CHARON™-VAX/6610 Plus for Windows

CHARON™-VAX/6620 Plus for Windows

CHARON™-VAX/6630 Plus for Windows

CHARON™-VAX/6660 Plus for Windows

Version 4.1 Build 134-02

User Manual

STROMASYS
VIRTUALIZATION TECHNOLOGIES

Stromasys SA

User Manual for CHARON-VAX/66x0 Plus version 4.1 for Windows Server 2008 R2, Standard and Enterprise Editions and Windows 7, Professional and Ultimate Editions.

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Contents

This manual

Stromasys SA is building computer system virtualization products since 1999. The CHARON-VAX product line, which provides VAX hardware functionality as a virtualization layer on industry standard servers, have followed a development path comparable to the original DIGITAL VAX hardware. From a 16 MB MicroVAX system introduced in the year 2000, our virtual VAX family added many models, culminating in a 6 CPU, 3GB VAX 6660 with a performance three times the largest VAX system ever designed by Digital Equipment Corporation, supporting more than 100 TB of disk storage.

This manual describes the next major release of VAX 6000 virtualization platforms: The ability to add virtual CI clustering using standard TCP/IP interconnects. With TCP/IP based routing capabilities, these products can create Wide Area Network Clusters with up to 224 virtual VAX nodes, functionally identical, and binary compatible with the classical OpenVMS CI clusters.

For even higher performance, CHARON-VAX/66X0 can be clustered to deliver a system performance exceeding existing VAX DSSI or CI clusters, as Oracle RdB benchmarks show. With this technology, it is possible to replace large VAX data centers with a single rack of modern servers.

To get the best performance from the CHARON-VAX/66X0 virtualization layer, it is essential to use a high performance Windows host system. This manual provides the guidelines for host system selection, CHARON-VAX installation and operation.

The products covered in this manual are:

CHARON-VAX/6610, a 1 GB, single CPU VAX 6600 replacement.

CHARON-VAX/6620, a 2 GB, dual CPU VAX 6600 replacement.

CHARON-VAX/6630, a 3 GB, triple CPU VAX 6600 replacement

CHARON-VAX/6660, a 3 GB, sextuple CPU VAX 6600 replacement

Note: The full 3 GB is only available on a Windows 64 bit platform. On a Windows 32 bit platform the limit is 2 GB.

1 Overview

Modern software operating systems contain a hardware abstraction layer or HAL. The HAL creates a software layer on top of the hardware to "virtualize" the functionality of the hardware components. The CHARON-VAX/66X0 products are essentially HALs of complete VAX 6000 systems, including the VAX I/O devices. They are mathematically precise models of VAX 6000 hardware, and contain modules of VAX 6000 CPUs, the console subsystem, the XMI bus and I/O adapters, disks and tapes.

After installation of CHARON-VAX on a host platform, it provides an exact model of a working VAX system. On this 'virtual' system you install your VAX operating system and VAX applications, just like you had bought new VAX hardware. No conversion or sources is needed, and you boot your VAX system as usual. The CHARON-VAX systems execute the same binary VAX code and the same I/O drivers as on the original hardware. Their exact compatibility means that we test this with the original VAX hardware diagnostics.

What you obtain is a VAX, typically running at a faster speed and with a significantly smaller footprint, service cost and electricity bill. An additional advantage of CHARON-VAX over VAX hardware is the scalability with its host system. The CHARON-VAX performance is proportional to the host system performance, and every time you move to a faster host system your ‘virtual VAX’ will also get faster.

This manual covers:

- The selection of a suitable host system, essentially a Windows SMP server configured for the specific requirements of a CHARON-VAX/66X0 product. Each product has its optimal host platform to get the best VAX system performance. Ask Stromasys SA or one of its Resellers for configuration details if you have specific system requirements.

- The installation process of the CHARON-VAX product, which is not significantly different from the installation of any other Windows application.

- The CHARON-VAX configuration settings that allow you to specify the VAX 6000 SMP system configuration of your choice.

- The VAX software installation process is not described in detail, since it is identical to VAX hardware, and your VAX software documentation applies. Solutions are provided to transfer the contents of the existing VAX system and user disks, avoiding a complete system re-installation in many cases.

Like hardware VAX systems, CHARON-VAX can be used with multiple VAX operating systems. The largest application area is VAX/VMS however, and VMS operation notes are provided in an appendix.

2 Host system selection

This chapter describes the minimum hardware and software requirements the host system must meet for the CHARON-VAX/66X0 virtualization layer to work properly. Some requirements are checked during installation and/or execution time. If these limits are not met, CHARON-VAX/66X0 will simply not install or operate. Other limits are 'soft' and invoke a performance reduction ('safe mode') as described elsewhere in this manual.

2.1 Host operating system

The CHARON-VAX/66X0 virtualization layers are designed for a Windows™ server platform, requiring Windows 2008 R2 server Standard or Enterprise edition or Windows 7 in either a 32 bit or a 64 bit version (64 bit platform is required for 3 GB emulation).

Note that Windows cluster software is not required nor used, even if multiple CHARON-VAX/66X0 systems are configured as a direct replacement of the original VAX CI clusters.

Not supported as host operating system are Windows XP, Windows 2000/2003 Server, Windows 2000 Professional and earlier versions.

2.2 Host system hardware

CPU selection

The CHARON-VAX/66X0 products require a multi-processor host system for their operation. The host system must have a physical CPU for each VAX CPU, for instance 6 CPUs for a VAX 6660 virtualization. In addition one additional host CPU must be available for 'housekeeping' tasks. The recommended host configurations for the specific CHARON-VAX/66X0 products are as follows:

- **CHARON-VAX/6610** creates a single CPU VAX 66X0, on a host system with two physical CPUs. For example a Intel Core i or Core 2 3.0 GHz or dual AMD Opteron server; the average VUPs (VAX Unit of Performance) number measured on the latter system is 85.
- **CHARON-VAX/6620** and **CHARON-VAX/6630** create a two respectively three CPU VAX 6600. As 3 CPU host systems are extremely rare, these products are designed for the HP Proliant DL580, the dual Intel Core 2 Duo CPU system, or HP Proliant DL585 or the 4 CPU Opteron systems. The average VUPs performance measured on such systems is around 130 respectively 238.

- **CHARON-VAX/6660** creates a six CPU VAX 6660. This product is designed for the HP Proliant DL580, with 4 Intel Core 2 Duo CPUs system, or the HP Proliant DL585 system, with 4 DUAL-CORE Opteron CPU's. The average VUPs performance measured on such system can range between 450 and 700 depending on host processor type.

The absolute minimum host CPU speed for correct operation is 1400 MHz. For predictable VAX performance the host system must be dedicated to the CHARON-VAX virtualization layer, with the possible exception of a co-resident VAX console terminal or X-terminal emulator.

Host system memory

The minimum host memory size depends on the amount of VAX memory that is requested from the VAX virtualization layer. As a rule of thumb, the minimum host memory is the amount of VAX memory + 2 GB, with a minimum of 3 GB.

The maximum amount of VAX memory that can be created in the CHARON-VAX/66X0 products and is supported by OpenVMS/VAX is 3 GB (Product would technically allow to configure 3.5 GB, but Stromasys supports configurations with up to maximum supported amount is 3 GB only). Up to 2 GB, either a 32 bit or a 64 bit version of Windows 7 can be used, but > 2GB VAX memory requires a 64 bit operating system, for example Windows 2008 R2 server. For details, see the VAX memory size specification in chapter 5.

Disk storage

The CHARON-VAX/66X0 virtualization layer requires approximately 3 MB disk space, not counting any (virtual) VAX disks. VAX disks can have the form of physical disks (locally or on an external storage subsystem) or VAX disk images, which are standard Windows files. When VAX disk images are used to represent VAX disk drives, the disk image files have the same size in MB as the equivalent VAX disk hardware, irrespective of their degree of utilization.

When physical disks are used for the virtual VAX, these disks are connected as SCSI devices to the host platform (local, via Fibrechannel or iSCSI), irrespective of the disk architecture configured in the VAX environment (that could for instance be an MSCP drive). These physical disks are formatted by the VAX operating system and cannot be used by the host system.

There is no supported way to electrically connect a hardware CI storage network to the CI component of the CHARON-VAX/66X0 virtualization layer. Since the I/O throughput of the hardware CI network is an order of magnitude lower than the CI / HSG80 virtualization, such connection would seriously degrade the CHARON-VAX/66X0 I/O performance, if it was possible at all.

Ethernet adapters

In CHARON-VAX/66X0, each VAX Ethernet adapter has its own device virtualization placed on top of a dedicated physical Ethernet adapter. The adapter must support dynamic MAC address changes (in essence does not require a reboot of the host system to reload a MAC address), which is the case with most modern adapters. The requirement for dedicated Ethernet adapters has two reasons:

- A host system protocol of the same type (e.g. TCP/IP) would interfere with the same protocol running on its virtual instance.
- For security reasons, the virtual network adapter uses special code that excludes access from the external network to anything but the Ethernet drivers running on the virtual VAX system. This prevents penetration of malicious code into the host system from the external network.

The only exception to this rule is when the host system uses iSCSI services, in which case a dedicated LAN with a separate adapter for the iSCSI storage services is recommended.

Other host system requirements

The host system must provide a USB port for the USB license key. The license key is used constantly by CHARON-VAX during operation; it is recommended to connect the key directly to the system USB hub and not via an external USB hub which can cause access problems. Key disconnection causes termination of operation within a few minutes. Note that a quick reconnection of the key might not cancel termination.

The CHARON-VAX/66X0 virtualization layer interacts in several areas directly with the host system hardware. Where possible without compromising reliability, virtual peripherals are 'mapped' through Windows drivers to the local hardware. Some host peripherals that work in Windows will not function correctly with the CHARON-VAX/66X0 layer. Examples are Ethernet adapters that cannot change their MAC address without a power cycle and some classes of peripherals connected to the host system via USB or Firewire connections.

External SCSI devices (i.e. tapes and disks) are accessed directly by the VAX Operating System drivers and do not need the installation of a Windows driver (legacy VAX devices like a TK50 tape drive for example), although they can operate trough a Windows driver if that one is available.

2.3 General performance considerations

The configurations referred to earlier in this chapter were the target systems used for best performance during product design. The *functionality* of the VAX virtualization layer is the same (in essence an accurate model of the corresponding VAX system) for every host platform that meets the minimum requirements. The effective VAX system *performance* delivered by CHARON-VAX/66X0 depends on the host system. This allows for instance CHARON-VAX/6630 to meet or exceed VAX 7760 performance when executing on an HP DL585, hence its use is appropriate for VAX 7000 systems as well.

For lower performance requirements, CHARON-VAX/66X0 can be used on smaller platforms. Since each of the virtual VAX components puts its own requirements on the host system, it is important to look at your specific requirements before deciding what type of host system to use.

Experience shows that the three main areas of performance consideration are: VAX CPU performance, disk I/O speed and network connections:

VAX CPU performance

The component in the virtualization layer that creates a VAX CPU runs several concurrent tasks using a complex proprietary algorithm (Advanced VAX CPU Emulation - ACE) to optimize performance. If insufficient host processing capacity is available, ACE runs in 'safe' mode and reaches only 25 - 30% of its nominal performance.

Above 2 GHz host CPU frequency, the memory bandwidth and latency becomes an important virtualization layer performance factor in the current I86 or AMD64 architecture. Important parameters are host cache memory size (the larger the better) and host memory latency (the lower the better). Also the VAX CPU floating point performance is quite dependent on the host CPU design.

The multiple ACE processes that run in the virtualization layer require a significant amount of host system memory, as specified earlier in this chapter. If momentarily less host memory is available, possibly because another application would be started on the same host system, the ACE process becomes less effective and can shut down completely, reducing the VAX CPU performance. Hence concurrent operation of the CHARON-VAX virtualization layer with other applications on the same system is not recommended.

Disk I/O subsystem

VAX Disk I/O throughput scales with the host I/O bandwidth and can exceed that of hardware VAX66x0 systems with an order of magnitude. In general disk I/O is rarely a bottleneck, the VAX 6000 virtualization layer can support 100's of disks and virtual disks.

Network connections

On a high performance host platform the virtual VAX 6000 XMI Ethernet adapter operates much faster than its hardware 10 Mbps counterpart, but it will not always reach the full 100 Mbps throughput of modern adapters. 100 Mbps host adapters can be used in most cases, and multiple adapters can be configured.

The use of multiple adapters will not increase aggregate throughput beyond that of a single 100 Mbps host adapter. Dropping incoming packets due to temporary overload is acceptable (it happens on hardware VAX systems as well) if the communications protocol can retransmit lost packets in time. For sensitive protocols, for example the communication between instances of the OpenVMS distributed lock manager, configuring a separate Ethernet link or using CI emulation reduces the risk of critical packet loss.

Enhancing virtualization layer reliability

CHARON-VAX/66X0 executes a number of interrelated processes that each needs sufficient host system performance to provide a stable system. At several levels it protects itself against a lack of host system capabilities:

- If the frequency of any of the host CPUs is below 1400 MHz, CHARON-VAX/66X0 will not install. If an installed executable is started on a system below that frequency, execution will terminate. Note that laptop or desktop systems in low power mode often reduce the clock frequency of their CPU(s) below their rated speed.
- If the number of host CPUs is less than required, execution falls back in safe mode, reducing the performance by a factor of 3 - 4, and limiting network throughput. In a severe situation, some VAX CPUs will not start, or the virtual layer shuts down completely.
- When insufficient VAX memory can be locked in physical host memory, safe mode is entered to reduce memory requirements. Below a critical size the virtualization layer shuts down.
- Additional host system load due to other applications running concurrently can prevent timely access to the USB license key, causing CHARON-VAX/66X0 not to start or to shut down.
- It is possible to run two or more CHARON-VAX/66X0 virtualization layers on the same host system, depending on the license.

(As far as possible, a lack of host system resources is reported in the CHARON-VAX log file).

For production use, CHARON-VAX/66x0 should use a dedicated host system. Windows host system network services and a number of other Windows services are not needed. To increase system security and reliability it is strongly recommended to disable these services, see Appendix B for a list.

3 VAX hardware compatibility

The CHARON-VAX virtualization layers are tested with AXE, the VAX architecture compatibility verification tool originally used by Digital Equipment Corporation in the design of VAX hardware. Compaq/HP has verified that the CHARON-VAX AXE test results correspond to correctly functioning VAX hardware. HP provides VMS and layered product licenses for the transfer from a hardware VAX to CHARON-VAX; see this web page:

http://h71000.www7.hp.com/openvms/sri-charon-vax-emulator.html

When CHARON- VAX is running on Compaq/HP products, the transfer licenses maintain the HP OpenVMS/VAX and layered software warranties.

The VAX components represented in CHARON-VAX/66X0 are designed to operate like their hardware equivalents. In addition to AXE, we use VAX hardware diagnostics to verify that a virtual VAX component indeed corresponds to its hardware. To avoid adding unnecessary complexity, the virtual components do not include diagnostic logic that was not used in normal hardware operation. Where possible without compromising compatibility, the virtual devices were 'redesigned' to avoid hardware limitations. For example the virtual VAX 6000 supports 1 and 2 GB XMI memory modules, which never existed in hardware, to save XMI slots.

The purpose of VAX 66X0 virtualization is to replace VAX hardware, and any VAX operating system or binary application that runs on VAX 6000 hardware can be executed this way. Given the predominance of certain VMS versions, specifically VMS 5.5-2H4, 6.2 and 7.3 were tested.

Since the performance of a virtual VAX 6000 depends on the host system hardware, its components operate at a different speed (usually faster) compared to the equivalent VAX hardware. This is similar to moving a VAX operating system and its applications to a VAX with faster hardware components. The VAX operating system will schedule the various application requests as before and applications will simply complete faster. Virtual real-time components, for instance the VAX system clock, receive the correct timing interrupts and will operate as expected, provided the host system meets the specified minimum system requirements.

Every effort has been made to handle unusual VAX coding sequences correctly. Self-modifying VAX binary code, as is used in Oracle RdB, is part of the verification tests and executes correctly. Note that (generally undesirable) coding techniques like using NOOPs for software delay loops can give unexpected results as the virtual VAX CPU executes NOOPs very fast.

