Tape0"
#set PKA container[500]="\\.\Tape<N>"

#============================================================================
#
# Uncomment to connect the emulator's MKA600 to a .VTAPE file (tape image).
#
#----------------------------------------------------------------------------

#set PKA container[600] = "<file-name>.vtape"

#============================================================================
#
# Uncomment to connect the emulator's DKA600 to host's 3.5" FDD. Uncomment
# the next line for the FDD to appear as DEC RX23 (otherwise it appears as
# DEC RX26).
#
# Either "A:" or "B:" may be used in container specification.
#
#----------------------------------------------------------------------------

#set PKA container[600]="\\.\A:"
#set PKA media_type[600]="RX23"

#============================================================================
#
# Uncomment to enable emulation of DEC-KGPSA-CA PCI FC Adapter.
#
#----------------------------------------------------------------------------

#load KGPSA FGA

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA0 to the disk image.
#
#----------------------------------------------------------------------------

#set FGA container[0] = "<file-name>.vdisk"

#============================================================================
#
# Uncomment to connect the emulator's $1$DGA100 to a host disk drive.
#
#----------------------------------------------------------------------------

#set FGA container[100] = "\\.\PhysicalDrive<N>"

#============================================================================
#
# Uncomment to enable emulation of secondary DEC-KGPSA-CA PCI FC Adapter.
#
#----------------------------------------------------------------------------

#load KGPSA FGB

#============================================================================
#
# Uncomment to enable PCI Pass Through access to physical EMULEX LP FC HBA,
# use two adapters to provide multipath with failover.
#
#----------------------------------------------------------------------------

#set FGA host_bus_location = "PCI bus X, device Y, function Z"
#set FGB host_bus_location = "PCI bus A, device B, function C"

# this is the end of the configuration file #################################
```

"configuration_name.icfg" configuration file

```
#
# Copyright (C) 1999-2019 STROMASYS
# All rights reserved.
#
# The software contained on this media is proprietary to and embodies
# the confidential technology of STROMASYS. Possession, use, duplication,
# or dissemination of the software and media is authorized only pursuant
# to a valid written license from STROMASYS.
#
#============================================================================