4 Installing CHARON-VAX/66x0 Plus

Before installing CHARON-VAX/66X0 Plus for Windows

1. Make sure your system is brought to the latest Service Pack and security patch level.
2. Make sure that your system configured as a standalone server and not as a part of a Microsoft domain.
3. Make sure that unnecessary Windows services are switched off according to the STROMASYS SA application note #33 (a full list of the Application Notes is available on the STROMASYS SA web site: http://www.softresint.com/charon-vax/app_notes.htm#an)

The CHARON-VAX distribution kits contain a packing list, a CD with the installation software, and a numbered CHARON-VAX USB license key. Additional CDs with VAX disk images might also be included. The packing list specifies the exact contents; if you find that something is missing, please contact Stromasys SA or your Reseller.

The CHARON-VAX/66X0 installation CD includes the release notes and User Manual. We recommend that you read the release notes before starting the installation of CHARON-VAX/66X0. The release notes may indicate changes to the documentation, software or installation procedure since the release of this manual.

Your CHARON license key is numbered and represents the full value of your CHARON-VAX/66X0 product purchase. It will not be replaced free of charge when lost; we recommend that you establish an appropriate security procedure for this high value item.

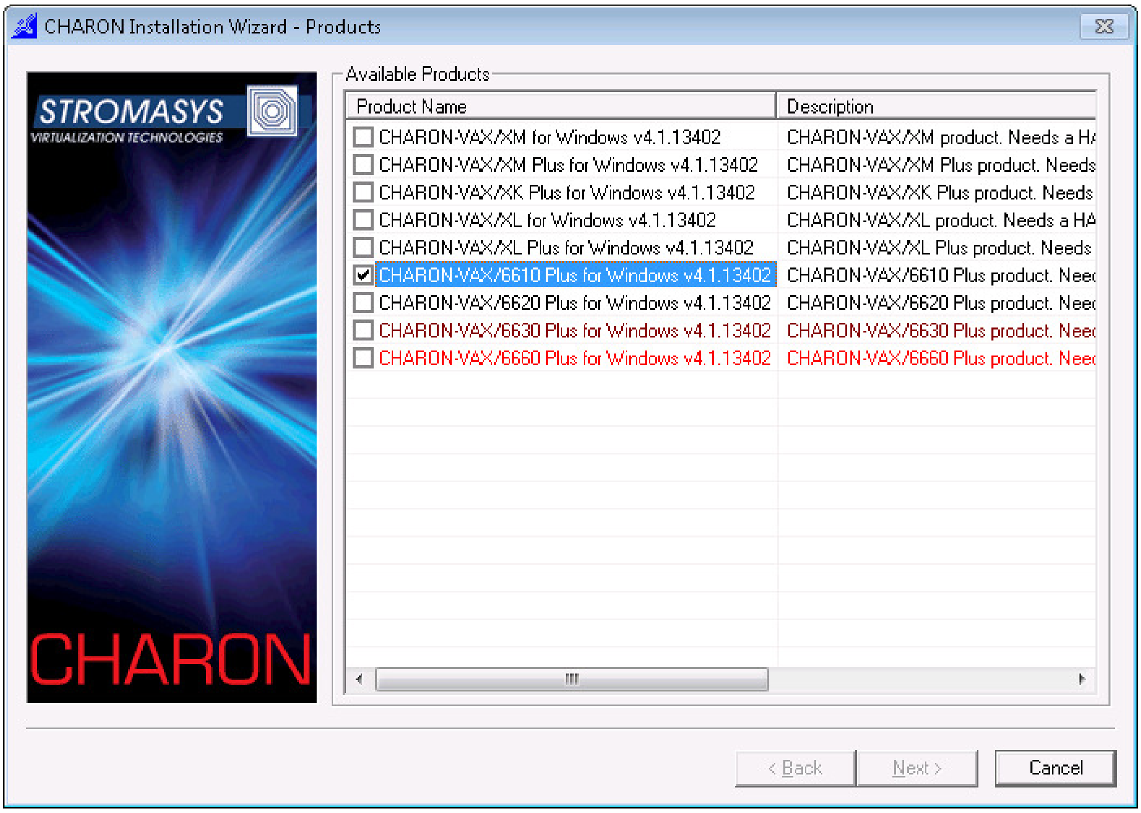
In the very unlikely case that the CHARON key fails, guard it carefully and contact Stromasys SA for replacement and recovery of its internal information. For very high availability requirements a runtime limited standby key can be purchased.

To execute the license key driver installation and CHARON-VAX/66X0 installation you must be logged in as local Administrator or as a user having local administrator rights.

4.1 License key driver installation

As the installation of CHARON-VAX/66X0 is managed by the CHARON license key, its driver must be installed first. Insert the CHARON-VAX/66X0 installation CD in the CD drive of your Windows system. **Do not connect the CHARON license key yet.** The Installation tool (InstallShell.exe) is started automatically if you have autorun enabled on your system. If the menu does not appear, double-click **InstallShell.exe** in the top directory on the CD.

The following dialog will appear:



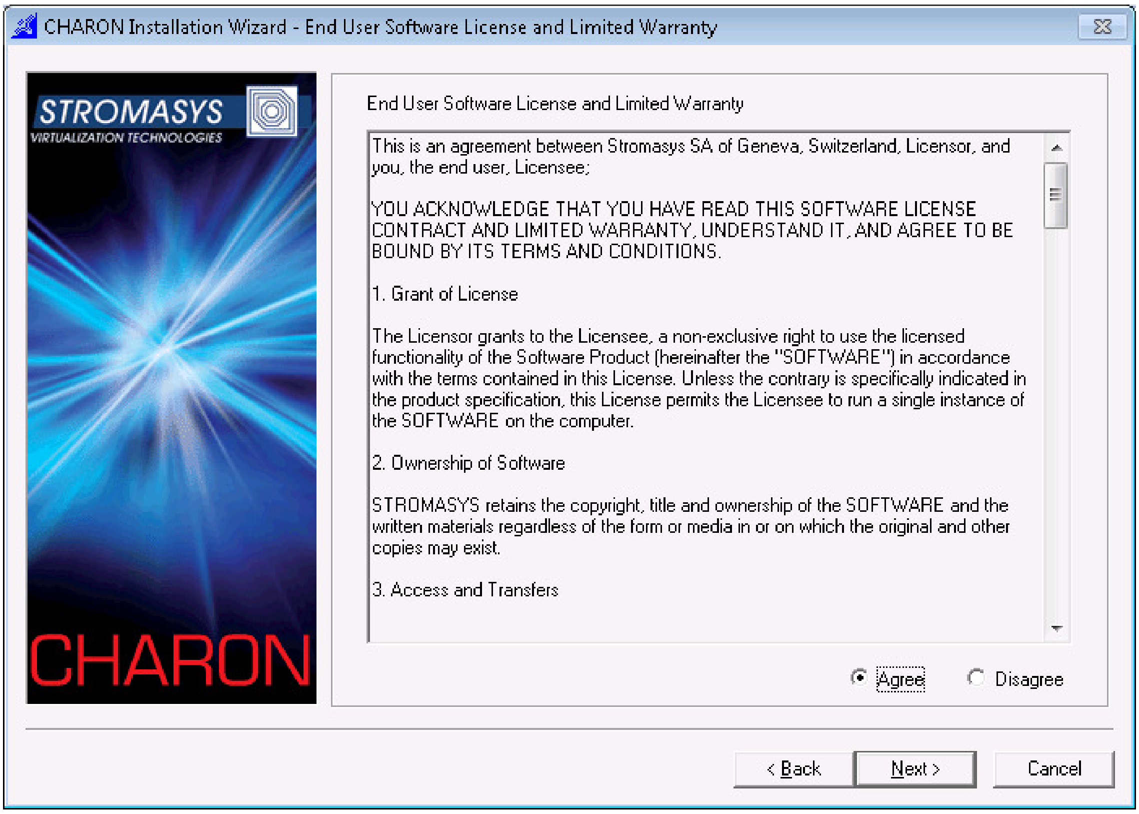
CHARON Installation Wizard - Products
STROMASYS
VIRTUALIZATION TECHNOLOGIES
CHARON
Available Products
< Back
Next >
Cancel

Product Name	Description
□ CHARON-VAX/XM for Windows v4.1.13402	CHARON-VAX/XM product. Needs a HA
□ CHARON-VAX/XM Plus for Windows v4.1.13402	CHARON-VAX/XM Plus product. Needs
□ CHARON-VAX/XK Plus for Windows v4.1.13402	CHARON-VAX/XK Plus product. Needs
□ CHARON-VAX/XL for Windows v4.1.13402	CHARON-VAX/XL product. Needs a HA
□ CHARON-VAX/XL Plus for Windows v4.1.13402	CHARON-VAX/XL Plus product. Needs
☑ CHARON-VAX/6610 Plus for Windows v4.1.13402	CHARON-VAX/6610 Plus product. Need
□ CHARON-VAX/6620 Plus for Windows v4.1.13402	CHARON-VAX/6620 Plus product. Need
□ CHARON-VAX/6630 Plus for Windows v4.1.13402	CHARON-VAX/6630 Plus product. Need
□ CHARON-VAX/6660 Plus for Windows v4.1.13402	CHARON-VAX/6660 Plus product. Need

The products marked with red cannot be installed on the systems because of the hardware requirements. It’s possible to get more details by pointing by the cursor at the target product name in the list.

Press Next to continue.

The installation procedure will display the EULA license. Please read it carefully, select “Agree” if you agree with the terms of the license and then press the button “Next”. Cancel the installation procedure with the “Cancel” button if you are disagree with the terms of the license.


CHARON Installation Wizard - End User Software License and Limited Warranty

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.

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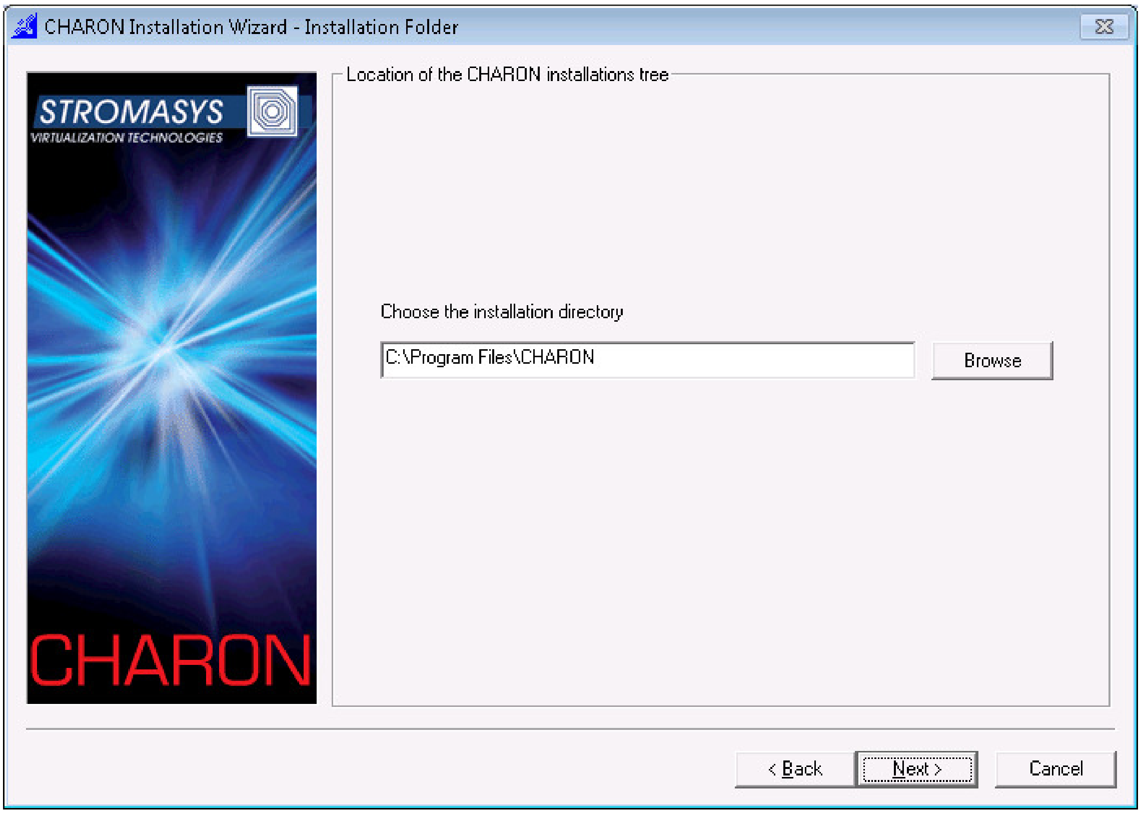
3. Access and Transfers

● Agree ○ Disagree

In the following dialog select the directory that will be “CHARON base”. Since this moment this directory will be used to store all the CHARON products – the being installed and future ones:


CHARON Installation Wizard - Installation Folder

Location of the CHARON installations tree

Choose the installation directory

C:\Program Files\CHARON

Unless directed elsewhere, the installation tool will place the software in the directory C:\Program Files\CHARON if there is enough space on the disk C:. Otherwise the installation directory will be located at one of other available drives – in this case it will look like <X>:\CHARON, where X is the first drive containing enough space for the installation.

It is possible to change the CHARON base if it is required – using the “Browse” button or by typing the desired path in the edit box.

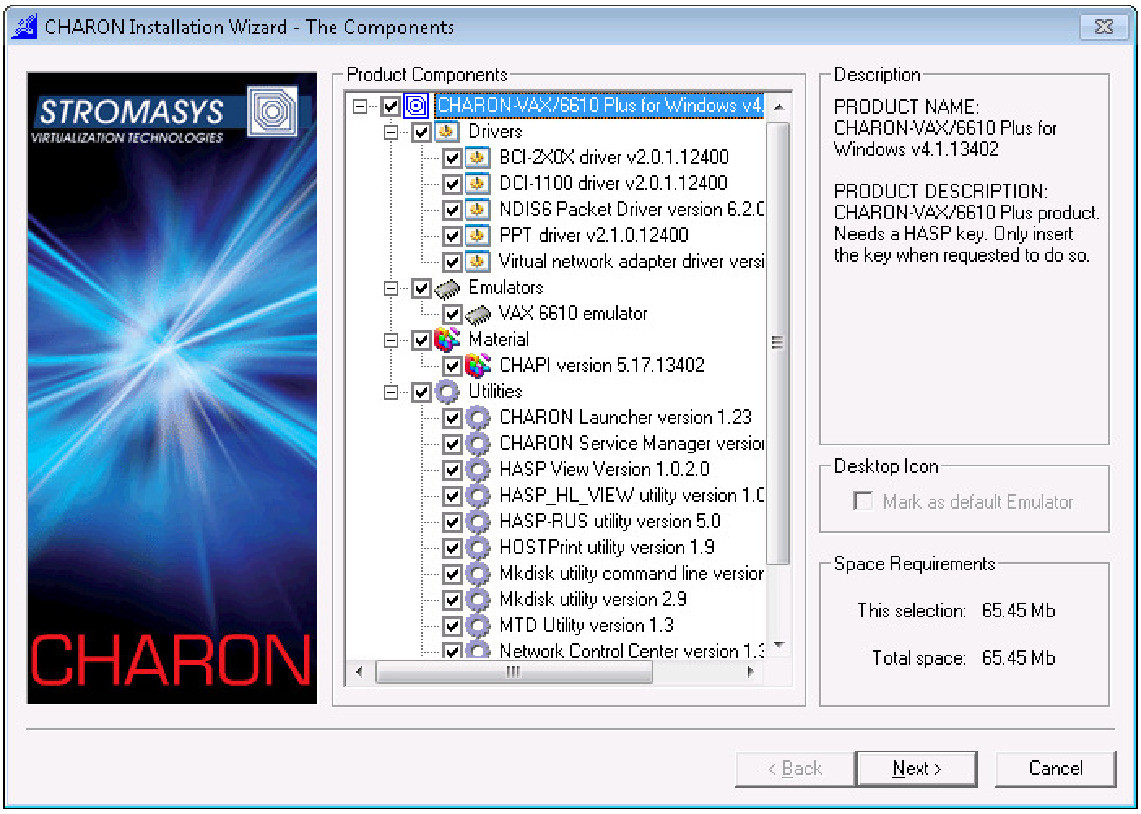
Press “Next” once the directory is set.

The procedure will install the driver for the HASP license key and several redistributive required for normal functioning of CHARON-VAX.

In other subdirectories of the CHARON-VAX/66X0 installation CD, you will find Release notes, Documentation (the PDF version of this manual) and Application notes.

4.2 Installing the CHARON-VAX/66X0 files and components

a. Select components to be installed, including network driver. It’s recommended to leave default selections untouched unless you have certain reasons to additionally deselect some components.



- ☑ CHARON-VAX/6610 Plus for Windows v4.
  - ☑ Drivers
    - ☑ BCI-2X0X driver v2.0.1.12400
    - ☑ DCI-1100 driver v2.0.1.12400
    - ☑ NDIS6 Packet Driver version 6.2.0
    - ☑ PPT driver v2.1.0.12400
    - ☑ Virtual network adapter driver versi
  - ☑ Emulators
    - ☑ VAX 6610 emulator
  - ☑ Material
    - ☑ CHAPI version 5.17.13402
  - ☑ Utilities
    - ☑ CHARON Launcher version 1.23
    - ☑ CHARON Service Manager versio
    - ☑ HASP View Version 1.0.2.0
    - ☑ HASP_HL_VIEW utility version 1.0
    - ☑ HASP-RUS utility version 5.0
    - ☑ HOSTPrint utility version 1.9
    - ☑ Mkdisk utility command line versior
    - ☑ Mkdisk utility version 2.9
    - ☑ MTD Utility version 1.3
    - ☑ Network Control Center version 1.3

PRODUCT NAME:
CHARON-VAX/6610 Plus for Windows v4.1.13402

PRODUCT DESCRIPTION:
CHARON-VAX/6610 Plus product. Needs a HASP key. Only insert the key when requested to do so.

☐ Mark as default Emulator

This selection: 65.45 Mb

Total space: 65.45 Mb

Click Next.

b. See the progress of the installation. Click Finish upon completion. The installation procedure may ask a confirmation to replace certain files if they already persist on the system in the CHARON base folder and have later date of modification than the files to be installed. The option are “Yes”, “No” or “Yes to All”/”No to All”.

If the installation tool reports success and no other users than the account that just ran the installation should run CHARON-VAX, proceed with reboot (notice that the installation procedure has added the current user to the CHARON-GRP user group).

If additional users should be able to run the virtualization layer do the following:

a. Uncheck "Reboot the system" checkbox to avoid rebooting

b. Open up "Start->Programs->Administrative Tools->Computer Management->Local Users and Groups->Groups->CHARON-GRP",

c. Add the desired user with a right click and choose "Properties, Add".

d. Reboot the system.

Unless directed elsewhere, the default installation location is the directory
C:\Program Files\CHARON\Build_xxxxx (Win32) and C:\Program Files
(x86)/\CHARON\Build_xxxxx (Win64). A start menu item is installed and a
shortcut is added to the desktop, if so requested.

4.3 Configuring network adapters for CHARON-VAX/66X0.

During the installation procedure, a CHARON specific NDIS6 packet protocol driver has been installed. Since CHARON-VAX/66X0 requires a dedicated host Ethernet adapter for each virtual VAX Ethernet adapter that you want to create, for each adapter that is dedicated to CHARON, please follow the following steps:

1. Disable all network protocols except the CHARON NDIS6 driver on each of the adapters you want to use for CHARON-VAX. You might use no adapters or several adapters with CHARON-VAX.

2. Insert those adapter name(s) in the CHARON-VAX/66X0 configuration file.

If the host system has only one network adapter, dedicate this adapter to CHARON-VAX/66X0 to prevent simultaneous use of the adapter by the Windows host system and CHARON-VAX/66X0, which will cause protocol errors (unless your VAX does not require networking at all).

For any operations relevant to CHARON networking please use specific tool called "Network Control Center" (NetDiag.exe). It helps to install/remove drivers, do all required configuration, etc. Please refer to the Utilities manual for more details.

4.4 Configuring the VAX virtualization layer

After installation you must edit a configuration script for the virtual VAX 66x0 and install a VAX operating system, for instance VAX/VMS. The configuration procedure is described in the next chapters.

4.5 De-installation of CHARON-VAX/66X0

You can remove CHARON-VAX/66X0 using the CHARON installation tool. It can be called from the standard place:

`Start > Settings > Control Panel > Add/Remove programs.`

4.6 Default installation

File locations

The default Windows installation folder (Win32) for CHARON products is "C:\Program Files\CHARON". The default installation puts the following files in the default installation folder:

Build_xxxxx folder contains the vx66X0.exe and its associated DLLs, the default configuration file vx6k6X0.cfg, etc.

Utilities_1.x.xxx folder contains CHARON Launcher, The CHARON service manager, the SCSI CHECK Utility, CHARON Network Control Center, and several other ones described in the “Utilities” chapter.

Drivers folder is containing the CHARON drivers.

Start Menu

A Start menu item Program –> CHARON -> CHARON-66<x>0 **version 4.0.xxx** is added, with the following submenu items:

- **VAX 66<x>0 emulator** starts the CHARON-VAX/66X0 virtualization layer with the default configuration file.
- **Utility** folder contains various CHARON utilities and reporting tools (check the CHARON utilities manual for the details).

Desk-top icon

During installation a shortcut "VAX 66<x>0 emulator" is placed on the desktop. This starts the CHARON-VAX/66X0 virtualization layer with the default configuration file.

5 Configuring the virtual VAX 66X0

5.1 The VAX 6000 system architecture

In a hardware VAX 6000 system, the CPU, memory boards, peripheral controllers and adapters are connected through the central XMI system bus. For further expansion, optional XMI adapters provide a bridge to a secondary bus (e.g. the VAX-BI bus) with its own peripherals. This multiple bus structure can lead to large, complex systems with many different controllers.

CHARON-VAX/66X0 implements the central XMI system bus, the VAX CPU(s), memory, disk/tape controllers and the Ethernet components. When CHARON-VAX/66X0 starts, it follows a configuration script and assembles a virtual VAX system by combining models of the XMI bus, the VAX CPU, memory and controllers into a working unit and loading this in the host system.

The virtual peripheral devices are mapped in the configuration script to a device or service on the host system. For instance, a virtual DEMNA XMI Ethernet adapter is associated with a dedicated physical Ethernet controller in the host system, thus connecting the virtual VAX to a physical Ethernet network.

When the configuration script is fully executed, CHARON-VAX/66X0 has created a complete virtual VAX system. It then hands over control to the VAX CPU, which will boot the VAX system software in the same manner as would happen on VAX hardware.

The configuration script consists of one or more text files with a **.cfg** extension. To facilitate structuring of large configurations, a part of the configuration (e.g. the mapping of a block of VAX disk drives to a virtual CI controller) can be stored in a separate file. Such file is incorporated in the main script with the `include` command.

Up to version 2.0.76 of CHARON-VAX/66X0 two configuration files were provided as a configuration template: the system definition (vx6k6x0.cfg) and a template for the user settings. Because both files required modification, and CI configuration adds additional complexity, This scheme has been replaced in version 2.0.77 by a single basic template for each 66x0 model. The relevant template files are located in the installation directory and listed in chapter 9 of this manual. When upgrading, it is recommended to adapt the user configuration files, although the older versions are compatible.

You can create a custom configuration script with the following steps:

1. Copy the vx6k610.cfg (vx6k620.cfg etc…) to your private configuration file (for example: my66X0.cfg);

2. Write a comment at the top of the my66X0.cfg to define the purpose for this configuration;
3. Define the amount of RAM you require (for example: set ram size=1024), default is 512Mb;
4. Define the virtual operator console mapping (for example Putty terminal: set OPA0 port=10003 application="putty –load OPA0");
5. Define the storage units (for example: set DUA container[0]="system72.vdisk"). This unit will appear in CHARON-VAX as DUA0;
6. Define the Ethernet NIC device connection (for example: set EXA_0 interface="connection:CHARON" This device will appear under VMS as EXA. Make sure that, before starting CHARON-VAX, you have the CHARON NDIS6 driver installed and configured and rebooted the host system after that; It's recommended to use Network Control Center utility (described in section 7.3) for the network configuration;
7. Now you can run the configured system.

5.2 The configuration command syntax

This chapter describes the meaning and the syntax of the configuration commands grouped according to the type of component. The configuration commands are summarized in appendix B.

There are two types of configuration commands:

The **load** command instructs CHARON-VAX/66X0 to add a component to a system bus.

The **set** command defines the characteristics of a loaded component.

To be able to load and manipulate more than one copy of a particular component a logical name is assigned to each loaded component as the following example shows:

```
Load "component A" NAME1
Load "component A" NAME2
```

NAME1 and NAME2 are freely chosen names *that are only relevant within the configuration file.* These names have no meaning and will never show up in the operating system running on the virtual VAX.

Using their logical names the two identical components (for instance two DEMNA Ethernet adapters) can now be given individual parameters (for instance the IDs of the host adapters they should use). The example configuration files in the Appendix A show how the logical names are used.

The parameters used with the **set** commands are typically assigned to something, which can be a **true/false** statement, a **number** or a **text string**. Numbers can be expressed in different formats, as it can be more convenient to use octal or hexadecimal formats:

For octal use a number starting with 0; use the symbols 0 – 7. Example: 07665

For decimal use a number starting with 1 - 9. Example: 12345

For hexadecimal use a number starting with 0x; 0 - 9 and a – f. Example: 0x1234abc

The **set** commands are listed separately in this manual for clarity. Alternatively, all **load** commands can be extended with one or more of their relevant **set** commands to get a more compact configuration file. For instance:

```
Load "component A" NAME1 <parameter>="abcd"
```

Is equivalent to:

```
Load "component A" NAME1
Set NAME1 <parameter>="abcd"
```

5.3 Multi -instance running

CHARON-VAX/66X0 supports several instances of the emulators running on the same host. To install such configuration the following steps should be done:

1. The host system should have enough CPUs and memory to provide them to all the emulators.

   Each VAX CPU emulation occupies one host CPU, so the total number of CPUs should be bigger, than a sum of all the emulated CPUs. Note that some CPUs needs to be used for I/O processing and at least one CPU – for the operating system housekeeping. Thus the total amount of the host CPUs depends on the number of the CPUs needed for I/O. The general recommendation is to leave at least 1/3 of the CPUs available to an instance for the instance I/O, but depending on data flow this number can be increased / decreased for each instance separately.

   The minimal host memory is calculated as a sum of emulated memory of each the CHARON-VAX 66X0 instances plus at least 1.5 Gb of additional memory.

2. Configuration file of each CHARON-VAX 66X0 instance should exactly specify the following:

   a) The number of CPUs chosen for I/O operations (**“n_of_io_cpus”**). By default this parameter is equal to 1/3 of the CPUs available for certain emulator (round by 1) and of course this value cannot be less than one. But it is possible to dedicate a chosen number of CPUs for I/O processing in case of intensive or, in opposite case, very shallow data flow.

b) Number of the CPUs the instance allocates. By default CHARON-VAX 66X0 instance grabs as many CPUs as possible. To balance the number of host CPUs between different instances a special parameter **“affinity”** is provided. This parameter specifies what CPUs in particular each instance can allocate.

c) The instance name (“**configuration_name**”) helps to distinguish the particular CHARON-VAX/XX instance. The name specified in this parameter is displayed at the CHARON-VAX/XX tray icon

Using those 2 parameters it’s possible to balance all the running instances and thus achieve desired performance.

Note that log, rom, nvram and toy containers should have different names for all the instances!

3. Once the configuration files are updated for each particular instance CHARON-VAX 66X0 that’s the time to run them. At the moment the Launcher utility does not support multi-instance running, so it is possible:

   a) Run each instance from a shortcut. In this case a shortcut should contain a proper configuration file name for each instance as parameter.

   b) Run each instance from command line. Open up the cmd.exe (Start->Run, type “cmd.exe”, cd to the directory where CHARON-VAX 66X0 executables are installed, type “<name of the executable> <name of the configuration file>” and press Enter, Repeat the last actions for all the instances to be run in the same time. Note that the configuration files must be different for each one!

   Example:

   - vx6k630.exe vax1.cfg
   - vx6k620.exe vax2.cfg

See the next chapter for detailed description of the “configuration_name”, “n_of_io_cpus”.and “affinity” parameters.

5.4 General configuration parameters

A few **set** parameters have no **load** equivalent; they set general parameters influencing startup and logging:

Set parameters	Type	Value
session hw_model	Text string	The VAX CPU model for which the configuration file is designed
session log	Text string	A string specifying the file name to store a log of the session.
session log_method	Text string	"overwrite" (default) or "append". Determines if prior log information is maintained.
log_show_messages	Text string	Defines the message types that should be shown. The parameter is a string of comma delimited words: "all", "info", "warning" and "error" which defines which message types should be logged. The default value is "all" message types.
log_repeat_filter	Text string	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 previous message has been repeated N times.", and the counter is cleared
xmi boot	Text string	"Auto" or "manual" (default). Determines if the VAX will stop at the >>> prompt after the self-tests are passed.
eeprom container	Text string	A string specifying file name to store the content of the eeprom
session log_locale	Text string	Tells the language of message database. So far the following values are recognized: “Dutch”, “English”, “Swedish”, “Spanish”, “Chinese-Simplified”. By default it is set to “English”. If specified an unsupported value, “English” is used. For example: **`set session log_locale=”Dutch”`**
session affinity	Text string	Overrides initial process’s affinity mask provided by host operating system (Note: Windows only). Once specified it allows binding the running instance of emulator to particular host CPUs. Might be used for soft partitioning host CPU resources, for isolating host CPUs for other applications. By default the emulator instance allocates as many host

Set parameters	Type	Value
		CPUs as possible. The “affinity” overrides that and allows explicit specification on which host CPU the instance shall run. Host CPUs are enumerated as comma separated list of host system assigned CPU numbers, for example: **set session affinity=”0, 2, 4, 6”**
session n_of_io_cpus	Numeric	Says how many host CPUs (of those specified by “affinity” parameter, if any) the emulator shall use for I/O handling. By default the emulator instance reserves one third of available host CPUs for I/O processing (round down, at least one). The “n_of_io_cpus” overrides that by specifying number of I/O host CPUs explicitly, for example: **set session n_of_io_cpus=2**
session configuration_name	Text String	A string specifying the name of the CHARON-VAX/XX instance. It is displayed by the CHARON-VAX/XX tray icon. The main use is distinguishing one instance from another one in case of the simultaneous running.

Example:

```
set session hw_model="VAX_6000_Model_610"
```

This command specifies for which VAX CPU model the configuration file is designed. This must be the first command in a configuration file. The various CHARON-VAX products create specific virtual VAX CPU models, and have different configuration commands. This command helps to detect errors and prevents execution in case an incorrect virtual VAX model is started. If the **set session hw_model="...."** statement is not found, the configuration file is ignored, and the virtual VAX will not be activated.

Example:

```
set session log = "vx6k610.log" log_method="append"
```

Creates a log file in the directory where CHARON-VAX starts. Specify the full path to locate the log file elsewhere. The specified log file is created or overwritten at each start depending on the log_method parameter.

Example:

```
set xmi boot="auto"
```

This command enables automatic boot from the DEFAULT boot specification, which must be previously configured from the VAX console (>>> prompt). The value "manual" disables automatic boot to display the >>> prompt for input as soon as the self tests are passed.

- The disk device name in the VAX 6000-610 boot menu is DUn, where "n" is the number of the container configured for the KDM70. >>> BOOT DU0 will boot from the disk (image) configured for container[0]
- To configure the DEFAULT boot, specify the XMI address of the KDM70 controller and the disk to boot from at the >>> prompt. The following setting will configure the default BOOT device to be set to container[6] on a KDM70 controller located on the 11th ("B") XMI slot:

```
>>>SET BOOT DEFAULT /XMI:B DU6
```

Once any of the SRM console parameters is changed this setting is preserved in a file and used at the next start.

Example:

```
set eeprom container="vx6k610.rom"
```

This command enables automatic saving of the EEPROM parameters (i.e. default boot drive) to the specified file. The EEPROM file is created in the directory where CHARON-VAX starts. The EEPROM file is created or overwritten each time a parameter relevant to EEPROM content is changed.

5.5 Data storage in the virtualization layer

Physical disks and disk images

Disk storage for the virtual VAX can have three alternative forms:

1. Disk images, which are essentially binary files in the local Windows host system or a network share. The advantages of disk images are that they are fast and can be copied easily. Backup is easy with standard Windows tools and fast, making lengthy VMS backups unnecessary. By copying a VAX system or user disk back in place, the disk is fully restored.