#set session configuration_name = My_Virtual_Machine

# this is the end of the configuration file ##################################
```

CHARON-AXP for Windows deinstallation

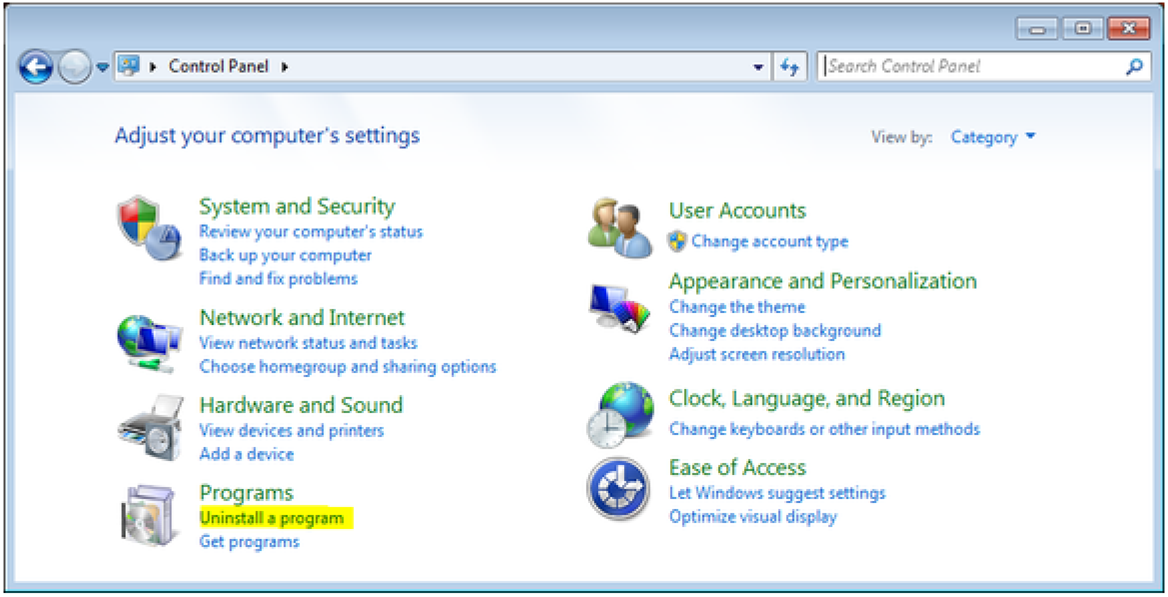
Deinstallation procedure

Perform a clean shutdown of the running guests, open the CHARON Virtual Machines Manager, stop all running CHARON-AXP Virtual Machines (VM) and remove them.

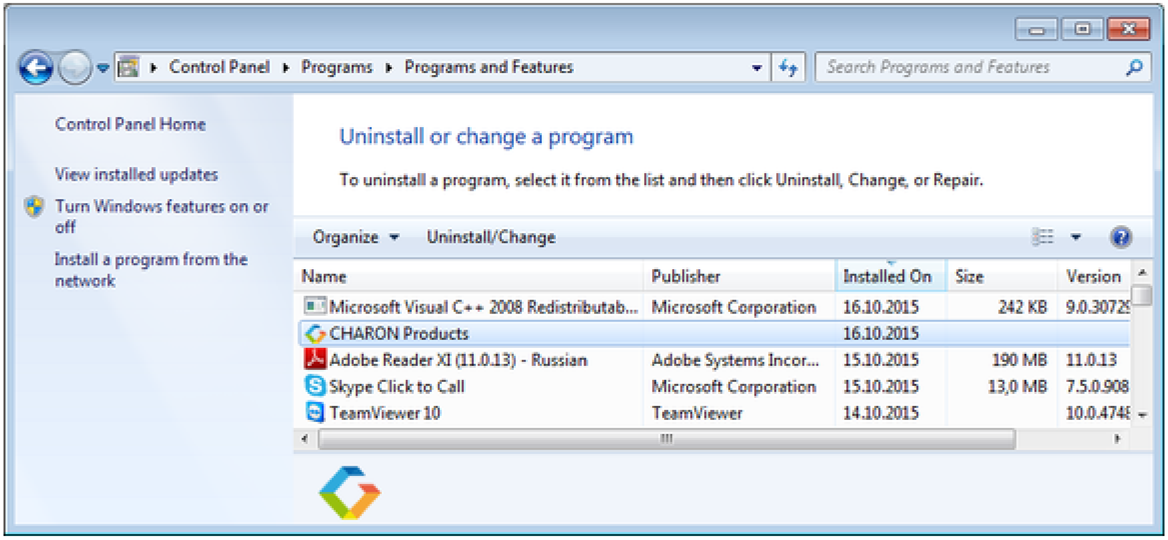
In case of a complete deinstallation:

- Remove all the CHARON Virtual Machines.
- Using the "Network Control Center" utility that can be opened from the "CHARON Virtual Machines Manager", release all the network interfaces back to the CHARON host.
- Remove any specific CHARON drivers installed manually (if any).

Open up the "Control Panel" and select "Uninstall a program":



In the list of applications, double click on "CHARON Products":

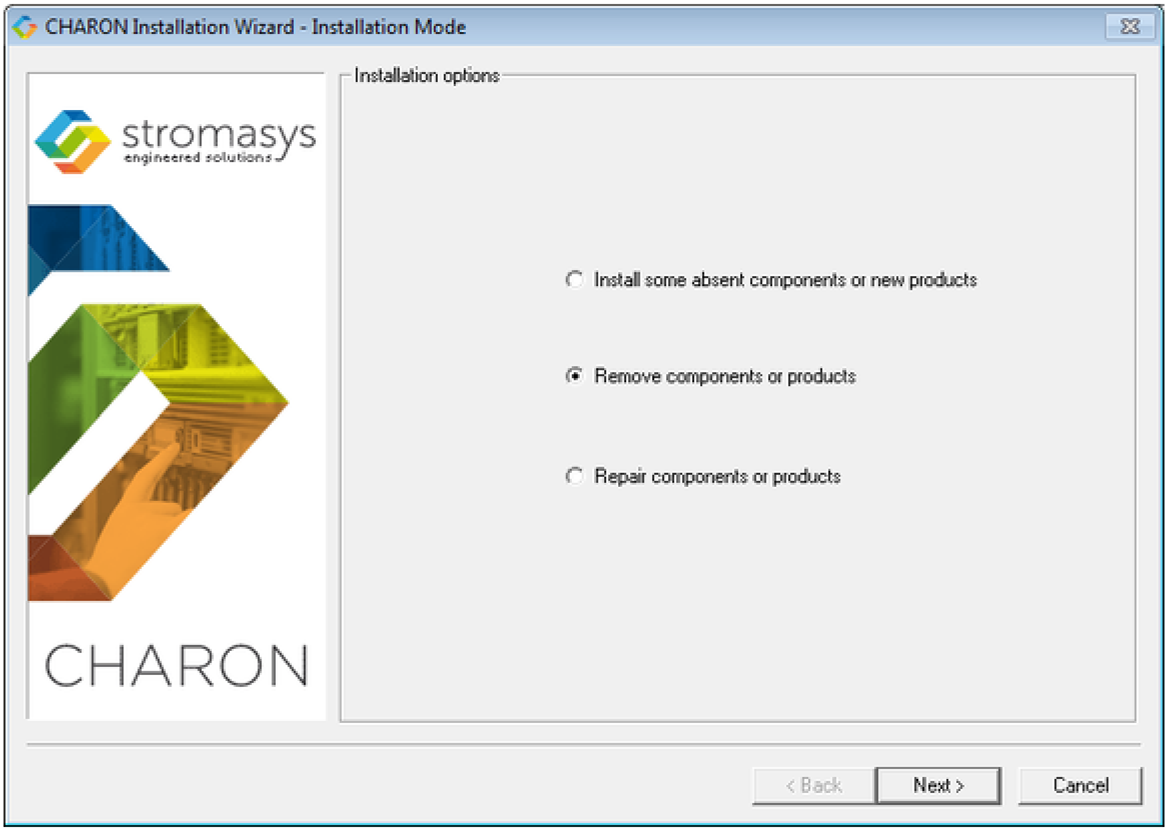


Uninstall or change a program

To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.

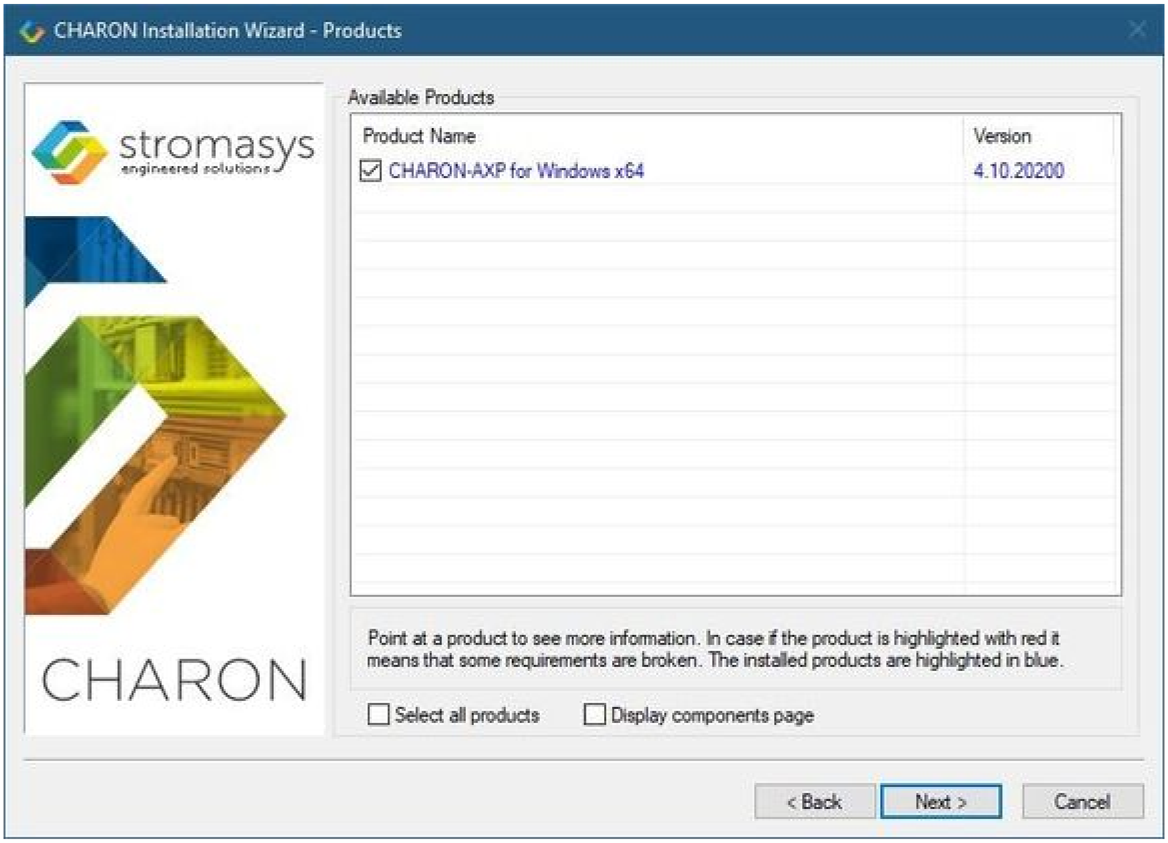
Name	Publisher	Installed On	Size	Version
Microsoft Visual C++ 2008 Redistributab...	Microsoft Corporation	16.10.2015	242 KB	9.0.3072
CHARON Products		16.10.2015		
Adobe Reader XI (11.0.13) - Russian	Adobe Systems Incor...	15.10.2015	190 MB	11.0.13
Skype Click to Call	Microsoft Corporation	15.10.2015	13,0 MB	7.5.0.908
TeamViewer 10	TeamViewer	14.10.2015		10.0.474

In the appearing CHARON installation dialog, select "Remove components or products" and press the "Next" button:


CHARON Installation Wizard - Installation Mode
stromasys
engineered solutions
CHARON
Installation options
○ Install some absent components or new products
● Remove components or products
○ Repair components or products
< Back
Next >
Cancel

In the following dialog, select the CHARON product to be removed (or changed). Check "Select all the products" for deinstallation (or changing) of all installed CHARON products. Do not select "Display components page" unless you need to remove just some components of the CHARON product.

Press the "Next" button:

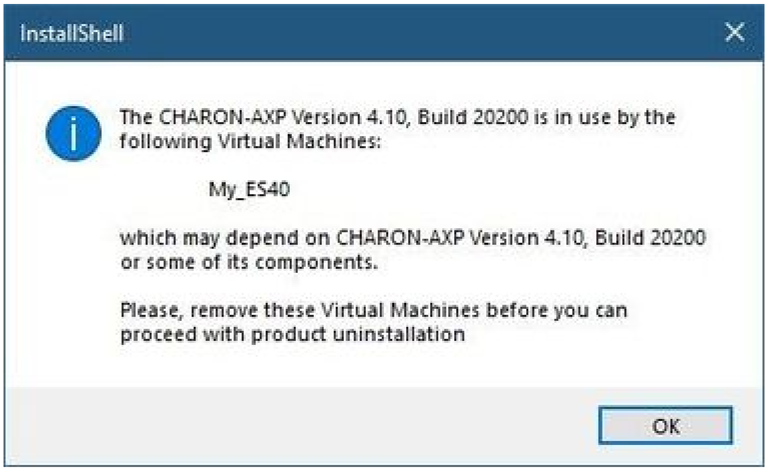


Product Name	Version
☑ CHARON-AXP for Windows x64	4.10.20200

Point at a product to see more information. In case if the product is highlighted with red it means that some requirements are broken. The installed products are highlighted in blue.

□ Select all products □ Display components page

If there are some CHARON Virtual Machines that use this particular version of CHARON the following error message will be displayed:



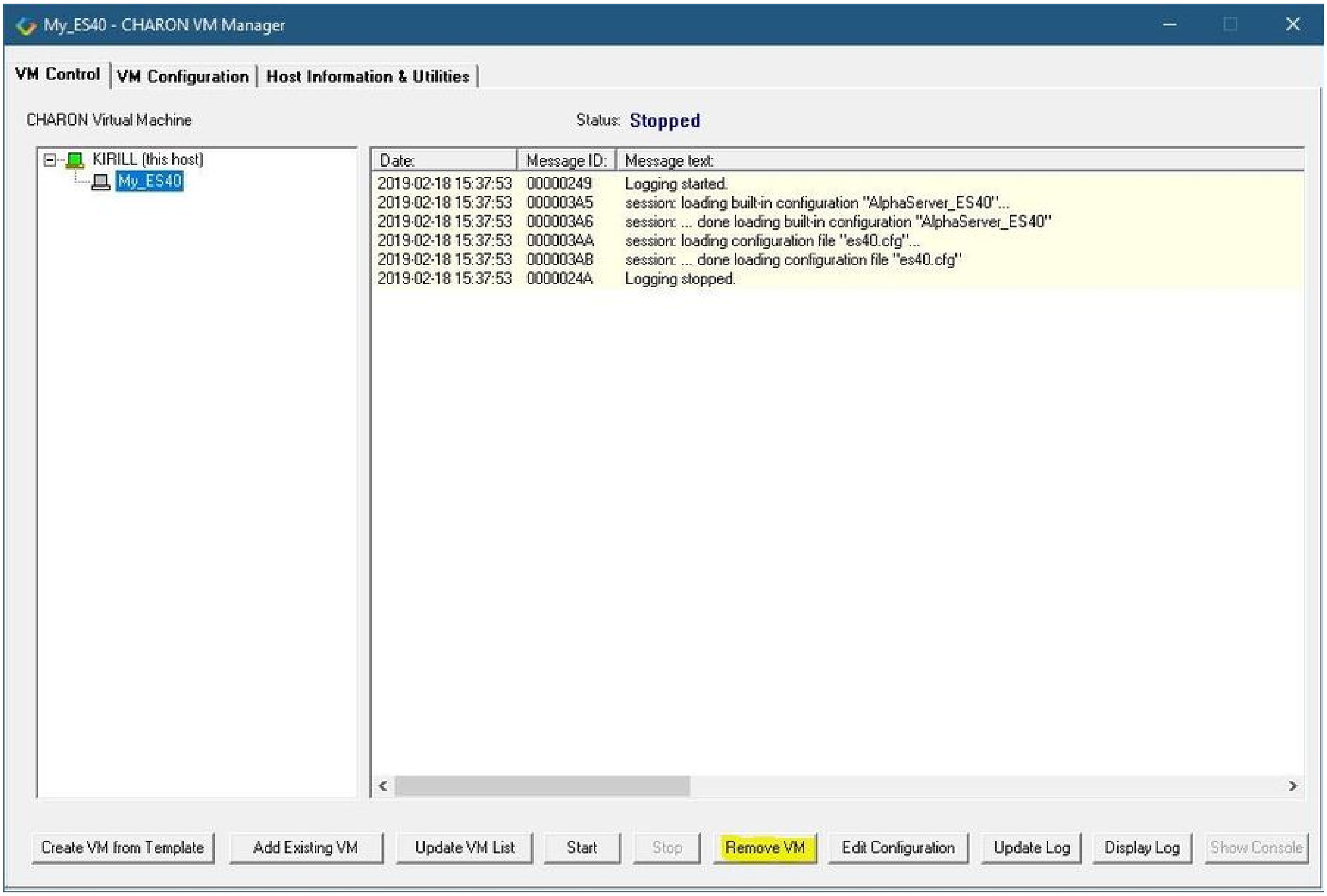
The CHARON-AXP Version 4.10, Build 20200 is in use by the following Virtual Machines:

My_ES40

which may depend on CHARON-AXP Version 4.10, Build 20200 or some of its components.

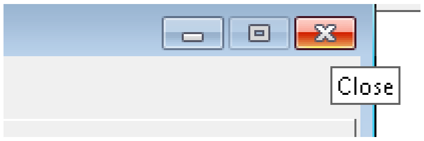
Please, remove these Virtual Machines before you can proceed with product uninstallation

In this case, open the "CHARON Virtual Machines Manager", select the CHARON Machine(s) listed above and either press the "Remove VM" button or open the VM configuration tab and set this virtual machine to use another Charon version if more than one version is installed:

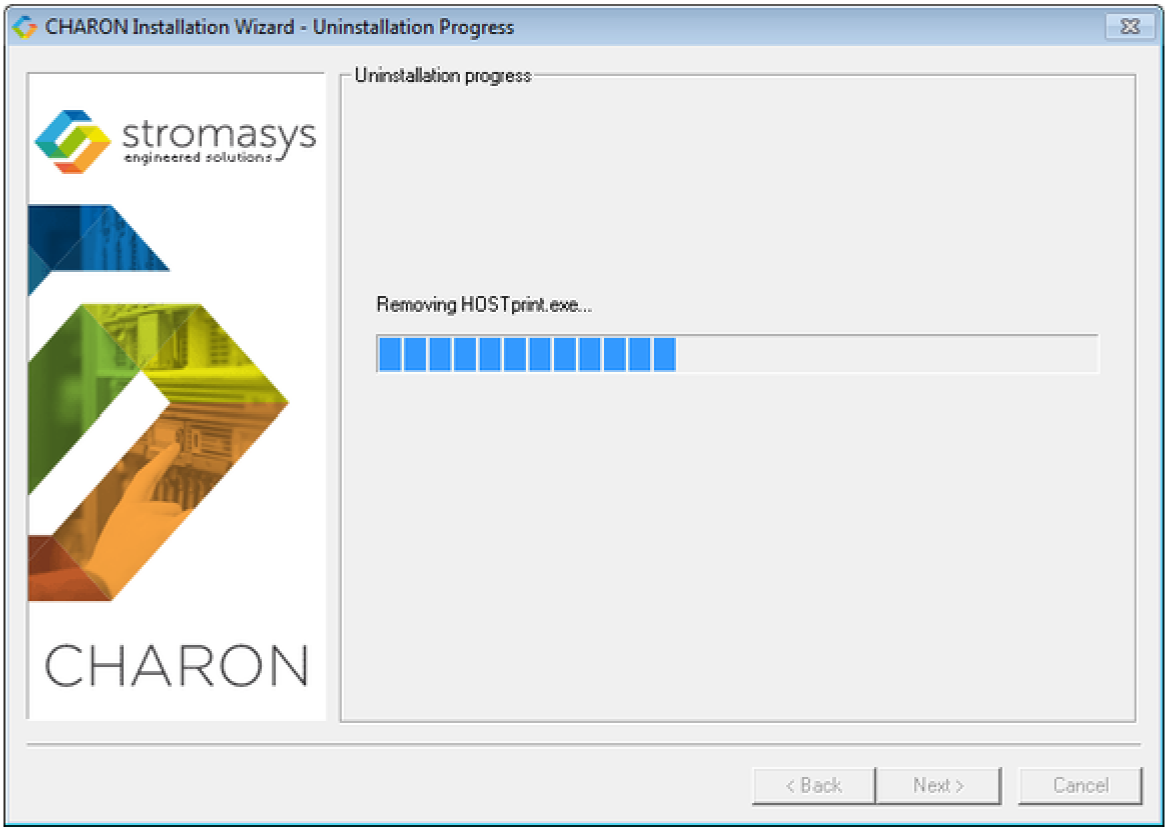