   The disk images can easily be compressed and sent to a remote site, facilitating remote maintenance and upgrade of CHARON-VAX systems. Disk images can be local to the host system where CHARON-VAX/66X0 runs or can be located on an iSCSI or fiber channel connected storage unit.

   It is NOT recommended to define disk images in network shared Windows directories. A disconnect of the network will permanently disable access from CHARON-VAX to the remote disk image.

2. Physical SCSI disks connected to a SCSI host adapter in the Windows host system or an iSCSI Initiator in the Windows host system. These SCSI disks must not contain a file system known to the Windows operating system;

otherwise the drive will not be available for use in CHARON-VAX/66X0. With the utility "Disk Management" (Control Panel | Administrative Tools | Computer Management | Disk Management) you can verify that Windows has not allocated the disks. If it has, use the disk management tool to delete the partition (i.e. destroy the file system) and thus release the disk.

Using a host SCSI or iSCSI connection permits the use of ATA or SCSI drives on a storage backend and the possibility to configure these physical disks in a high reliability RAID of VMS disk cluster configuration.

3. Floppy disk, CD and DVD devices on the host server can be used by the virtualization layer by specifying the usual Windows device name in the configuration script. For example: "\\.\A:" (floppy disk A); "\\.\CdRom0" (the first CDROM or DVD drive on the host).

Note that disk images and physical SCSI disks offer similar I/O throughput. Disk images can be generated with the MKDISK utility.

Physical tapes and tape images

Tape support via the KDM70 is not implemented on VAX 6600 hardware systems. However, in CHARON-VAX/66X0, the virtual KDM70 is modified to support tape handling. Booting from KDM70 connected tapes is not supported, as no boot ROM mechanism exists.

Tape handling is implemented in CHARON-VAX/66X0 in two different ways:

1. A SCSI tape drive can be connected to a SCSI controller in the Windows host system. Its Windows tape driver must be installed; the device is referenced in the configuration file with its usual Windows device name. For instance "\\.\Tape0" is the first tape drive connected to the host system. The tape operation speed is essentially limited by the capabilities of the physical tape drive and the throughput of the SCSI connection.

2. A physical tape drive can be replaced by a file (default extension .vtape). This file is a binary replica of a physical tape, and can be converted to/from a physical tape with the MTD utility. The tape operation speed is essentially limited by the file handling speed of the host operating system since no tape positioning movements are required, usually resulting in much faster R/W operations.

   Note: It is NOT recommended to define tape images in network shared Windows directories.

5.6 The VAX 6000 CPU and its console interface

There is no **load** command for the virtual CPUs in CHARON-VAX 66X0. Each specific product loads the required number of VAX CPU components by default. The logical name for the collective VAX CPUs is **cpu**.

CPU emulation mode

Set cpu parameter	Type	Value
ace_mode	Boolean	True or False

CHARON-VAX/66X0 defaults to the Advanced VAX CPU Execution mode (ACE). The user can set **ace_mode** to ‘**false**’ to force the diagnostic VAX instruction "interpretation" mode in the unlikely case that a voluntary slowdown of CHARON-VAX/66X0 by a factor 3 -5 is desired.

Example:

```
set cpu ace_mode=false
```

If host system resources are insufficient, CHARON-VAX/66X0 will automatically disable ACE. For certain product licenses ACE can be disabled in the license key. If the CHARON-VAX license does not enable ACE, setting **ace_mode** to ‘true’ has no effect. The ACE mode is reported in the log file.

CPU allocation on the XMI bus

CHARON-VAX/66X0 automatically allocates specific XMI slots for the virtual VAX CPUs, depending on the system model selected. XMI slot 1 is always occupied with the primary CPU. Slot 2 is available for an I/O controller, the default configuration file loads the KDM70.

For SMP VAX systems, the additional CPUs are loaded starting from XMI slot 7, counting downwards. For example, a virtual VAX 6660 (6 VAX CPUs) has CPUs in slots 1,3,4,5,6,7. With slots 8 and 9 used by the virtual VAX memory subsystem, slots 10 – 14 are available for additional I/O controllers.

When not occupied by CPUs, XMI slots 3, 4 and 5 can be used for additional XMI I/O controllers. XMI slots 6 and 7 should not be used for I/O controllers.

The CPU console interface

The VAX 66X0 has one serial console port, which in CHARON-VAX/66X0 is identified with the logical name **OPA0**. To use the **OPA0** a physical or logical line connection must be loaded in the configuration file.

Except for the console port, the virtual VAX 6610 does not provide virtual serial ports. Terminals can be connected to CHARON-VAX/66X0 via TCP/IP or LAT terminal servers.

Load parameter	Function
physical_serial_line	This configuration file command associates a COM port in the Windows host system with the OPA0 console port. The COM port can be a physical port part of the host system hardware or a logical COM port as created by an Ethernet serial port device.
virtual_serial_line	This command associates a network connection in the Windows

Load parameter	Function
	host system with the OPA0 console port.

Set physical_serial_line parameter	Type	Value
Line	Text string	"\\.\COMn" A defined COM port on the Windows host system.
Break_on	Text string	Defines a key (combination of keys) for the break operation. "Ctrl-P" or/and "Break" – specify one of them or both separating with comma (",") "none" – No break key is defined The default value is "Break"

Example:

```
Load physical_serial_line OPA0
set OPA0 break_on="Ctrl-P,Break"
set OPA0 line="\\.\COM1"
```

or in a more compact form:

```
Load physical_serial_line OPA0 line="\\.\COM1"
```

Set virtual_serial_line parameter	Type	Value
Host	Text string	The host IP address or host name to connect to. If omitted, the circuit will listen on the specified port. Specify the port in the following form: <host name>:<port>. If the <port> value is absent the virtualization layer assumes that it is equal to the number specified by "Port" parameter.
Port	Numeric	The port number for the virtual circuit. The circuit will always listen on this port but also try to connect if the host is specified.
Application	Text string	The application to run. For example a 3rd party terminal emulator connecting to a specified port. Specify a file known to the operating system. E.G. an *.ht file to invoke Hyper Terminal with the parameters stored within that file.
break_on	Text string	Defines a key (or combination of keys) for the break operation. This works only for the console line! "Ctrl-P" and/or "Break" and/or "F5" Separate the parameters with a comma. "none" – No break key is defined

Set virtual_serial_line parameter	Type	Value
		The default value is "F5, Break"
stop_on	Text string	Defines a key (combination of keys) to tell the virtualization layer which external events could trigger a STOP condition. This works only for the console line! "F6" and/or "Application"– specify one of them or all separating with a comma (",") "none" – No stop key is defined The default value is "F6" Set to "Application" to trigger the STOP condition when the associated application terminates. Use this option only for virtual_serial_lines configured for automatic application invocation (where the APPLICATION parameter specifies a valid application). Press the "F6" button to trigger the STOP condition upon reception of the sequence "<ESC>[17~". Terminal emulators may send these sequences when pressing the F6 button.

Example defining a local PuTTY session as the console terminal:

```
Load virtual_serial_line OPA0 break_on="Ctrl-P,F5"

set OPA0 port=10003 stop_on="F6,Application"

set OPA0 application=" putty.exe -load OPA0"
```

or in a more compact form:

```
load virtual_serial_line OPA0 port=10003 application="
    putty.exe -load OPA0"
```

The file **OPA0** is a parameter for the Putty terminal emulator loading settings for this particular session. This example defines the VAX console as an application on node 192.168.1.1, which should be listening on port 10000 when CHARON-VAX/66X0 starts:

```
Load virtual_serial_line OPA0 host="192.168.1.1" port=10000
```

Note: The standard Windows Hyperterm terminal emulator can generate some spurious characters when VMS starts up. Typing a carriage return will remove these and allow a correct entry of a command at the VMS prompt.

5.7 Specifying VAX memory

A hardware VAX 66X0 uses a maximum of 4 XMI slots for system memory. As of version 2.0.77 CHARON-VAX/66X0 uses only slots 8 and/or 9 of the virtual

XMI bus for memory, and automatically calculates and loads the appropriate memory cards. This reduction, due to the use of high density (1 and 2 GB) virtual memory modules, provides more XMI slots for peripherals.

The memory subsystem is permanently loaded and has the logical name **ram**. The effective amount of memory is determined in steps, starting with the **set ram size** statement in the configuration file:

1. If no **set ram** statement is found, the memory size is set to 512 MB.
2. Where applicable, the memory is capped to the maximum as defined in the CHARON license key.
3. If the virtual VAX6000 is loaded on a 32 bit operating system, the maximum size is capped to 2176 MB (2048 + 128), the maximum that can be locked into host system memory.
4. On a 64 bit host operating system the memory size is capped at 3 GB.
5. The component library contains memory modules of the following sizes (in MB): 32,64,128,256,512,1024 and 2048. The requested size is rounded down to closest size of that can be built with 2 modules.

Examples (the size must be specified in MB):

```
set ram size = 512
```

Creates 512 MB

```
set ram size = 3072
```

Creates 3 GB VAX memory when the virtual VAX is loaded on 64 bit Windows and 2176 MB VAX memory when loaded on 32 bit Windows.

In addition, CHARON-VAX/66X0 will generate an error message in the log file and reduce its effective memory size further if the Windows host system cannot allocate enough memory to map the calculated VAX memory size.

Windows 32 bit host system settings

When more than 1.5 GB VAX memory is configured, a 32 bit Windows host system must be configured for 'large application memory'. This is done by adding the /PAE and /3GB switches to the Windows boot.ini file.

To set the /3GB Startup Switch in Windows:

1. Right-click My Computer and select Properties. The System Properties dialog box will appear.
2. Click the Advanced tab.
3. In the Startup and Recovery area, click Settings. The Startup and Recovery dialog box will appear.
4. In the System startup area, click Edit. This will open the Windows boot.ini file in Notepad.

5. In the [Operating Systems] section, add the following switches to the end of the startup line that includes the /fastdetect switch: /3GB
6. Save the changes and close Notepad.
7. Click OK two times to close the open dialog boxes, and then restart the computer for the change to take effect.

Note, this procedure is not required for 64 bit Windows. For more information, see the Windows documentation on large application addressing.

5.8 The KDM70 disk/tape controller

The KDM70 is an MSCP/TMSCP disk and tape controller for the VAX 6000. (T)MSCP controllers are highly autonomous units that offload the VAX CPU significantly.

The virtual KDM70 controller in CHARON-VAX/66X0 supports 256 disks and tapes instead of the 8 disk limitation in the original hardware. The 256 devices are recognized by the VAX/VMS operating system. This design modification has the advantage to utilize only one XMI slot for up to 256 disk and tape devices.

The I/O behavior of the virtual KDM70 is as follows:

- Up to 16 connected disks operate in parallel without any I/O performance degradation.
- For systems with more than 16 heavily used disks configure two controllers and distribute the heavily loaded disks evenly.
- As in the hardware KDM70, VMS can be booted only from the first 10 devices on the KDM70 (DU0 - DU9).
- Hardware KDM70's do not support tape drives. The virtual KDM70's support a transparent extension for data tapes (one cannot boot tapes from this tape device).

KDM70 configuration parameters

Load parameter	Function
KDM70	This command creates an instance of the KDM70 (T)MSCP controller and associates it with a logical name.

Example:

```
load KDM70 PUA
```

Set KDM70 parameter	Type	Value
xmi_node_id	Number	Specifies the XMI slot in which the virtual KDM70 controller is placed. For CHARON-VAX/66X0 a free slot between 10 (A) and 14 (E) must be chosen.
container[N] N=0…9999	Text string	N to be replaced by a decimal number between 0 and 255 to specify the N'th drive. The text string specifies the file name of the disk / tape container file, or the device name in Windows format: "dua0.vdisk" This is a disk image in the default CHARON directory. "C:\temp\mua11.vtape" This is a tape image in the "temp" directory on drive C: "\\.\A:" Floppy drive A will now read VMS formatted floppy drives "\\.\CdRom0" The first CD-Rom in the Widows system "\\.\PhysicalDrive5" The 5th physical drive on the Windows system as reported by the disk manager "\\.\Tape0" The physical tape drive on the Windows system as reported by the device manager.
media_type[N] N=0…9999	Text string	Overrides default (automatically determined) MSCP media type of the device. Syntax: "<device-name>,<device-type>" Where: <device-name> is one of "DU", "MU", "DK", "MK", "SCSI", "DI", "MI", "DSSI", "DJ", "MJ"; <device-type> is of the form "LLD" or "LLLD", where "L" is letter from A through Z, and "D" is decimal number from 0 through 99. If not specified device name is set to "DU", and device type is selected based on disk size for disk units, and to "MU" and "TA85" respectively for tape units. Initialy not specified.

Set KDM70 parameter	Type	Value
geometry[N] N=0…9999	Text string	This string value with a special format specifies the explicit geometry of the disk storage element with DSSI node id N and MSCP unit number N. This parameter is not applicable to tape storage elements. The string format is <X>"/"<Y>["/"<Z>] where: • X is number of sectors on track; • Y is number of tracks on cylinder; • Z (optional) is 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; If this parameter is not set, CHARON-VAX will configure the geometry based on the most probable disk type. Initially not specified. Not applicable to tape units.
use_io_file_buffering[N] N=0…9999	Boolean	Enables use of host OS I/O buffering. Initially set to "NO" (buffering disabled). Not applicable to tape units.

Examples:

Create a KDM70 (T)MSCP controller in XMI slot 10:

```
load KDM70/KDM70 PUA xmi_node_id=10
```

Configure on this controller a system disk to show up as DUA0: in VMS:

```
set PUA container[0]="vms72-66X0.vdisk"
```

Configure a user disk to show up as DUA1: in VMS:

```
set PUA container[1]="usertest.vdisk"
```

Configure the first SCSI tape drive connected to the host to show up as MUA0: in VMS:

```
set PUA container[4]="\\.\Tape0"
```

The file my_tape.vtape in the default directory is used by VMS as MUA1:

```
set PUA container[5]="my_tape.vtape"
```

The first host system CD-ROM can be used to read VMS CDs and shows up as DUA9:

```
set PUA container[9]="\\.\CdRom0"
```

The host system floppy drive A: can be used in VMS as DUA10:

```
set PUA container[10]="\\.\A:"
```

Notes:

- To make a distinction between a disk image and a tape image, the virtual KDM70 looks at the file extension; **.vdisk** respectively **.vtape.**
- Configured physical devices or tape/disk images that do not exist on the host system will in general cause VAX/VMS to report that the unit is offline. In some cases this can result in a VMS BUG CHECK, but in this case the error is noted in the log file.

5.9 The CIXCD CI host adapter

The virtual CIXCD is the functional equivalent of a hardware CIXCD host adapter, with the exception that there is no physical layer to connect to a hardware CI infrastructure. Since the current host hardware is an order of magnitude faster than the physical CI implementation, such connection - if it were possible - would greatly limit the virtual system throughput.

For data storage, the CIXCD connects to one or more virtual HSJ50 controllers that are loaded as a separate component in the configuration file. To configure VAX CI clusters, the virtual CIXCDs of the multiple CHARON-VAX/66X0 instances are interconnected via TCP/IP links.

Configuring (large) virtual VAX CI clusters require many configurable parameters and an replicated identical definition of the shared virtual HSJ50 storage controllers in each virtual VAX instance. Cluster configuration details are provided in the chapter "Cluster Interconnect (CI) configuration".

To connect a virtual VAX 66x0 to a virtual CI network, the CHARON-VAX configuration file must load at least one virtual CIXCD host adapter; one unit is sufficient in all practical cases.

Note that VAXI/VMS enumerates the virtual CIXCD host adapters in the order of increasing XMI node IDs, and assigns them the VMS internal names PAA, PAB, etc. It is recommended for clarity to keep the same naming scheme for virtual CIXCD host adapters in the configuration file.

To load a CIXCD host adapter instance and assign it the instance name PAA:

```
load CIXCD PAA
```

CIXCD configuration parameters

Parameter	*Description*
xmi_node_id	An integer value that specifies the location of the virtual CIXCD host adapter on the XMI bus.

Parameter	Description
	Possible values are from 11 through 14 (Initially set to 14).
ci_node_id	An integer value that specifies the address of the virtual CIXCD host adapter on the virtual CI network. Possible values are from 0 through 127 (Initially set to 127).
port[N] N=0…127	An integer value that specifies the TCP/IP port number at which the virtual CIXCD host adapter listens for connections from another virtual CIXCD host adapter with address N. Possible values are from 1024 through 32767 (Initially not set).
host[N] N=0…127	A string value that specifies the TCP/IP host name (and optionally the TCP/IP port number) to connect to another virtual CIXCD host adapter with address N. The syntax for the string is "host-name[:port-no]", with possible values for port-no in the range from 1024 through 32767 (Initially not set).

These parameters can be added to the load command or specified separately in a **`set`** command. The example below shows how to configure a virtual CIXCD adapter with a location on the XMI bus other than the default. It declares a CIXCD adapter in slot 11 (0xB stands for decimal 11) of the virtual XMI bus:

```
load CIXCD PAA xmi_node_id=0xB
```

For non-clustered configurations, the default values of the virtual CIXCD simplify configuration. The configuration file below creates a virtual VAX 6610 (single CPU) node with one virtual HSJ50 storage controller serving two disks to the VAX over a virtual CI network:

```
set session hw_model="VAX_6000_Model_610"
set session log="vax6610.log"
set toy container="vax6610.dat"
set eeprom container="vax6610.rom"
load virtual_serial_line OPA0 port=10003 application="opa0.ht"
load CIXCD PAA
load HSJ50 DISKS
set DISKS container[0]="C:\mydisks\dua0-rz24-vms-v6.2.vdisk"
set DISKS container[1]="C:\mydisks\dua1-rz24-vms-v6.2.vdisk"
```

5.10 The HSJ50 storage controller

The virtual HSJ50 storage controller functionally replaces a physical HSJ50 CI storage unit. It supports virtual and physical disks, tapes and removable storage devices that are mapped on local or remote host platform storage. The virtual HSJ50 cannot connect to a physical CI infrastructure.

In a single CHARON-VAX/66X0 instance without a CI cluster, the virtual HSJ50 is located as a separate entity on the same host platform. In a CI cluster, the definition of each HSJ50 is replicated exactly in each CHARON-VAX CI node. In most cases one HSJ50 storage controller per virtual CI network is enough.

When loading an instance of a virtual HSJ50 storage controller, the CHARON-VAX configuration file must supply a unique reference name for that instance. While this name is only valid within the configuration file, it is recommended for clarity that the VMS SCSNODENAME is used as instance name.

The line below loads a virtual HSJ50 storage controller and assigns it the instance name MYDISKS:

```
load HSJ50 MYDISKS
```

HSJ50 configuration parameters

As per CHARON configuration file syntax, all integer values can be entered in Hex, Decimal or Octal form:

Parameter	***Description***
ci_host_name	A string value which specifies the instance name of the virtual CIXCD host adapter serving the same virtual CI network. If this value is not set, CHARON-VAX will try to locate the host adapter automatically. This automatic lookup works only if the CHARON-VAX configuration has exactly one instance of a virtual CIXCD host adapter.
ci_node_id	An integer value which specifies the address of a virtual HSJ50 storage controller on the virtual CI network. Possible values are from 0 through 127 (initially set to 127).
scs_node_name	A string value that specifies the SCSNODENAME of the virtual HSJ50 storage controller. The string is up to 6 characters long. Possible characters are uppercase letters A through Z , figures 0 through 9. Initially set to the name of the virtual HSJ50 controller.

Parameter	***Description***
scs_system_id	An integer value that specifies the SCSSYSTEMID of the virtual HSJ50 storage controller. Initially set to an arbitrary value that is guaranteed to be unique within the running virtual VAX 66x0 node.
mscp_allocation_class	An integer value which specified the ALLOCLASS of the virtual HSJ50 storage controller. Possible values are from 0 through 255 (initially set to 0).
container[N] N=0…9999	A string value that specifies the container of the storage element with MSCP unit number N. This storage element might be either a (virtual) disk or tape. In VMS , these storage elements appear as HSX00 disks (DUA*N*:) or HST00 tapes (MUA*N*:). Possible values of the parameter are strings in one of the following forms: ● "\\.\PhysicalDriveX", where X is 0, 1, … for accessing non-removable physical disk drives; ● "\\.\CdRomX", where X is 0, 1, … for accessing compact disk drives (read-only); ● "\\.\TapeX", where X is 0, 1, … for accessing physical tape drives; ● "\\.\L", where L is A, B, … for accessing removable disk drives (floppies, some optical media, …); ● [<path-name>"\"]<file-name>[".vdisk"] for accessing CHARON disk images, or CHARON virtual disks; ● [<path-name>"\"]<file-name>[".dsk"] for accessing CHARON disk images, or CHARON virtual disks; ● [<path-name>"\"]<file-name>".vtape" for accessing CHARON tape images, or CHARON virtual tapes; ● [<path-name>"\"]<file-name>".mtd" for accessing CHARON tape images, or CHARON virtual tapes;

Parameter	*Description*
	This parameter is initially not set, thus creating NO storage elements on the controller.
media_type[N]	Overrides default (automatically determined) MSCP media type of the device. Syntax: “<device-name>,<device-type>” Where: <device-name> is one of “DU”, “MU”, “DK”, “MK”, “SCSI”, “DI”, “MI”, “DSSI”, “DJ”, “MJ”; <device-type> is of the form “LLD” or “LLLD”, where “L” is letter from A through Z, and “D” is decimal number from 0 through 99. If not specified device name is set to “DU”, and device type is set to “HSX00” for disk unit, and to “MU” and “HST00” respectively for tape unit. Initialy not specified.
geometry[N] N=0…9999	This string value with a special format specifies the explicit geometry of the disk storage element with MSCP unit number N. This parameter should not be used for tape storage elements. The string format is <X>"/"<Y>["/"<Z>] where ● X is number of sectors on track; ● Y is number of tracks on cylinder; ● Z (optional) is 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; If this parameter is not set, CHARON-VAX will configure the geometry based on the most probable disk type. Not applicable to tape units.
use_io_file_buffering [N]	Enables use of host OS I/O buffering. Initially set to “NO” (buffering disabled). Not applicable to tape units.

The following example configures a virtual HSJ50 storage controller with a non-default CI network address of 75:

```
load HSJ50 DISKS ci_node_id=75
```

Configuration example: One VAX system and 2 disks

This is the configuration of a virtual VAX 6610, as described before:

```
set session hw_model="VAX_6000_Model_610"
set session log=" vax6610.log"
set toy container="vax6610.dat"
set eeprom container="vax6610.rom"
load virtual_serial_line OPA0 port=10003 application="opa0.ht"
load CIXCD PAA
load HSJ50 DISKS
set DISKS container[0]="C:\mydisks\dua0-rz24-vms-v6.2.vdisk"
set DISKS container[1]="C:\mydisks\dua1-rz24-vms-v6.2.vdisk"
```

When this configuration file is executed and container[0] points to a valid VMS system disk image, the virtual VAX 6610 can boot VMS with the following command:

```
>>> BOOT /XMI:E /NODE:0 DU0
```

In the above boot command, "/XMI:E" and "/NODE:0" instruct the boot ROM to connect to the disk via the host adapter in XMI slot 14 (this is the default CIXCD XMI node ID, the hex value E stands for decimal 14). Then via the storage controller with CI node id 0, DU0 is reached (defined as container[0]) and the boot command is executed for the associated file on the host system.

After logging into VMS, the "SHOW DEVICE" command displays the following:

```
$ sho dev

Device                    Device            Error     Volume          Free  Trans
Mnt
 Name                     Status            Count      Label         Blocks Count
Cnt
DISKS$DUA0:          Mounted             0  DSSI01           32022   147   1
DISKS$DUA1:          Online              0

Device                  Device           Error
 Name                   Status           Count
OPA0:                   Online               0
FTA0:                   Offline              0

Device                  Device           Error
 Name                   Status           Count
PAA0:                   Online               0
$ _
```

5.11 The DEMNA Ethernet controller

The DEMNA is an Ethernet/802 controller for the VAX 6000 XMI bus. CHARON-VAX/66X0 maps the virtual DEMNA on a dedicated Ethernet adapter in the Windows host system. The Ethernet adapter 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.

The virtual DEMNA requires the installation of the CHARON-VAX NDIS6 packet driver, which provides a direct link between the virtual system and the adapter hardware. The driver installation is described in chapter 4. The proper sequence is to first load a DEMNA, then create a logical name for a connection to the NDIS6 packet driver and finally link the two logical names.

DEMNA configuration

Load parameter	Function
DEMNA	This command creates an instance of the DEMNA XMI Ethernet controller and associates it with a logical name.

```
Example: load DEMNA/DEMNA EXA
```

Set parameter for DEMNA	Type	Value
xmi_node_id	Number	Specifies the XMI slot in which the virtual DEMNA controller is placed. For CHARON-VAX/66X0 a free slot between 10 (A) and 14 (E) must be chosen.
interface	Text string	This connects the logical name representing a DEMNA instance with the logical name of a host network port, after the host network port is loaded.
station_address	Ethernet address	Station_address allows to specify the permanent address of the adapter. The default permanent address is read from the host system's NIC. Setting the station_address is required when configuring a satellite (remotely booted) system that runs DECnet or when a VAX application uses the NIC permanent address for license protection. Format: XX-XX-XX-XX-XX-XX or XX:XX:XX:XX:XX:XX

Set parameter for DEMNA	Type	Value
rx_fifo_size	Numeric	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 receive queue. Typically, you don't need to change the rx_fifo_size parameter. It is available for extended tuning and bug hunting purposes.

Examples:

```
set EXA xmi_node_id=11
set EXA station_address="XX:XX:XX:XX:XX:XX"
```

Any of the above **set** parameters can also be incorporated in the load command. Example:

```
load DEMNA/DEMNA EXA xmi_node_id=11
```

Assuming that the network packet port (see next paragraph) is defined as **EXA0**, the following command connects the configured DEMNA with this logical packet port:

```
set EXA interface=EXA0
```

It is recommended to check the sample configuration files to see the correct structure of the Ethernet configuration commands.

If your VAX/VMS system disk is configured for automatic TCP/IP startup and you use UCX, not loading an Ethernet adapter in the CHARON-VAX/66X0 configuration can cause a VMS crash. The problem appears only if UCX is enabled while the networking device is missing. DECnet works correctly.

NDIS6 packet port configuration

The CHARON specific NDIS6 packet driver establishes the connection between an Ethernet adapter in the host system and the CHARON-VAX/66X0. For every DEMNA instance loaded, one dedicated host Ethernet adapter is required. On each of these Ethernet adapters the NDIS6 packet driver must be enabled and all Windows drivers and services disabled, as CHARON-VAX/66X0 needs exclusive use of these adapters for optimal performance and to avoid interference from the host network traffic. The installation procedure of the NDIS6 packet driver is described in chapter 4. After installation a system reboot is required.

Load parameter	***Function***
packet_port	This command associates a physical Ethernet adapter in the host system via the NDIS6 packet driver with a logical name.

Example: `load packet_port/chnetwrk EXA0`

It is convenient to extend the load command with the interface ID assignment. See the examples below.

Set parameter - ndis5_chpack_port	***Type***	***Value***
Interface	Text string	Identifies the connection name to be used. For the correct device name see below.
port_enable_mac_add_change	Boolean	If true (default), CHARON-VAX/66X0 sets the appropriate Ethernet address automatically. If false is specified set the Ethernet address manually with the NETSETUP utility.
port_retry_on_tx	Numeric	This parameter limits the number of times the port attempts to transmit a packet until giving up. By default, the value is 3. Increasing this value might introduce problems in carrier losing logic, because not all NIC drivers support carrier status query. Normally do not increase the value.
port_pending_rx_number	Numeric	This parameter sets the number of pending receive buffers. The default value is 64. The maximum value allowed by CHARON's Protocol Driver is 128. Increase this value when you have a heavy network load and experience losing connections not related to carrier loss.
port_pending_tx_number	Numeric	This parameter sets the number of buffers the port uses for transmit. The default value is 64, the maximum 128. Increase this value if the log file indicates dropped TX packets due to TX queue overflow.
suspend_msg_on_mac_change	Boolean	To avoid confusion arrising from non critical errors during MAC address change, by default, logging is supressed (default value is **true**). To enable tracing during MAC address change set this parameter to **false**

The connection name to be entered in the configuration file can be obtained from the Windows ‘connection properties’ applet: Start -> Settings -> Network and Dial-up connections. Note the connection name.

For example the box displays the connection named "CHARON"

The combined load and set interface command is:

```
load packet_port/chnetwrk EXA0
    interface="connection:CHARON"
```

The following command prevents VMS to automatically change the DECnet address in the adapter (little practical use):

```
set EXA0 port_enable_mac_addr_change=false
```

Once you have loaded a packet interface instance, connect the DEMNA via its logical name to the packet_port instance. The following configuration commands add a DEMNA instance to port 12 of the XMI, links an instance of the NDIS6 packet driver to a physical Ethernet adapter and connects both instances:

```
load DEMNA/DEMNA EXA xmi_node_id=11

load packet_port/chnetwrk EXA_0 interface="
    connection:CHARON"

set EXA interface=EXA_0
```

6 Cluster Interconnect (CI) configuration

The hardware Cluster Interconnect (CI) network has a star topology. On top of this topology, it establishes private node-to-node communication channels between any two CI nodes that are part of the same CI network. In this context, the CI storage controllers are also nodes like VAX computers, but are running special software.

The virtual CI implementation replicates this structure by establishing TCP/IP channels between each pair of virtual CIXCD host adapters, and by connecting the virtual HSJ50's to every CIXCD in the same virtual CI network. The definition of the virtual HSJ50's must be present in each participating virtual VAX node.

The use of TCP/IP for the virtual CI interconnects makes it possible to use the CI cluster distributed in a Wide Area Network. Note that, *in the current implementation,* packet loss in the virtual CI TCP/IP links can cause cluster malfunction, hence WAN operation is not recommended.

The current CI implementation for CHARON-VAX/66x0 supports up to 8 VAX nodes in a virtual CI cluster and handles a maximum cluster size of 128 nodes. A single virtual CI network supports up to 256 storage elements.

Cluster operation requires (virtual) disks that are simultaneously accessible by all CHARON-VAX nodes involved. This can be implemented for instance by using a properly configured iSCSI initiator / target structure or a fiber channel storage back-end. For test purposes Windows remote shares can be used, but these do not offer the reliability required for a VAX cluster. Disks on a multiport SCSI switch are not acceptable, as a SCSI switch does not provides true simultaneous access to multiple nodes.

Note that the virtual CI subsystem has many configurable parameters when multiple nodes on a single CI are to be configured. Incorrect configuration, in particular non-identical specification of virtual HSJ50 disks in the CI nodes are likely to case data corruption. It is advisable to start building a complex configuration with implementing a single node and to use the cluster examples that are provided in this chapter.

6.1 Virtual CI cluster configuration rules

Consider a pair of virtual VAX 66x0 nodes: **VAX_A** and **VAX_B** running on host system **HOST_A** and **HOST_B** respectively.

These two VAX nodes have their own CIXCD host adapter interconnected with the virtual CI network. In order to communicate properly, these two adapters must have different CI node id's (CI_NODE_ID_A and CI_NODE_ID_B), which must be explicitly specified in the corresponding CHARON-VAX configuration files.

Hence, on HOST_A the CHARON-VAX configuration file must load the virtual CIXCD as follows:

```
load CIXCD PAA ci_node_id=CI_NODE_ID_A
```

On HOST_B, the CHARON-VAX configuration file loads the virtual CIXCD host adapter as follows:

```
load CIXCD PAA ci_node_id=CI_NODE_ID_B
```

Next, every CIXCD host adapter participating in the virtual CI cluster must be able to communicate to every other CIXCD host adapter in the same virtual CI cluster. Such communication is performed over TCP/IP links established between every two CIXCD host adapter instances.

A virtual CI cluster consisting of N VAX 66x0 nodes has $\frac{N \cdot (N-1)}{2}$ such links. Every end of such link is identified by the pair:

{<TCP/IP-HOST-NAME>,<TCP/IP-PORT-NO>}.