```
Date:                Message ID:  Message text:
2019-02-18 15:37:53  00000249     Logging started.
2019-02-18 15:37:53  000003A5     session: loading built-in configuration "AlphaServer_ES40"...
2019-02-18 15:37:53  000003A6     session: ... done loading built-in configuration "AlphaServer_ES40"
2019-02-18 15:37:53  000003AA     session: loading configuration file "es40.cfg"...
2019-02-18 15:37:53  000003AB     session: ... done loading configuration file "es40.cfg"
2019-02-18 15:37:53  0000024A     Logging stopped.
```

Close the "CHARON Virtual Machine Manager" with a click on the "x" button and confirm you want to exit:

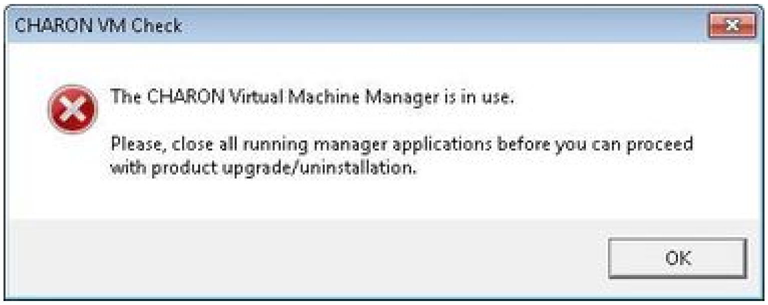


Press the "Next" button, the uninstallation process will begin:



Removing HOSTprint.exe...

If the "CHARON Virtual Machines Manager" is still running the following dialog will be displayed:

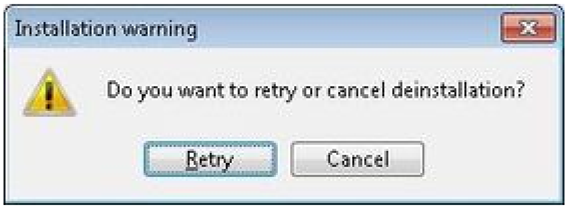


The CHARON Virtual Machine Manager is in use.

Please, close all running manager applications before you can proceed with product upgrade/uninstallation.

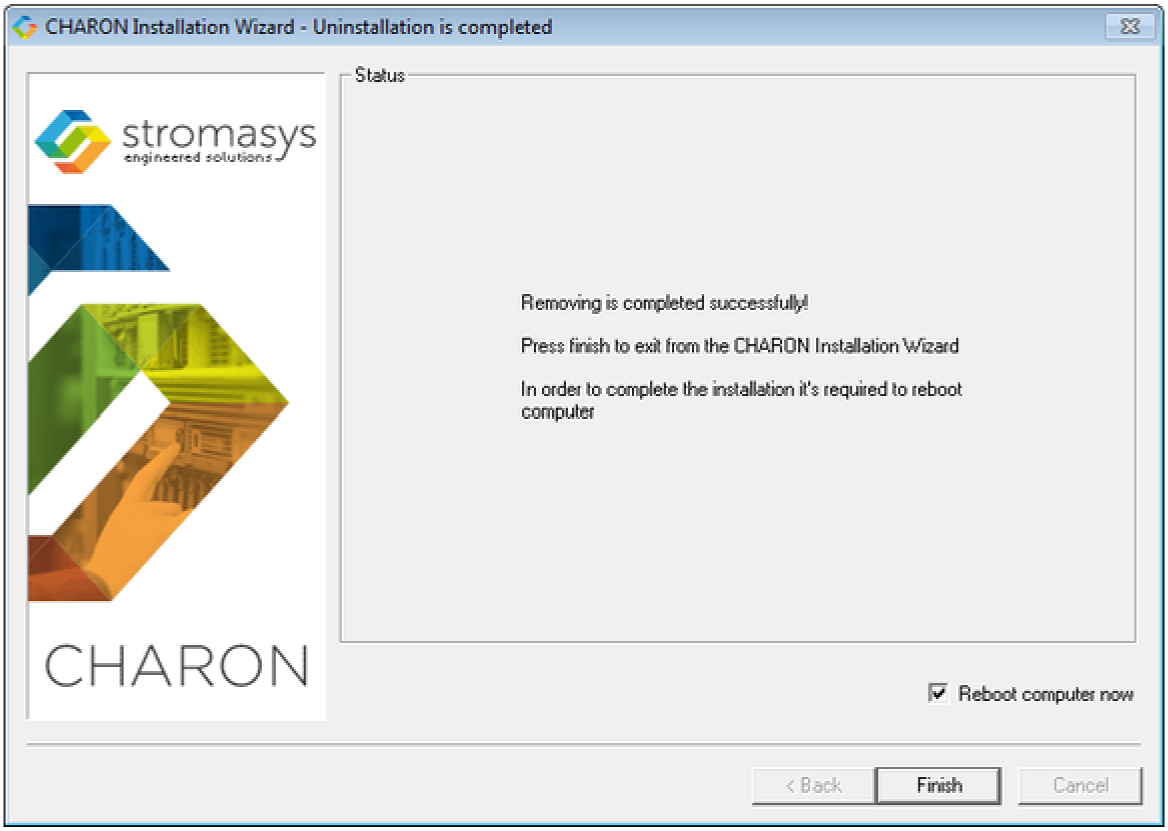
Do not close the uninstallation dialog but exit from "CHARON Virtual Machines Manager" the way described above.

Press the "OK" button then the "Retry" one in the appearing dialog:



Do you want to retry or cancel deinstallation?

Once uninstallation (or changing) is done, the following dialog will be displayed:



Removing is completed successfully!

Press finish to exit from the CHARON Installation Wizard

In order to complete the installation it's required to reboot computer

☑ Reboot computer now

Keep the "Reboot computer now" selected and press the "Finish" button to reboot the CHARON host.

Appendixes

Contents

Log monitoring - logmond best practice

Table of contents

Description

The Log Monitor & Dispatcher, known as LOGMOND, is a special program which monitors a guest LOG file produced by Charon and executes a customized script when it detects removal of a license.

It runs in the background (as a program or as a service) and periodically scans a specified LOG file. When it detects a message with the code 00000424 ("Detected removal of a license") or 0000002A or 00000351 for backward compatibility, it submits the `nolicense.bat` procedure (this BAT file must be created manually). It also invokes the `license_changed.bat` script, if it exists, when it detects a message with code 0000040B / "License has changed. License detected and online".

The Log Monitor & Dispatcher service is installed as `EmulatorLogMonitor`. By default it is installed in such a way that requires explicit actions to be started (either through a command line interface or using the standard ways of service management). For unattended execution, change the service’s configuration so that Windows starts the service automatically.

The tool requires a specific file "`nolicense.bat`", and optionally a file named "`license_changed.bat`", containing some specific instructions to be taken in situation of license absence or license change. These files must be created in the virtual machine's home directory.

⚠ The user action file will not invoke interactive applications as it may run in an environment where interactive services do not work, for example: when “Log Monitor & Dispatcher” is installed as a service.

Recommendations

- Create a specific folder to hold the Charon configuration and log files, the `nolicense.bat` file, the `license_changed.bat` if needed, and any specific action script you would add.
- Use the rotating log files mechanism or use a single log file with "append" mode.
- Install and start the Charon log monitor service, named "`EmulatorLogMonitor`": doing so you will not have to start `logmond` manually in interactive mode and newly added virtual machines services will be automatically taken into account. Use interactive mode for tests and debugging purpose.

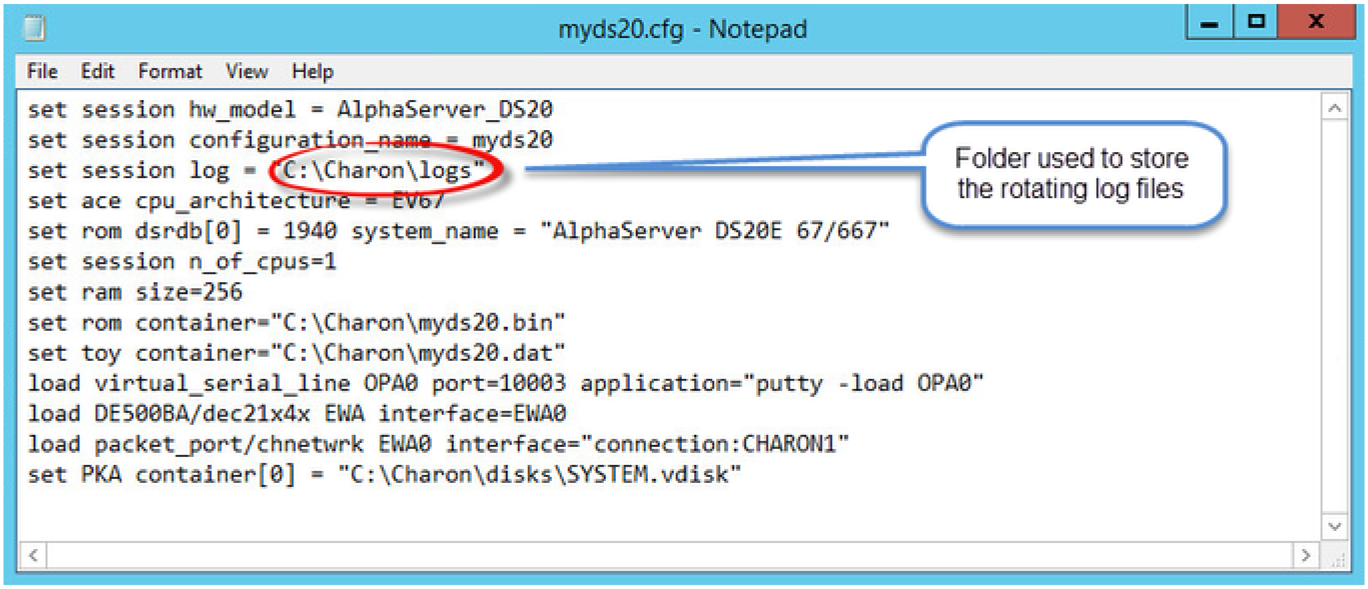
Notes

- The log monitor utility will detect the absence or change of the dongle only at a specified interval, called the license check interval and defined by the license. Its default is set to 1 hour. In case you need to perform tests, you can send us a fresh C2V file and ask for an update to reduce this interval.
- Once started the logmond utility will lock the virtual machine log file, you will not be able to move it, copy it or delete it. You will however be able to open it using the notepad utility or other log editors like `baretail` for example which will allow you to have a continuous view of the log with highlights (see: Charon Log files - Using baretail on Windows for syntax highlighting) or `vim` (see: Charon Log files - Using vim for syntax highlighting on Linux and Windows).

Service setup example

Example below is based on a Charon-AXP V4.9 B19402 running on a Windows 2012 R2 server and emulating an AlphaServer DS20. All files (configuration, bin, rom and `nolicense.bat`) are located in `C:\Charon`, rotating log files are located in `C:\Charon\logs`

The configuration file is defined as follows:



```
set session hw_model = AlphaServer_DS20
set session configuration_name = myds20
set session log = "C:\Charon\logs"
set ace cpu_architecture = EV67
set rom dsrdb[0] = 1940 system_name = "AlphaServer DS20E 67/667"
set session n_of_cpus=1
set ram size=256
set rom container="C:\Charon\myds20.bin"
set toy container="C:\Charon\myds20.dat"
load virtual_serial_line OPA0 port=10003 application="putty -load OPA0"
load DE500BA/dec21x4x EWA interface=EWA0
load packet_port/chnetwrk EWA0 interface="connection:CHARON1"
set PKA container[0] = "C:\Charon\disks\SYSTEM.vdisk"
```

Folder used to store the rotating log files

Setup and start your virtual machine.

- Start the "Charon Virtual Machines Manager"
- Create your virtual machine and start it

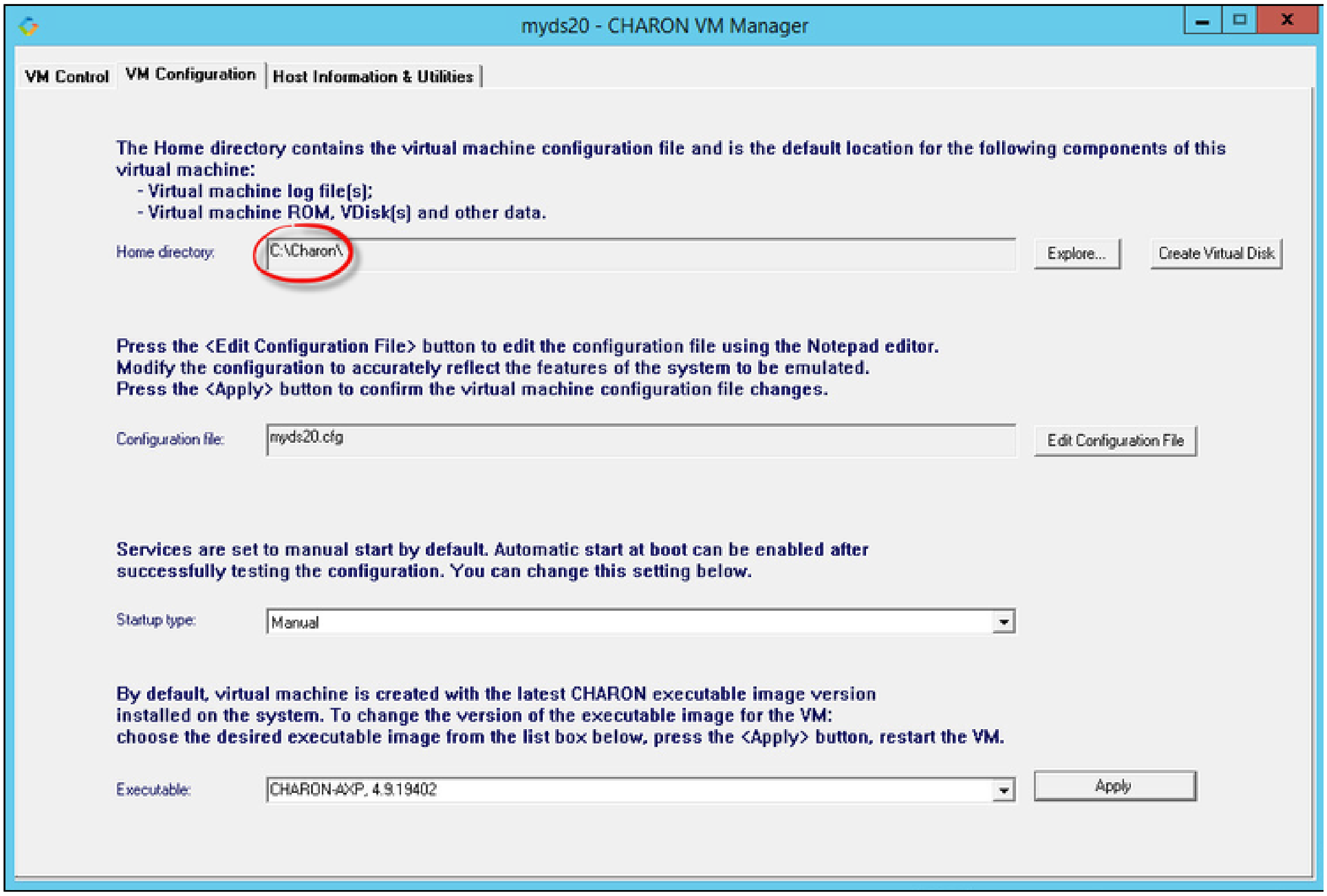
See Running and managing Charon-AXP for Windows or Running and managing Charon-VAX and Charon-PDP for Windows for details.

Install and start the log monitor service

- First, prepare a `nolicense.bat` file. See nolicense.bat considerations chapter further for more information if needed.

The `nolicense.bat` file has to be placed in the virtual machine "Home directory". To locate this "Home directory" open the "Charon Virtual Machines manager" utility, select the virtual machine and switch to the "VM Configuration" tab

Example:



The Home directory contains the virtual machine configuration file and is the default location for the following components of this virtual machine:
- Virtual machine log file(s);
- Virtual machine ROM, VDisk(s) and other data.

Home directory: C:\Charon\

Press the <Edit Configuration File> button to edit the configuration file using the Notepad editor.
Modify the configuration to accurately reflect the features of the system to be emulated.
Press the <Apply> button to confirm the virtual machine configuration file changes.

Configuration file: myds20.cfg

Services are set to manual start by default. Automatic start at boot can be enabled after successfully testing the configuration. You can change this setting below.

Startup type: Manual

By default, virtual machine is created with the latest CHARON executable image version installed on the system. To change the version of the executable image for the VM:
choose the desired executable image from the list box below, press the <Apply> button, restart the VM.

Executable: CHARON-AXP, 4.9.19402

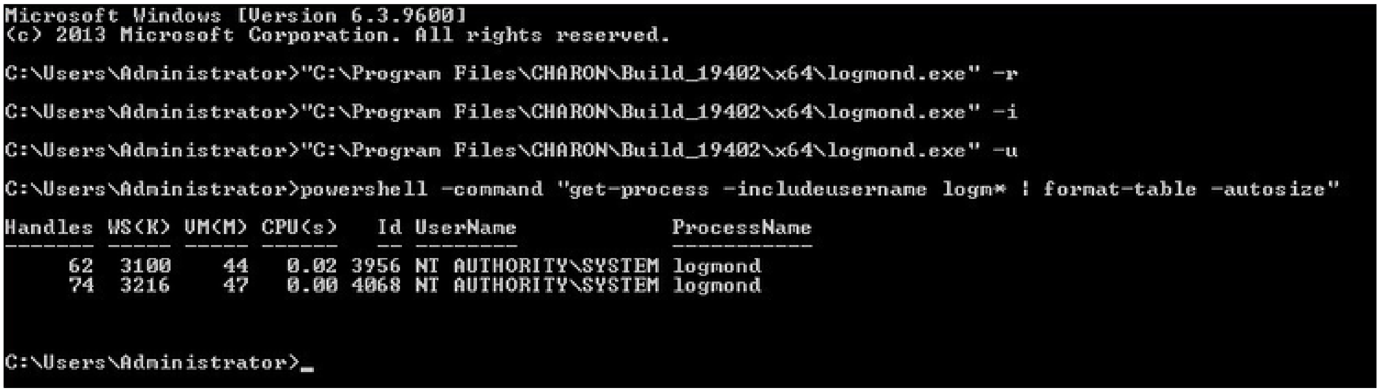
Use the notepad for example to create the `nolicense.bat` script. We will here add a line in a log file:

```
echo %date% %time% dongle removed >>C:\Charon\logmond.log
```

The `license_changed.bat` script can also contain quite the same line:

```
echo %date% %time% license has changed >>C:\Charon\logmond.log
```

- Install the log monitoring service and start it:
  ⚠ **These command lines must be executed as an administrator in order to manage the services**

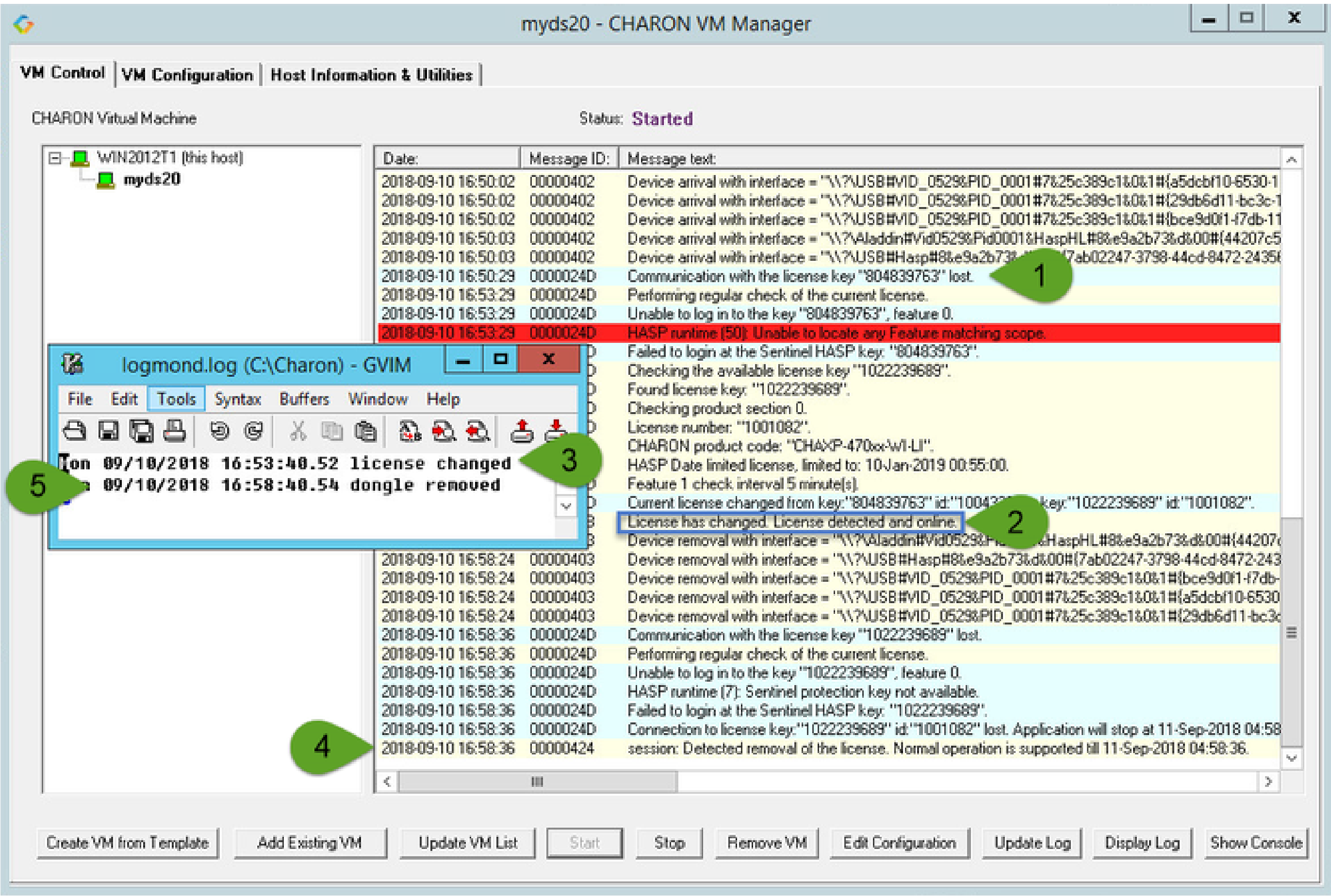


```
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>"C:\Program Files\CHARON\Build_19402\x64\logmond.exe" -r

C:\Users\Administrator>"C:\Program Files\CHARON\Build_19402\x64\logmond.exe" -i

C:\Users\Administrator>"C:\Program Files\CHARON\Build_19402\x64\logmond.exe" -u

C:\Users\Administrator>powershell -command "get-process -includeusername logm* | format-table -autosize"

Handles WS(K) VM(M) CPU(s)   Id UserName            ProcessName
------- ----- ----- ------   -- --------            -----------
     62  3100    44   0.02 3956 NT AUTHORITY\SYSTEM logmond
     74  3216    47   0.00 4068 NT AUTHORITY\SYSTEM logmond