Hence, on HOST_A the CHARON-VAX configuration file describes the connection to HOST_B as follows:

```
set PAA port[CI_NODE_ID_B]=TCPIP_PORT_A_FOR_B
set PAA host[CI_NODE_ID_B]="HOST_B:TCPIP_PORT_B_FOR_A"
```

And on HOST_B the CHARON-VAX configuration file describes the connection to HOST_A as follows:

```
set PAA port[CI_NODE_ID_A]=TCPIP_PORT_B_FOR_A
set PAA host[CI_NODE_ID_A]="HOST_A:TCPIP_PORT_A_FOR_B"
```

Next, every CIXCD host adapter must also connect to all storage controllers on the same virtual CI network. This is similar to non-clustered CI configurations, except for the MSCP allocation class:

The VAX Cluster architecture requires that every VAX node participating in the cluster is assigned a specific MSCP allocation class. The same requirement applies to CI storage controllers, which are also nodes on the CI. Therefore, when configuring an instance of an virtual HSJ50 storage controller, the MSCP allocation class for that controller must be supplied through the corresponding parameter. For example, the following line:

```
load HSJ50 MYDISKS mscp_allocation_class=5
```

assigns the MYDISKS virtual storage controller the MSCP allocation class 5.

Note that in a CI cluster all VAX nodes and all storage controllers within the cluster must have the same MSCP allocation class value.

6.2 Example: a dual node VAX cluster with 4 disks

To setup two virtual VAX 66x0 nodes, the two host machines should preferably run the same version of Windows. Assume that these host systems have Windows host names CASTOR and POLLUX in the host TCP/IP network.

The following is the CHARON-VAX configuration file for the virtual VAX 6610 node named VAX001 running on the CASTOR host system:

```
set session hw_model="VAX_6000_Model_610"
set session log=" vax6610.log"
set toy container=" vax6610.dat"
set eeprom container=" vax6610.rom"

load virtual_serial_line OPA0 port=10003 application="opa0.ht"

load CIXCD PAA ci_node_id=1
set PAA port[2]=11012 host[2]="pollux:11021"

load HSJ50 DISKS ci_node_id=101
set DISKS scs_system_id=3238746238 mscp_allocation_class=1
set DISKS container[0]="H:\ourdisks\dua0-rz24-vms-v6.2.vdisk"
set DISKS container[1]="H:\ourdisks\dua1-rz24-vms-v6.2.vdisk"
set DISKS container[2]="H:\ourdisks\dua2-rz24-vms-v6.2.vdisk"
set DISKS container[3]="H:\ourdisks\dua3-rz24-vms-v6.2.vdisk"
```

The CHARON-VAX configuration file for the second virtual VAX 6610 node named VAX002 running on the POLLUX host system:

```
set session hw_model="VAX_6000_Model_610"
set session log=" vax6610.log"
set toy container=" vax6610.dat"
set eeprom container=" vax66102.rom"

load virtual_serial_line OPA0 port=10003 application="opa0.ht"

load CIXCD PAA ci_node_id=2
set PAA port[1]=11021 host[1]="castor:11012"

load HSJ50 DISKS ci_node_id=101
set DISKS scs_system_id=3238746238 mscp_allocation_class=1
set DISKS container[0]="H:\ourdisks\dua0-rz24-vms-v6.2.vdisk"
set DISKS container[1]="H:\ourdisks\dua1-rz24-vms-v6.2.vdisk"
set DISKS container[2]="H:\ourdisks\dua2-rz24-vms-v6.2.vdisk"
set DISKS container[3]="H:\ourdisks\dua3-rz24-vms-v6.2.vdisk"
```

Note that in both configuration files, the data related to the virtual HSJ50 storage controller devices must be identical. Not following this rule will very likely cause data corruption on the (virtual) disks. In this respect note the explicit specification of SCS_SYSTEM_ID for the storage controllers.

As mentioned earlier, CHARON-VAX loads an initial (default) value for the SCS_SYSTEM_ID that is guaranteed to be unique within the virtual instance. But with two instances these default values are likely to be different. Therefore, the SCS_SYSTEM_ID value must be specified explicitly for both virtual HSJ50 storage controllers to obtain an identical value.

This example also assumes that drive "H" is a network share, so that all disk images are accessible from both host machines.

6.3 Example: a 3 node VAX cluster with multiple iSCSI disks

In this example we assume that all three host systems have an iSCSI initiator (for example the Microsoft iSCSI initiator) and are connected to a common iSCSI server. The iSCSI disk server provides 8 virtual disks with R/W access on all hosts. These disks are configured as \\.\PhysicalDrive1 ... \\.\PhysicalDrive8 on each of the host machines.

Since the storage configuration must be identical on all three nodes, it is recommended to describe the storage structure in separate configuration file (to be included in each CHARON configuration file) and store it on a common Windows network share (H:):

```
load HSJ50 DISKS1 ci_node_id=101
set DISKS1 scs_system_id=3238746238 mscp_allocation_class=1
set DISKS1 container[1]="\\.\PhysicalDrive1"
set DISKS1 container[2]="\\.\PhysicalDrive2"
set DISKS1 container[3]="\\.\PhysicalDrive3"
set DISKS1 container[4]="\\.\PhysicalDrive4"

load HSJ50 DISKS2 ci_node_id=102
set DISKS2 scs_system_id=1256412654 mscp_allocation_class=1
set DISKS2 container[5]="\\.\PhysicalDrive5"
set DISKS2 container[6]="\\.\PhysicalDrive6"
set DISKS2 container[7]="\\.\PhysicalDrive7"
set DISKS2 container[8]="\\.\PhysicalDrive8"
```

The following is the CHARON-VAX configuration file for the virtual VAX 6610 node named VAX001 running on HOST001:

```
set session hw_model="VAX_6000_Model_610"
set session log=" vax6610.log"
set toy container=" vax6610.dat"
set eeprom container=" vax6610.rom"

load virtual_serial_line OPA0 port=10003 application="opa0.ht"

load CIXCD PAA ci_node_id=1
set PAA port[2]=11012 host[2]="host002:11021"
set PAA port[3]=11013 host[3]="host003:11031"

include h:\ourdisks\disksets.cfg
```

The configuration file for the virtual VAX 6610 node named VAX002 running on HOST002 is as follows:

```
set session hw_model="VAX_6000_Model_610"
set session log=" vax6610.log"
set toy container=" vax6610.dat"
set eeprom container=" vax6610.rom"

load virtual_serial_line OPA0 port=10003 application="opa0.ht"

load CIXCD PAA ci_node_id=2
set PAA port[1]=11021 host[1]="host001:11012"
set PAA port[3]=11023 host[3]="host003:11032"

include h:\ourdisks\disksets.cfg
```

And the following is the CHARON-VAX configuration file for the virtual VAX 6610 node named VAX003 running on HOST003:

```
set session hw_model="VAX_6000_Model_610"
set session log=" vax6610.log"
set toy container=" vax6610.dat"
set eeprom container=" vax6610.rom"

load virtual_serial_line OPA0 port=10003 application="opa0.ht"

load CIXCD PAA ci_node_id=3
set PAA port[1]=11031 host[1]="host001:11013"
set PAA port[2]=11032 host[2]="host002:11023"
```

```
include h:\ourdisks\disksets.cfg
```

7 Starting CHARON-VAX/66X0

When CHARON-VAX/66X0 starts, the license checking procedure takes a few seconds. When checking, a verification message is displayed. If you remove the license key while CHARON-VAX/66X0 is running, a warning message is given after a few minutes, and you have a maximum of 10 minutes to save your files and shut down your virtual VAX system. Reapplying the key during this period will not help, as the termination process cannot be undone.

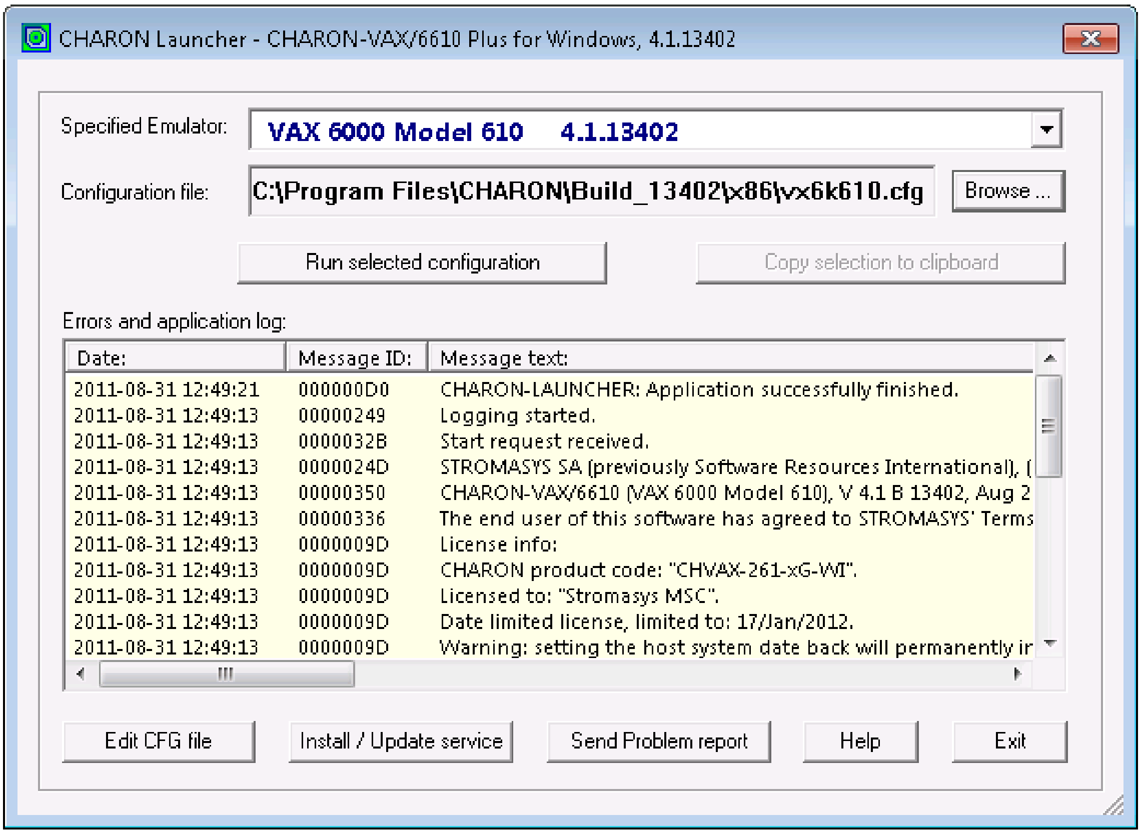
If the "checking your license key" pop-up box appears for a second, then disappears and CHARON-VAX/66X0 does not start, you might have a license key with a product of revision code different from the installed version. Since CHARON-VAX has not yet read the configuration file with the log file definition, its log file cannot be updated. In this case the reason why CHARON-VAX does not start is logged in the 'Application' list the 'Windows event viewer'.

CHARON-VAX/66X0 can be started manually as a Windows application, or can be defined as a Windows service with manual or automatic start. The procedure to create and manage CHARON-VAX services is described below.

Note that it is possible to install several CHARON-VAX/66x0 services to be run at the same time (multi-instance mode) using the Launcher utility and then using the CHARON Service Manager to set “automatic” mode of execution for each CHARON-VAX/66x0 service. Then on restart of the system that multi-instance configuration will start at the same time.

7.1 The CHARON Launcher

Use the CHARON Launcher to start CHARON-VAX/XX manually. Click on Help or type F1 for help. Select the CHARON-VAX/XX configuration file you want to run and the version of the particular CHARON VAX emulation that will be used for that. (In case of only one version is installed the Launcher will select it automatically). The CHARON-Launcher will display the VAX model specified in this configuration file, if valid.


CHARON Launcher - CHARON-VAX/6610 Plus for Windows, 4.1.13402
Browse ...
Run selected configuration
Copy selection to clipboard
Edit CFG file
Install / Update service
Send Problem report
Help
Exit

Specified Emulator: VAX 6000 Model 610 4.1.13402

Configuration file: C:\Program Files\CHARON\Build_13402\x86\vx6k610.cfg

Errors and application log:

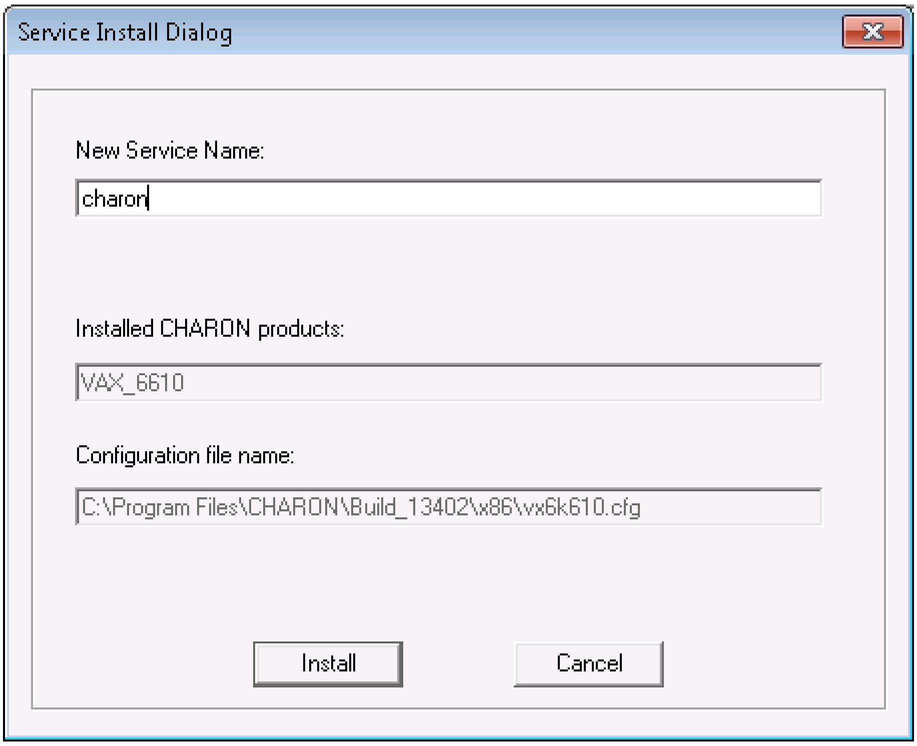
Date:	Message ID:	Message text:
2011-08-31 12:49:21	000000D0	CHARON-LAUNCHER: Application successfully finished.
2011-08-31 12:49:13	00000249	Logging started.
2011-08-31 12:49:13	0000032B	Start request received.
2011-08-31 12:49:13	0000024D	STROMASYS SA (previously Software Resources International), (
2011-08-31 12:49:13	00000350	CHARON-VAX/6610 (VAX 6000 Model 610), V 4.1 B 13402, Aug 2
2011-08-31 12:49:13	00000336	The end user of this software has agreed to STROMASYS' Terms
2011-08-31 12:49:13	0000009D	License info:
2011-08-31 12:49:13	0000009D	CHARON product code: "CHVAX-261-xG-WI".
2011-08-31 12:49:13	0000009D	Licensed to: "Stromasys MSC".
2011-08-31 12:49:13	0000009D	Date limited license, limited to: 17/Jan/2012.
2011-08-31 12:49:13	0000009D	Warning: setting the host system date back will permanently ir

Click "Run selected configuration" and CHARON-VAX will start. It displays the CHARON log (including any configuration and run-time errors) in the Launcher Window. While CHARON-VAX is running, the Launcher updates the log file contents each 60 seconds. After CHARON-VAX stops the Launcher loads the final application log contents for review.

The log file language depends on the locale settings of your system. Currently English, Dutch, Spanish, Chinese Simplified and Swedish versions are available.

Click on "Edit CFG file" to edit the selected configuration file using the notepad editor. The ability of running a configuration, displaying the log and editing the configuration from a single interface makes the CHARON-VAX Launcher useful for debugging new installations/configuration files or examining error conditions.