C:\Users\Administrator>_
```

- **Notes**:
  - The "`logmond -r`" command removes the service if any
  - The "`logmond -i`" command installs the service
  - The "`logmond -u`" command starts the service

  - The powershell commands shows 2 logmond processes, one scans for new services, the other is monitoring the log file of the current service (myds20)
  - The `EmulatorLogMonitor` service running the `logmond` processes will discover already installed Charon virtual machines services. If a new virtual machine service is added, it's log file will be automatically discovered and monitored.
  - The logmond.exe file is located by default in the "`C:\Program Files\Charon\Build_19402\x64`" folder for Charon-AXP/VAX/PDP V4.9, "`C:\Program Files\Charon\Build_20200\x64`" for V4.10.

- In this test, two dongles were connected, the active one has been removed (**1**) producing the license changed message (**2** and **3**) then the last active dongle has been removed (**4** and **5**).
  ℹ During the tests the license check interval was set to 5 minutes therefore, when the dongle is disconnected, a message is sent telling there are only 4 minutes remaining before the DS20 stops



```
Date:                Message ID:  Message text:
2018-09-10 16:50:02  00000402     Device arrival with interface = "\\?\USB#VID_0529&PID_0001#7&25c389c1&0&1#{a5dcbf10-6530-1
2018-09-10 16:50:02  00000402     Device arrival with interface = "\\?\USB#VID_0529&PID_0001#7&25c389c1&0&1#{29db6d11-bc3c-1
2018-09-10 16:50:02  00000402     Device arrival with interface = "\\?\USB#VID_0529&PID_0001#7&25c389c1&0&1#{bce9d0f1-f7db-11
2018-09-10 16:50:03  00000402     Device arrival with interface = "\\?\Aladdin#Vid0529&Pid0001&HaspHL#8&e9a2b73&d&00#{44207c5
2018-09-10 16:50:03  00000402     Device arrival with interface = "\\?\USB#Hasp#8&e9a2b73                   7ab02247-3798-44cd-8472-2435
2018-09-10 16:50:29  0000024D     Communication with the license key "804839763" lost.
2018-09-10 16:53:29  0000024D     Performing regular check of the current license.
2018-09-10 16:53:29  0000024D     Unable to log in to the key "804839763", feature 0.
2018-09-10 16:53:29  0000024D     HASP runtime (50): Unable to locate any Feature matching scope.
                                  Failed to login at the Sentinel HASP key: "804839763".
                                  Checking the available license key "1022239689".
                                  Found license key: "1022239689".
                                  Checking product section 0.
                                  License number: "1001082".
                                  CHARON product code: "CHAXP-470xx-WI-LI".
                                  HASP Date limited license, limited to: 10-Jan-2019 00:55:00.
                                  Feature 1 check interval 5 minute(s).
                                  Current license changed from key:"804839763" id:"10043           key:"1022239689" id:"1001082".
                                  License has changed. License detected and online.
                                  Device removal with interface = "\\?\Aladdin#Vid0529&Pi          &HaspHL#8&e9a2b73&d&00#{44207
2018-09-10 16:58:24  00000403     Device removal with interface = "\\?\USB#Hasp#8&e9a2b73&d&00#{7ab02247-3798-44cd-8472-243
2018-09-10 16:58:24  00000403     Device removal with interface = "\\?\USB#VID_0529&PID_0001#7&25c389c1&0&1#{bce9d0f1-f7db-
2018-09-10 16:58:24  00000403     Device removal with interface = "\\?\USB#VID_0529&PID_0001#7&25c389c1&0&1#{a5dcbf10-6530
2018-09-10 16:58:24  00000403     Device removal with interface = "\\?\USB#VID_0529&PID_0001#7&25c389c1&0&1#{29db6d11-bc3c
2018-09-10 16:58:36  0000024D     Communication with the license key "1022239689" lost.
2018-09-10 16:58:36  0000024D     Performing regular check of the current license.
2018-09-10 16:58:36  0000024D     Unable to log in to the key "1022239689", feature 0.
2018-09-10 16:58:36  0000024D     HASP runtime (7): Sentinel protection key not available.
2018-09-10 16:58:36  0000024D     Failed to login at the Sentinel HASP key: "1022239689".
2018-09-10 16:58:36  0000024D     Connection to license key:"1022239689" id:"1001082" lost. Application will stop at 11-Sep-2018 04:58
2018-09-10 16:58:36  00000424     session: Detected removal of the license. Normal operation is supported till 11-Sep-2018 04:58:36.
```

```
Mon 09/10/2018 16:53:40.52 license changed
  n 09/10/2018 16:58:40.54 dongle removed
```

Running the log monitor from the command line

? The "`logmond`" utility has several parameters available. Use the "`logmond -h`" command to have a complete list.

Starting in background mode

In order to **start** the Log Monitor & Dispatcher as a background application:

1. Open "cmd.exe" from the "Start" menu.
2. Change current directory to the folder (presumably) containing the Charon configuration file.
3. Start the Log Monitor & Dispatcher using the following command line as an example:

   For single log file:

   ```
   ...> "C:\Program Files\Charon\Build_19402\x64\logmond" C:\my_Charon.log
   ```

   For rotating log file:

   ```
   ...> "C:\Program Files\Charon\Build_19402\x64\logmond" -l <log-directory> -p <log-prefix>
   ```

   where:

   - `<log-directory>` is the directory where the rotating log files are stored
   - `<log-prefix>` is the same as the "configuration_name" value in corresponding Charon configuration file (or "hw_model", if "configuration_name" is not specified).

Example:

```
...> "C:\Program Files\Charon\Build_19402\x64\logmond" -l "C:\My Charon logs" -p "MY_VAX"
```

To stop the Log Monitor & Dispatcher application, open the Task Manager, find the "`logmond.exe`" process and terminate it.

Debugging

To diagnose LOGMOND using trace feature:

1. Stop LOGMOND service using "`--stop`" (or "`-d`" or "`--down`"). This is not absolutely necessary though, as multiple running LOGMOND utilities do not affect each other.

2. Start "almost-as-a-service" LOGMOND with diagnostic trace using two command line switches: "`-e`" and "`-t`". This starts master task of LOGMOND which enumerates all Charon services and for each of them invokes slave task of LOGMOND. The master task of LOGMOND looks for installing or removal Charon services.
   a. When Charon service is installed, master creates new slave.
   b. When Charon service is removed, slave is terminated to. The slave task monitors LOG of particular Charon service.

   ℹ The "`-t`" switch enables trace windows, so you can see the process of monitoring.

3. To terminate "almost-as-a-service" LOGMOND master and all its slaves, bring focus to master's trace window, and press "`Ctrl-C`" ([X] button closes master task, but slaves continue to run unmastered).

The LOGMOND still supports backward compatibility mode, when it does NOT monitor ALL Charon services, but only monitors a particular folder or even a particular file. So, if you want to diagnose how it monitors a file, you can use the same "`-t`" option:

```
C:\...>logmond.exe -t -l <path to Charon log file>
```

If you want to diagnose monitoring rotating log:

```
C:\...>logmond.exe -t -l <path to Charon log directory> -p <log prefix>
```

If you want to diagnose monitoring particular service:

```
C:\...>logmond.exe -t -s <service name>
```

When you install LOGMOND to run as a service it implicitly runs with "`-e`" option but without "`-t`". Alternatively you may install LOGMOND as a service with explicitly specified name of log file (for backward compatibility)

> You better use "`-e`" together with "`-t`" to diagnose monitoring Charon services. Unless you run instances with Launcher, in which case you will have to invoke LOGMOND with "`-l`" with "`-t`" options.

nolicense.bat considerations

LOGMOND always looks for `nolicense.bat` and `license_changed.bat` files in the current working directory. What is current working directory for LOGMOND depends on how it is invoked.

If you run LOGMOND with just path to log file, the LOGMOND inherits current working directory from command prompt it is invoked from. So, before you run LOGMOND this way, change prompt's working directory to where you keep your NOLICENSE.BAT file.

If you run LOGMOND with name of Charon service, the LOGMOND changes its current working directory to the Charon service's Home directory. So, keep the `nolicense.bat` and `license_changed.bat` files in the virtual machine's home directory.

If you run LOGMOND with "`-e`" option, each slave receives a particular name of Charon service, and therefore changes to the service's Home directory. So, keep the `nolicense.bat` and `license_changed.bat` files in the virtual machine's home directory.

Stromasys highly recommends to use logmond as a service, installing it with the "`-i`" option then starting it with "`-u`".

Alerts customization examples

You will find below some examples of alerts that can be sent from the `nolicense.bat` file

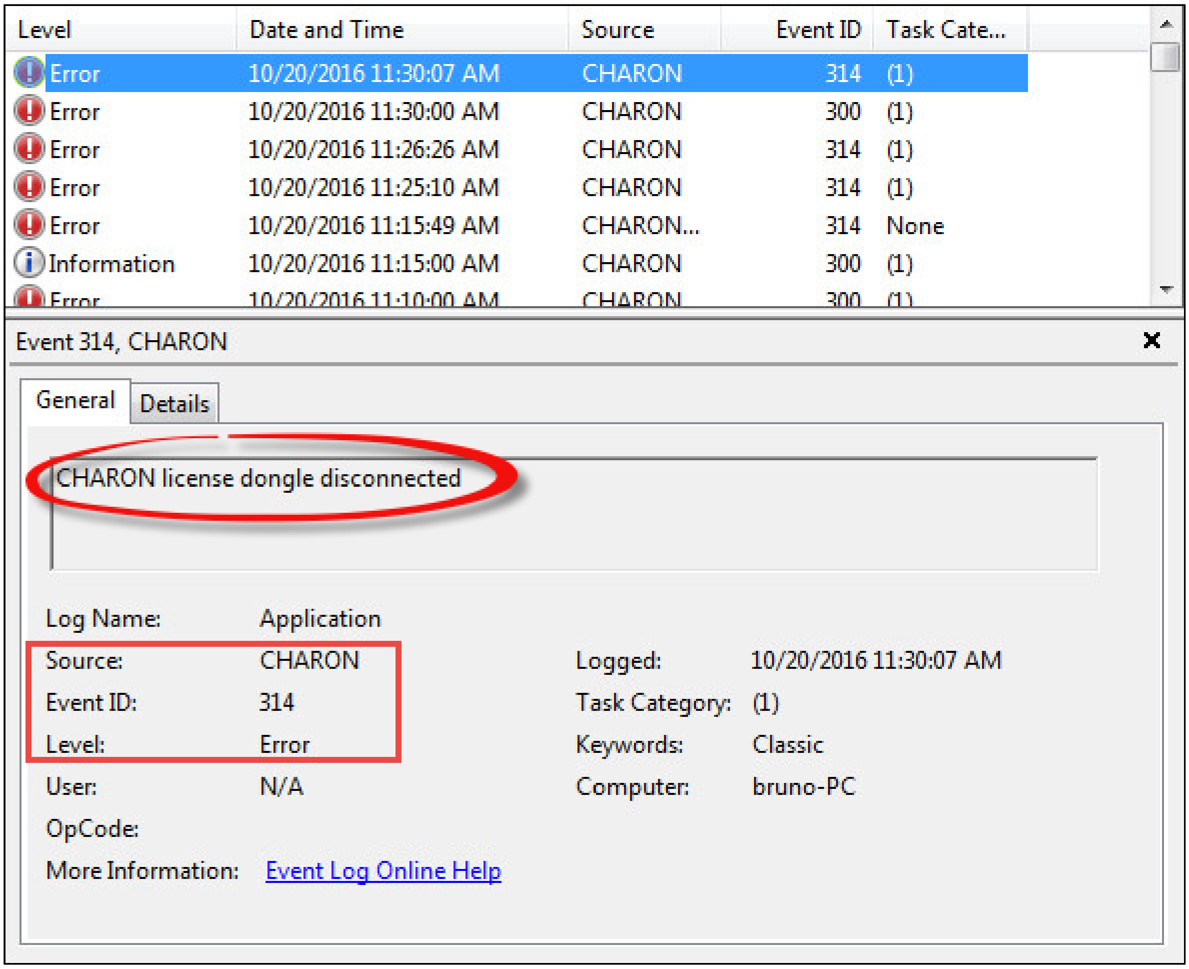
Reminder: Interactive applications are not allowed

Creating a Windows Event

```
powershell -command "New-Eventlog -Logname application -Source Charon -Erroraction silentlycontinue;Write-Eventlog -Logname
application -Source Charon -Entrytype Error -Eventid 314 -Message 'Charon license dongle disconnected'"
```

It is recommended to use the powershell command to write events instead of the "eventcreate" command line as some other events are created with powershell scripts. Using the eventcreate command in this case will fail as the source, Charon, will not be accepted.

Example:



Level	Date and Time	Source	Event ID	Task Cate...
Error	10/20/2016 11:30:07 AM	CHARON	314	(1)
Error	10/20/2016 11:30:00 AM	CHARON	300	(1)
Error	10/20/2016 11:26:26 AM	CHARON	314	(1)
Error	10/20/2016 11:25:10 AM	CHARON	314	(1)
Error	10/20/2016 11:15:49 AM	CHARON...	314	None
Information	10/20/2016 11:15:00 AM	CHARON	300	(1)
Error	10/20/2016 11:10:00 AM	CHARON	300	(1)

Event 314, CHARON

CHARON license dongle disconnected

Log Name:	Application		
Source:	CHARON	Logged:	10/20/2016 11:30:07 AM
Event ID:	314	Task Category:	(1)
Level:	Error	Keywords:	Classic
User:	N/A	Computer:	bruno-PC
OpCode:			
More Information:	Event Log Online Help		

The "Event Id" can be set at your convenience. A valid ID is any number from 1 to 65535.

Sending an email via powershell

An alert email can be sent using the "`Send-MailMessage`" powershell command however it is important to know no interactive command can be executed (for asking the sender's credentials for example).

You can either ask the `nolicense.bat` file to invoke a powershell script or pass the commands from the command line

Examples below are given with Powershell V4.0 installed on a Windows 2012 R2 server, some commands may not be appropriate to your Windows distribution.

To determine which version of Powershell is installed and upgrade if necessary, see Powershell version, upgrade, enabling scripts execution, tips and tricks

To run PowerShell scripts (files that end with .ps1), you must first set the execution policy to Unrestricted (This operation has to be done once).

To do so, open a command line window (cmd.exe) as an Administrator and use the following command:

```
c:\Charon>powershell -command "Set-ExecutionPolicy Unrestricted"
```

The ExecutionPolicy can also be set to "`RemoteSigned`". In this case the `.ps1` script files will have to be unblocked as described below.

If you are still prompted to allow for execution of the script, please run the following command to unblock the `.ps1` file you want to execute:

```
c:\Charon>powershell -command "Unblock-File -path c:\Charon\sendmail.ps1"
```

Example using an office365 account

Create a powershell script file, named `sendmail.ps1` for example and located in "`C:\Charon`" folder:

```
# Update the email addresses below:
$From = "<monitoring-account>@<somewhere>"
$To = "<someone>@<somewhere>"

# Send the email
send-mailmessage -to $To -from $From -subject "Charon detected removal of the license" -body "Please check" -smtpserver smtp.
office365.com -usessl -port 587 -delivery none
```

> If you must specify multiple recipients, you can specify them using an array with comma separated fields.
>
> **Example1**:
>
> `$To = @( "Kirk <Kirk@uss-enterprise.fed>", "Spock <spock@uss-enterprise.fed>" )`
>
> **Example2**:
>
> `$To = @( "Kirk@uss-enterprise.fed", "Spock@uss-enterprise.fed", "McCoy@uss-enterprise.fed" )`

Update the `nolicense.bat` file as follows:

```
powershell -NonInteractive -File C:\Charon\sendmail.ps1
```

The problem here is the email account mentioned in the `$Myemail` variable must be able to send anonymous emails otherwise the following error can occur:

"`Client was not authenticated to send anonymous mail during MAIL FROM`"

If the account cannot send anonymous emails, you can perform an interactive test by asking for the credentials:

The "<monitoring-account>@<somewhere>" and "<recipient>@<somewhere>" values must be adapted to your configuration

```
# Update the email addresses below:
$From = "<monitoring-account>@<somewhere>"
$To = "<someone>@<somewhere>"

# The command below will open a window for you to store the password
$Creds=(get-credential -credential "$From")

# Send the email (credentials are then required each time)
send-mailmessage -to $To -from $From -subject "Charon detected removal of the license" -body "Please check" -smtpserver smtp.
office365.com -usessl -port 587 -delivery none -credential $Creds
```

This method cannot be used when executed within a service due to the popup window that will be opened to ask for the email account password.

To be able to send an email, we can then store the credentials in an encrypted and protected file. This is done using the `Export-CliXML` powershell command. As this file will be bound to the server where the command is issued and to the user account who created the file, we need to perform the operations as "`system`" user account because this user is the one running the `logmond` processes that will invoke the `nolicense.bat` file.

It is necessary then to use `psexec` from the Windows Sysinternals kit. It can be downloaded here: https://technet.microsoft.com/en-us/sysinternals/psexec.aspx

Once extracted from the zip file, to the "`C:\Charon`" folder for example, run the following command from the command line running as Administrator:

```
C:\...> C:\Charon\psexec -i -s cmd.exe
```

and generate the CliXML file as described below:

```
C:\Windows\system32>powershell
Windows PowerShell
Copyright (C) 2014 Microsoft Corporation. All rights reserved.

PS C:\Windows\system32> $From="<monitoring-account>@<somewhere>"
PS C:\Windows\system32> $Creds=(get-credential -credential $From)
PS C:\Windows\system32> $Creds | Export-CliXML C:\Charon\creds.clixml
PS C:\Windows\system32> exit

C:\Windows\system32>exit
```

If it is no more needed, remove the "`psexec.exe`" file.

If the sender's email address or its password has to be changed, the `.clixml` file will have to be recreated.

Now update the powershell script as follows:

The "<monitoring-account>@<somewhere>" and "<recipient>@<somewhere>" values must be adapted to your configuration

```
# Update the email addresses below:
$From = "<monitoring-account>@<somewhere>"
$To = "<someone>@<somewhere>"

$Creds = Import-CliXml C:\Charon\creds.clixml

send-mailmessage -to $To -from $From -subject "Charon detected removal of the license" -body "Please check" -credential
$Creds -smtpserver smtp.office365.com -usessl -port 587 -delivery none
```

Once updated, the script will only work when executed by the "`system`" account and on the server where the `Export-CliXML` powershell command was issued.

Example using a gmail account

To send an email using a gmail account, perform the same operations as described in the Example using an office365 account chapter above and replace the `smtpserver` value by `smtp.gmail.com` as shown below:

❓ The "<monitoring-account>@gmail.com" and "<recipient>@<somewhere>" values must be adapted to your configuration

```
# Update the email addresses below:
$From = "<monitoring-account>@gmail.com"
$To = "<someone>@<somewhere>"

$Creds = Import-CliXml C:\Charon\creds.clixml

send-mailmessage -to $To -from $From -subject "Charon detected removal of the license" -body "Please check" -credential
$Creds -smtpserver smtp.gmail.com -usessl -port 587 -delivery none
```

ℹ Only the `smtpserver` value must be changed

⚠ Google may block sign-in attempts when using powershell and send-mailmessage. In this case the sender will receive a "Sign in attempt prevented" alert email. To allow emails to be sent:

1. Create a dedicated gmail account
2. Allow less secure apps to access your account. See this article: https://support.google.com/accounts/answer/6010255?hl=en

Related articles

- Charon Log monitoring on Windows (logmond) - Best practices for V4.9 to V4.11
- CHARON on Windows - Automated License Expiration Check
- CHARON on Windows - Automated License Expiration Check - Release Notes
- CHARON on Windows - Rotating log files cleaning - Release Notes
- CHARON on Windows - Rotating log files cleaning

How to implement time synchronisation between CHARON-AXP Host OS and Guest OS

Table of contents

Description

This document will explain how to implement the time synchronization feature using the "`sync_to_host`" parameter in the configuration file. This parameter allows to keep TOY time always synchronized with the host's time and disable undesirable updates to the TOY from guest OS.

Restrictions: Minimum product versions/builds required:

- **Windows**:
  - CHARON-AXP V4.4 Build 148-02 with patch 148-09 installed
  - CHARON-AXP V4.6 Build 166-03 and later
  - Note: CHARON-AXP V4.5 Build 153-03 and 153-05 (patched) are not supported
- **Linux**:
  - CHARON-AXP V4.6 Build 168-03 and later

Step-by-step guide

Configuration file settings

Update the configuration file with the following settings:

Syntax:

```
set TOY sync_to_host = "{as_vms | as_tru64 | as_is}[, nowrite]"
```

⚠ If "sync_to_host" parameter is specified there is no need to specify "container" parameter in addition.

where:

Parameter	Description
as_vms	If the guest OS is OpenVMS/AXP and its date and time must be set to the host's date and time each time it boots.
as_tru64	If the guest OS is Tru64 UNIX and its date and time must be set to the host's date and time each time it boots.
as_is	If the TOY date and time must be set to the host's UTC date and time
nowrite	Forbid updates to the TOY from the guest OS ℹ If you want guest to synchronize itself using DTSS or NTP for example, remove "nowrite"

Example:

```
set TOY sync_to_host = "as_vms, nowrite"
```

To synchronize the guest OS with TOY, use the following commands (from "SYSTEM"/"root" account):

On OpenVMS/AXP	On Tru64 UNIX
`$ set time`	``# date -u `consvar -g date | cut -f 3 -d ' '` ``

The default value is "`not specified`" - it means that by default CHARON does not synchronize its guest OS time with the CHARON host time but collects date and time from the file specified with "`container`" parameter.

If "`sync_to_host`" parameter is specified there is no need to specify "`container`" parameter in addition.

The CHARON virtual machine must be restarted in order to take the new parameter into account

Virtual machine operating system settings

The commands mentioned above used to synchronize the guest OS with TOY are effective only when they are executed. To avoid time difference, these commands must be executed at specified intervals.

You will find below examples on how to implement scripts to perform time synchronization for OpenVMS and Tru64 UNIX.

If you have NTP running on your OpenVMS or Tru64 UNIX system, you can keep it running even if `sync_to_host` is enabled

On OpenVMS/AXP

You need first to perform a manual synchronization between the CHARON server and the CHARON virtual machine using the `SET TIME=` command:

```
$ SET TIME=12:30:00
```

You can use either a batch queue or a detached process to synchronize time. The two methods are described below.

Using a batch queue

Create a simple script containing the following lines. The example below will sync time every hour:

In our example, we will create the script in the `SYS$MANAGER` folder and name it `CHARON_SYNCTIME.COM`. The OS version used is OpenVMS 7.3-2. Its content is:

```
$ SET NOON
$ SET VERIFY
$LOOP:
$ SHOW TIME
$ SET TIME
$ SHOW TIME
$ WAIT 01:00:00
$ GOTO LOOP
```

The "`$ SET VERIFY`" line is optional, just used for verifying commands are correctly executed

A batch queue will be required to create the job:

- Find an available batch queue or create a new one
- Execute the following command to view available batch queues (refer to OpenVMS documentation)

  ```
  $ SHOW QUEUE /ALL /BATCH
  ```

  If the command returns the following error message: "%JBC-E-JOBQUEDIS, system job queue manager is not running", you will need to initialize the queue manager:

  ```
  $ START /QUEUE /MANAGER /NEW
  %%%%%%%%%%%  OPCOM  29-MAY-2015 12:30:07.36  %%%%%%%%%%%
  Message from user SYSTEM on VMS732
  %JBC-I-CREATED, SYS$COMMON:[SYSEXE]QMAN$MASTER.DAT; created
  ```

- Create a dedicated batch queue for the synchronization job (recommended):

  ```
  $ INIT /QUEUE /BATCH /START SYS$SYNCTIME /JOB_LIMIT=1
  $ SHOW QUEUE SYS$SYNCTIME /FULL
  Batch queue SYS$SYNCTIME, idle, on VMS732::
    /BASE_PRIORITY=4 /JOB_LIMIT=1 /OWNER=[SYSTEM] /PROTECTION=(S:M,O:D,G:R,W:S)
  ```

- Submit the job:

  ```
  $ SUBMIT /QUEUE=SYS$SYNCTIME SYS$MANAGER:CHARON_SYNCTIME
  Job CHARON_SYNCTIME (queue SYS$SYNCTIME, entry 1) started on SYS$SYNCTIME
  ```

- Update the systartup script (SYS$STARTUP:SYSTARTUP_VMS.COM) to start the SYS$SYNCTIME queue and the job at system boot. The two following lines will have to be added at the very end of the script (for example):

  ```
  ...
  $ START /QUEUE SYS$SYNCTIME
  $ SUBMIT /QUEUE=SYS$SYNCTIME SYS$MANAGER:CHARON_SYNCTIME
  $
  $ EXIT
  ```

  ℹ For OpenVMS version 5, the systartup script will be named: SYS$STARTUP:SYSTARTUP_V5.COM

Using a detached process

Create a simple script containing the following lines. The example below will sync time every hour

In our example, we will create the script in the `SYS$MANAGER` folder and name it `CHARON_SYNCTIME.COM`. The OS version used is OpenVMS 7.3-2. Its content is:

```
$ SET NOON
$ SET VERIFY
$LOOP:
$ SHOW TIME
$ SET TIME
$ SHOW TIME
$ WAIT 01:00:00
$ GOTO LOOP
```

The `"$ SET VERIFY"` line is optional, just used for verifying commands are correctly executed. If you let it active, please replace the "`NL:`" device above by a log file name

Update the systartup script (`SYS$STARTUP:SYSTARTUP_VMS.COM`) to start the detached process at system boot. The following lines will have to be added at the very end of the script (for example):

```
...
$ RUN SYS$SYSTEM:LOGINOUT /AUTHORIZE /DETACH /UIC=[SYSTEM] -
      /PROCESS_NAME="TIME SYNC" /OUTPUT=NL: /ERROR=NL: -
      /INPUT=SYS$MANAGER:CHARON_SYNCTIME.COM
$
$ EXIT
```

To start the job manually without a reboot, just execute the line above from an interactive session.

Considerations using DECnet-Plus software

If you have DECnet-Plus software installed, you will have to disable DTSS before setting time in order to avoid errors like:

```
%SET-E-NOTSET, error modifying time
-SYSTEM-E-TIMENOTSET, time service enabled; enter a time service command to update the time
```

To disable DTSS, you will have to update the `CHARON_SYNCTIME.COM` script:

```
$ SET NOON
$! SET VERIFY
$LOOP:
$ SHOW TIME
$ RUN SYS$SYSTEM:NCL
DISABLE DTSS
DELETE DTSS
EXIT
$ SET TIME
$ SHOW TIME
$ @SYS$STARTUP:DTSS$STARTUP
$ WAIT 01:00:00
$ GOTO LOOP
```

It is recommended here not to use "`SET VERIFY`"

On Tru64 UNIX

Restrictions: The synchronization requires the "`consvar`" command to be available on the Tru64 operating system thus Tru64 UNIX version 4.0F minimum is required

You need first to perform a manual synchronization between the CHARON server and the CHARON virtual machine using the `date` command. Example:

```
# date -u 05291724
```

Create an entry in the root's `crontab` file using "**`crontab -e`**" as shown below:

```
...
# CHARON time sync_to_host
00 * * * * /sbin/date -u `/sbin/consvar -g date | cut -f 3 -d ' '`
```

⚠ Full path to `date` and `consvar` commands must be specified

💡 The above command will be executed at minute 0 of every hour. If you want to execute this every 15 minutes for example, use the following line instead:

```
00/15 * * * * /sbin/date -u `/sbin/consvar -g date | cut -f 3 -d ' '`
```

ℹ More information at Wikipedia.org - Cron

Related articles

- How to implement time synchronisation between CHARON-AXP Host OS and Guest OS (sync_to_host)