You can configure CHARON-VAX/XX as a Windows service by pressing the button "Install / Update service". The following dialog is displayed:

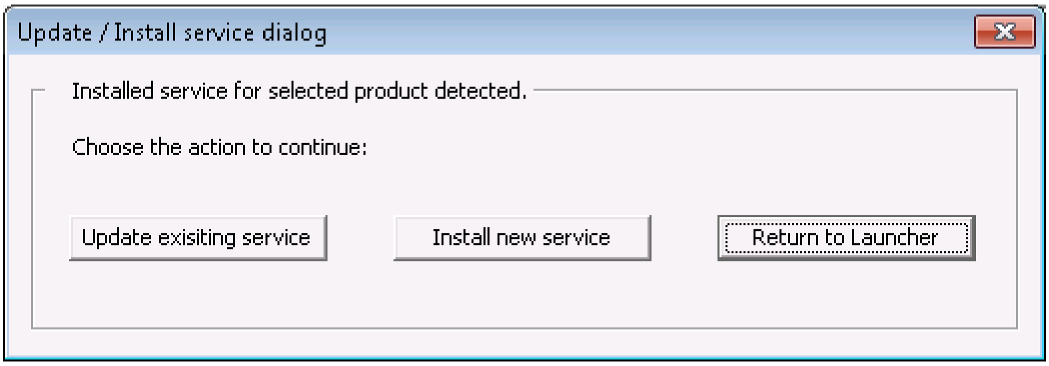

Service Install Dialog

New Service Name: charon

Installed CHARON products: VAX_6610

Configuration file name: C:\Program Files\CHARON\Build_13402\x86\vx6k610.cfg

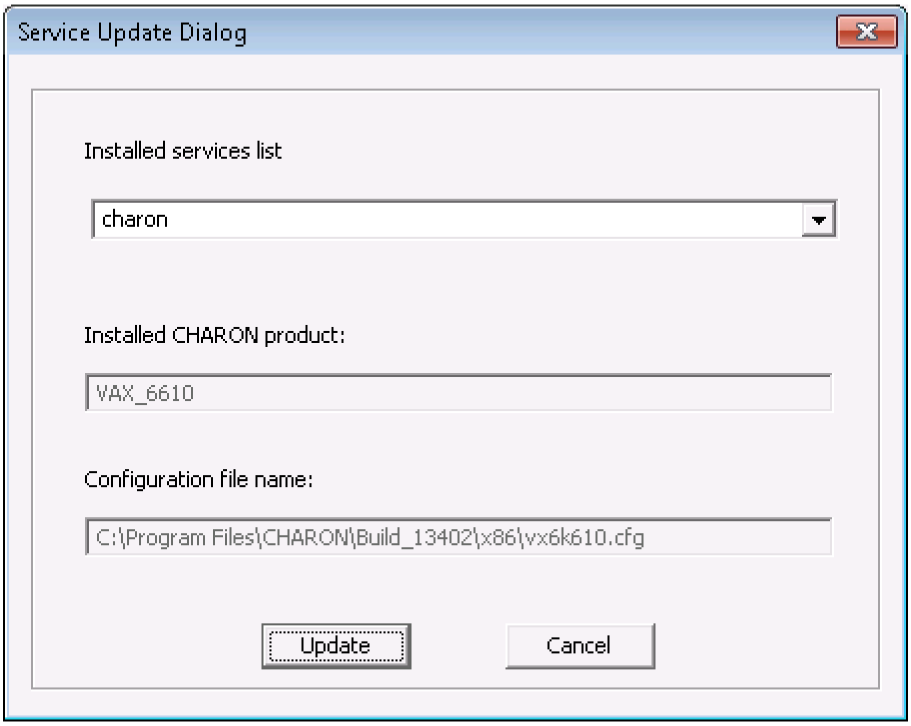
Enter the desired service name in "New Service Name" and press the "Install" button. Note that the name of the service cannot have spaces. If the service already exists the following dialog is displayed:


Update / Install service dialog

Installed service for selected product detected.

Choose the action to continue:

If the "Install new service" button is pressed the Launcher displays the dialog for creating new service shown above. Otherwise the following dialog is displayed:



Installed services list: charon

Installed CHARON product: VAX_6610

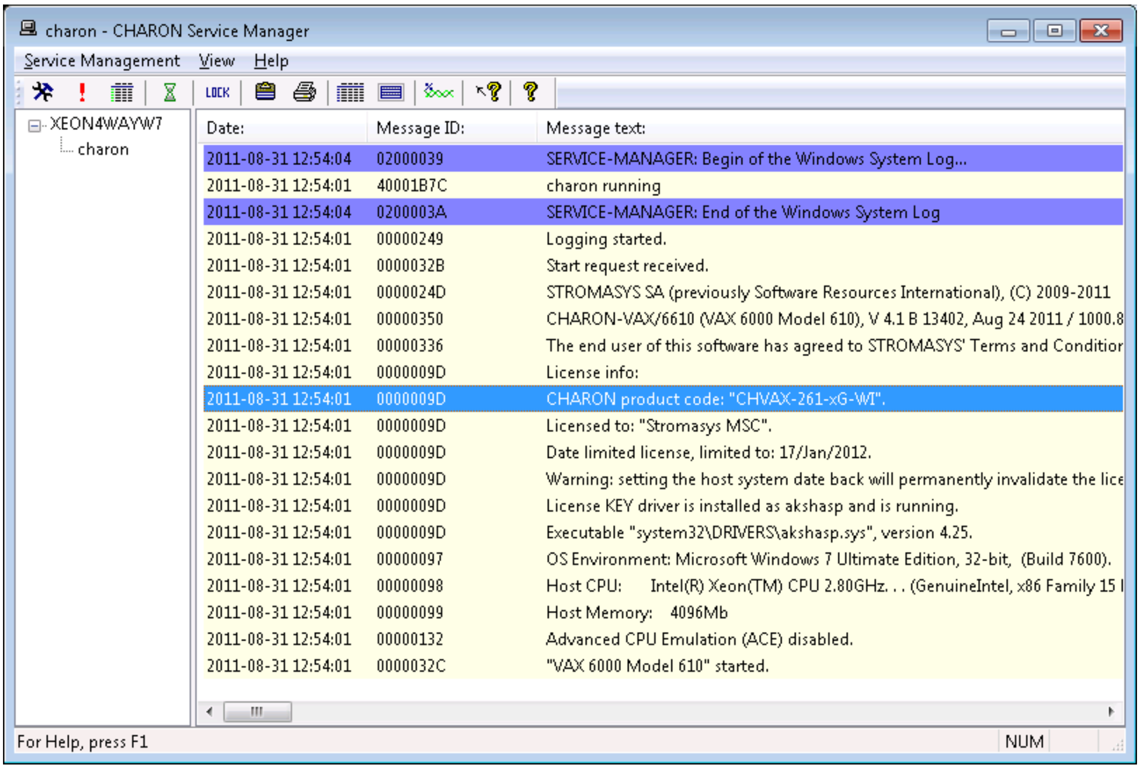
Configuration file name: C:\Program Files\CHARON\Build_13402\x86\vx6k610.cfg

Press "Update" button. Once the "Service Update Dialog" has disappeared press "Back" button in the "Update / Install Service Dialog". The Launcher will update the service and inform if the service was successfully updated.

Use the "Copy selection to clipboard" button to copy selected lines of the log to the clipboard.

7.2 The CHARON Service Manager

The CHARON Service Manager manages CHARON services (i.e. specific VAX configurations) available on your computer. The utility starts automatically on login to the host system and creates an icon in the system tray. Click on the icon to invoke the CHARON Service Manager main window. If the utility is not running, it is possible to start it directly from the tray icon with the right click and the "Start" button.



```
Date:                Message ID:  Message text:
2011-08-31 12:54:04  02000039     SERVICE-MANAGER: Begin of the Windows System Log...
2011-08-31 12:54:01  40001B7C     charon running
2011-08-31 12:54:04  0200003A     SERVICE-MANAGER: End of the Windows System Log
2011-08-31 12:54:01  00000249     Logging started.
2011-08-31 12:54:01  0000032B     Start request received.
2011-08-31 12:54:01  0000024D     STROMASYS SA (previously Software Resources International), (C) 2009-2011
2011-08-31 12:54:01  00000350     CHARON-VAX/6610 (VAX 6000 Model 610), V 4.1 B 13402, Aug 24 2011 / 1000.8
2011-08-31 12:54:01  00000336     The end user of this software has agreed to STROMASYS' Terms and Conditior
2011-08-31 12:54:01  0000009D     License info:
2011-08-31 12:54:01  0000009D     CHARON product code: "CHVAX-261-xG-WI".
2011-08-31 12:54:01  0000009D     Licensed to: "Stromasys MSC".
2011-08-31 12:54:01  0000009D     Date limited license, limited to: 17/Jan/2012.
2011-08-31 12:54:01  0000009D     Warning: setting the host system date back will permanently invalidate the lice
2011-08-31 12:54:01  0000009D     License KEY driver is installed as akshasp and is running.
2011-08-31 12:54:01  0000009D     Executable "system32\DRIVERS\akshasp.sys", version 4.25.
2011-08-31 12:54:01  00000097     OS Environment: Microsoft Windows 7 Ultimate Edition, 32-bit,  (Build 7600).
2011-08-31 12:54:01  00000098     Host CPU:     Intel(R) Xeon(TM) CPU 2.80GHz. . . (GenuineIntel, x86 Family 15 I
2011-08-31 12:54:01  00000099     Host Memory:    4096Mb
2011-08-31 12:54:01  00000132     Advanced CPU Emulation (ACE) disabled.
2011-08-31 12:54:01  0000032C     "VAX 6000 Model 610" started.
```

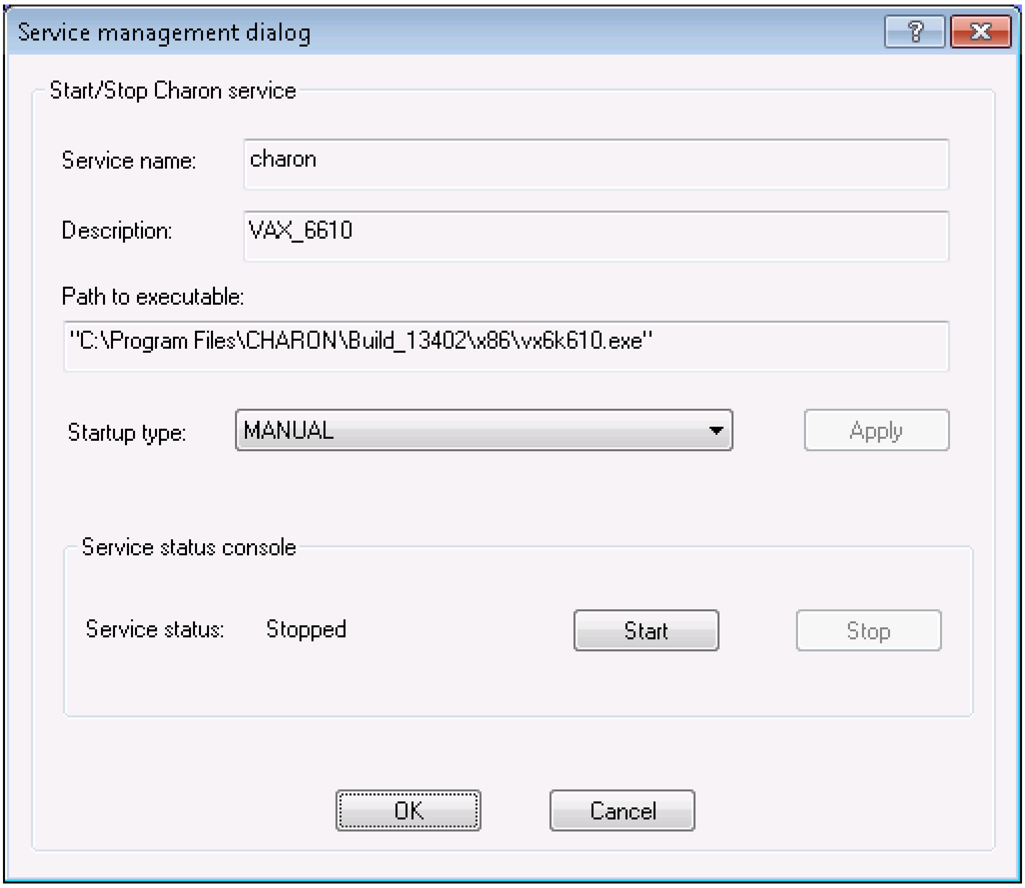
In the Services Manager, the tree structure on the left shows all CHARON-VAX services installed on the host system. Initially the right hand panel displays the product license key information. Clicking on a service name shows the most recent event log display for this service in the right hand panel.

The buttons on the panel have the following meaning (left to right):

1. Manage CHARON-VAX/XX services invokes a panel with the following options:

   "Service Name" stands for the name of the chosen service, "Description" displays the CHARON model, and "Path to executable" refers to the executable to run.

   "Startup type" can be "Manual", "Automatic" or "Disabled". Type or choose the desired type and press "Apply" to apply the setting.



Service management dialog

Start/Stop Charon service

Service name: charon

Description: VAX_6610

Path to executable:

"C:\Program Files\CHARON\Build_13402\x86\vx6k610.exe"

Startup type: MANUAL

Service status console

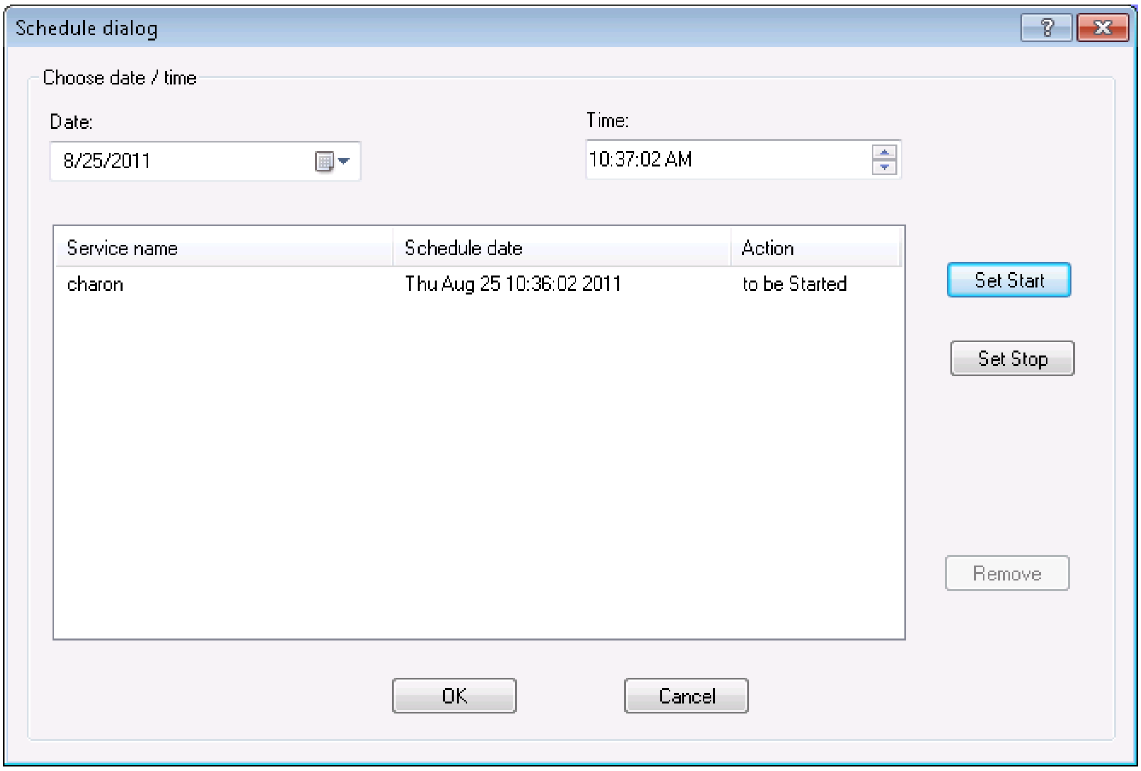
Service status: Stopped

"Service Status" gives information about the current status of the service. You can start the service or stop it depending on its actual status.

2. *"Remove selected CHARON-VAX/XX services"* removes the service you currently selected.

3. *"Update the list of installed CHARON-VAX/XX services"* updates the service list shown in the left pane of the application window. This button is useful if you add new services while the CHARON Service manager runs. Just added services are invisible until you restart the CHARON Service manager or update this list. This item is also available through the corresponding item on the "Service Management" submenu.

4. *"Schedule start service" (al*so available through the corresponding item on the "Service Management" submenu) sets the start and, if necessary, stop time of a selected service. It invokes the following dialogue:



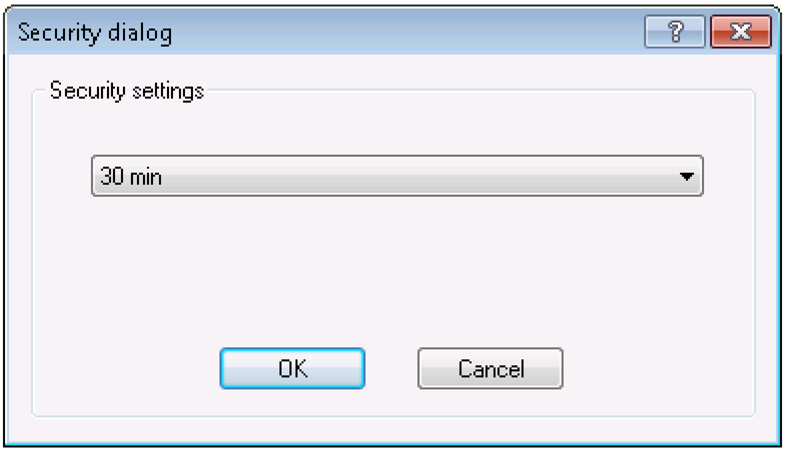
Date: 8/25/2011

Time: 10:37:02 AM

Service name	Schedule date	Action
charon	Thu Aug 25 10:36:02 2011	to be Started

Press the "Set start" or "Set Stop" buttons to apply the date and time. To remove any schedule date, choose it and press the "Remove" button. Note that all scheduled tasks proceed only if the CHARON Service manager runs. No scheduled information is stored in the system registry. When the CHARON service manager restarts, the scheduled task queue will be empty.

5. *Security Setting* (also available through the corresponding item on the "Service Management" submenu). This function locks the computer after a selected amount of time.



30 min

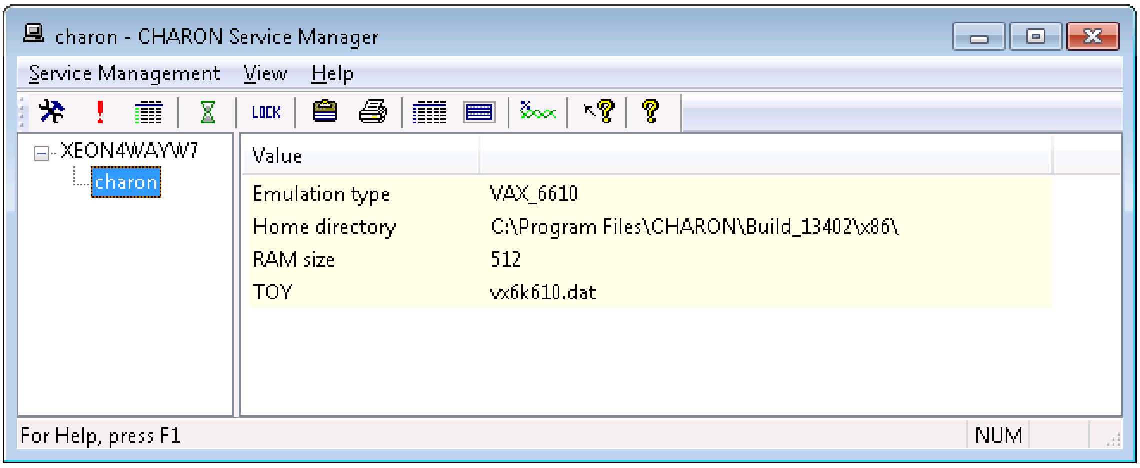
Enter the Windows User name/password combination in the standard Windows box to regain access. By default this function is disabled.

6. *The Mail Problem Report* (also available through the mail item on the "Service Management" submenu) automatically prepared a problem report fileto being sending to support team.

7. *Print the active document* opens up the standard printer dialogue to print the right hand panel of the application. Use the submenu "Service Management" to customize printing through "Print Preview" and "Print Setup".

8. *Display service startup and error log* displays the service startup and event log of a chosen service in the right panel of the application. This function is also available on the "View" submenu.

9. *Display the configuration* displays the configuration of the chosen service on the right panel of the application. This function is also available on the "View" submenu.

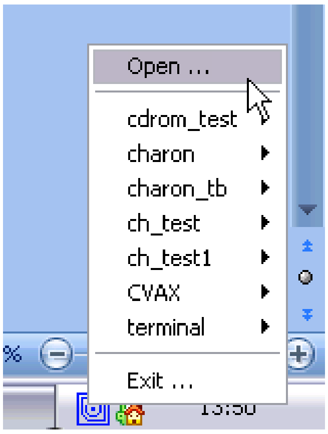


Value	
Emulation type	VAX_6610
Home directory	C:\Program Files\CHARON\Build_13402\x86\
RAM size	512
TOY	vx6k610.dat

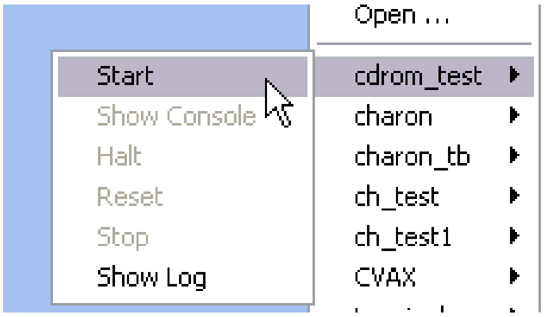
10. The System Monitor invokes the Windows system monitor to trace the chosen service activity. This function is also available on the "View" submenu.

11. The "question mark" buttons provide access to the help system.

It is possible to use the system tray menu to manage CHARON services w/o opening the main window of the utility. Click at it with the right button of the mouse and the following pop-up menu will appear:



The tray menu lists all the installed CHARON services. For each service the full range of essential operations is available:

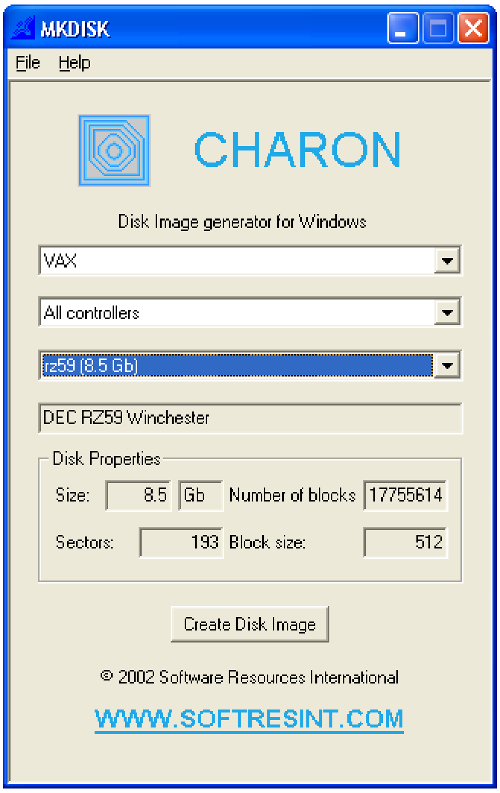


So it is possible to start the service (“Start” option), stop it (”Stop” option), halt (“Halt” option) and reset (“Reset” option) it.

It is also possible to view the service log (“Show Log” option).

Option “Show Console” is very important if the CHARON service has console configured for terminal emulator (like the default “PuTTY”). If the service is set to “Automatic” mode the console will not appear on system reboot despite the fact that CHARON service will be up and running normally. To access the console use the “Show Console” option.

7.3 MkDisk Utility


MKDISK
File Help
CHARON
Disk Image generator for Windows

VAX

All controllers

rz59 (8.5 Gb)

DEC RZ59 Winchester

Disk Properties

Size: 8.5 Gb Number of blocks 17755614

Sectors: 193 Block size: 512

Create Disk Image
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WWW.SOFTRESINT.COM

The MKDISK utility creates empty disk images of given standard disk drive types or of custom disk images. It is available in the utilities folder under Start->Programs->CHARON-><product>->Utility.

Choose the system in the first drop-down box, specify "All controllers" in the second and choose the desired disk in the third one. After that press the "Create Disk Image" button, select the destination folder, enter the desired disk image name and press "Save".

To generate disk images with any size use the "Custom" type and enter the number of blocks and block size. In the disk properties you see the size of the disk to be created.

7.4 Sentinel HASPRUS Utility

HASPRUS utility allows applying a license update to the CHARON-VAX HASP license dongle. It provides the following functionality:

1. Collecting HASP key license information and creating a special ".c2v" file which should be sent to STROMASYS.
2. Updating CHARON-VAX license with ".v2c" file received from STROMASYS.

To collect license information select "Collect Status Information", and press "Collect Information" button. The utility will ask for name of the ".c2v" file to be created and its location. Once the file is created it should be provided to STROMASYS for getting update to the license.

To update the current license select "Apply License Update", choose ".v2c" file provided by STROMASYS with the "…" bottom at the lower edge of the dialog and press "Apply Update". HASP RUS will display information whether the update was successful or not. In case of failure it is required to provide the displayed status to STROMASYS to trace the updating problem.

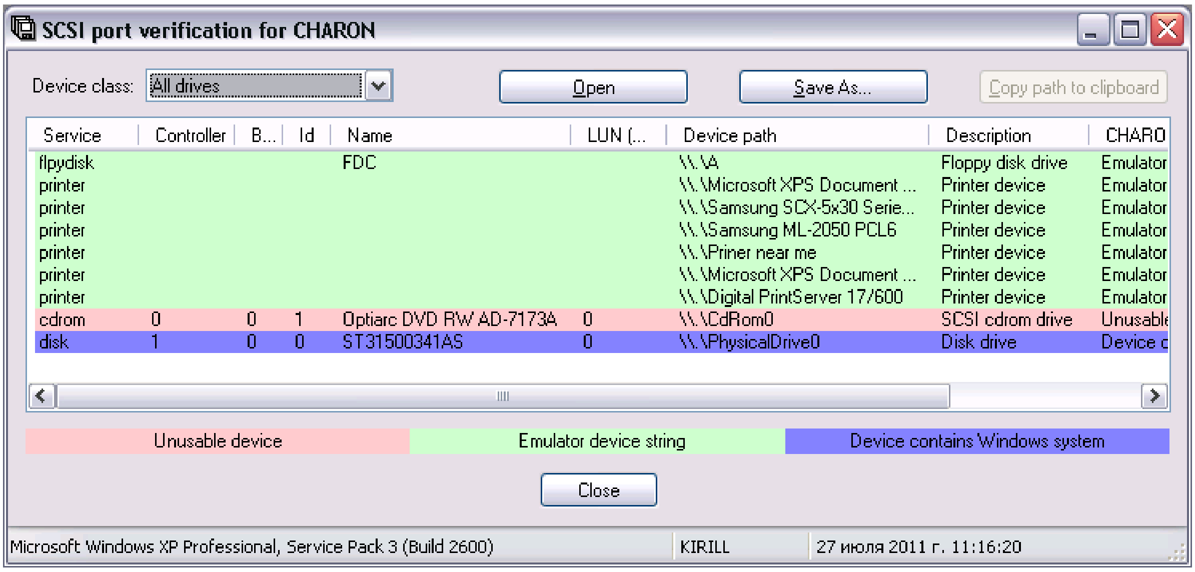
It is possible to update CHARON-VAX license "on fly", while CHARON-VAX is running. But it is still recommended to stop the emulator, update the license and run the emulator again

7.5 HASP View Utility

"HASP View" utility allows reading the content of CHARON-VAX license. The Utility reads a connected HASP-HL or HASP-SRM dongle and provides content of the license in its main window. The license text can be scrolled up and down and copied to clipboard. Use "Refresh" button to reread the license dongle.

7.6 SCSI Check Utility

The SCSI check utility is designed to locate the correct CHARON names for physical disks, tapes, CD-ROM drives, floppies and other SCSI devices found on the system. At startup the utility presents you with a list of disk drives found on your system:



Device class: All drives

Service	Controller	B...	Id	Name	LUN (...	Device path	Description	CHARO
flpydisk				FDC		\\.\A	Floppy disk drive	Emulator
printer						\\.\Microsoft XPS Document ...	Printer device	Emulator
printer						\\.\Samsung SCX-5x30 Serie...	Printer device	Emulator
printer						\\.\Samsung ML-2050 PCL6	Printer device	Emulator
printer						\\.\Priner near me	Printer device	Emulator
printer						\\.\Microsoft XPS Document ...	Printer device	Emulator
printer						\\.\Digital PrintServer 17/600	Printer device	Emulator
cdrom	0	0	1	Optiarc DVD RW AD-7173A	0	\\.\CdRom0	SCSI cdrom drive	Unusable
disk	1	0	0	ST31500341AS	0	\\.\PhysicalDrive0	Disk drive	Device c

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

Microsoft Windows XP Professional, Service Pack 3 (Build 2600) | KIRILL | 27 июля 2011 г. 11:16:20

The green color indicates the devices, which are not allocated by the host operating system, thus can be used in the CHARON-VAX environment.

It is possible to choose a specific device class from the following list: "Disk drives", "Tape drives", "CD-ROM drives", "Floppy disk drives", “Printers”, "Unknown devices". You can select "All drives" to inspect your host system.

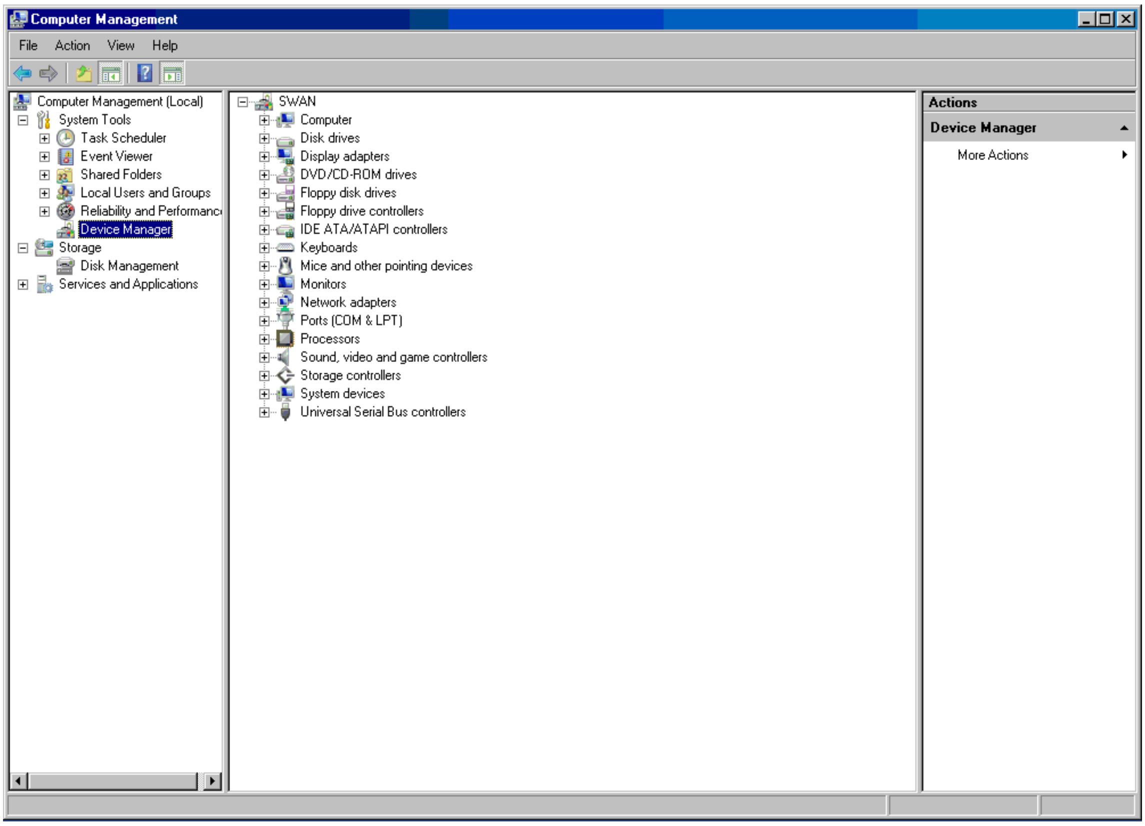
Note that the current version of SCSI Check does not correctly report iSCSI devices.

You can store the configuration as found with SCSI Check using the "Save As…" button and re-display this configuration by pressing the "Open" button.

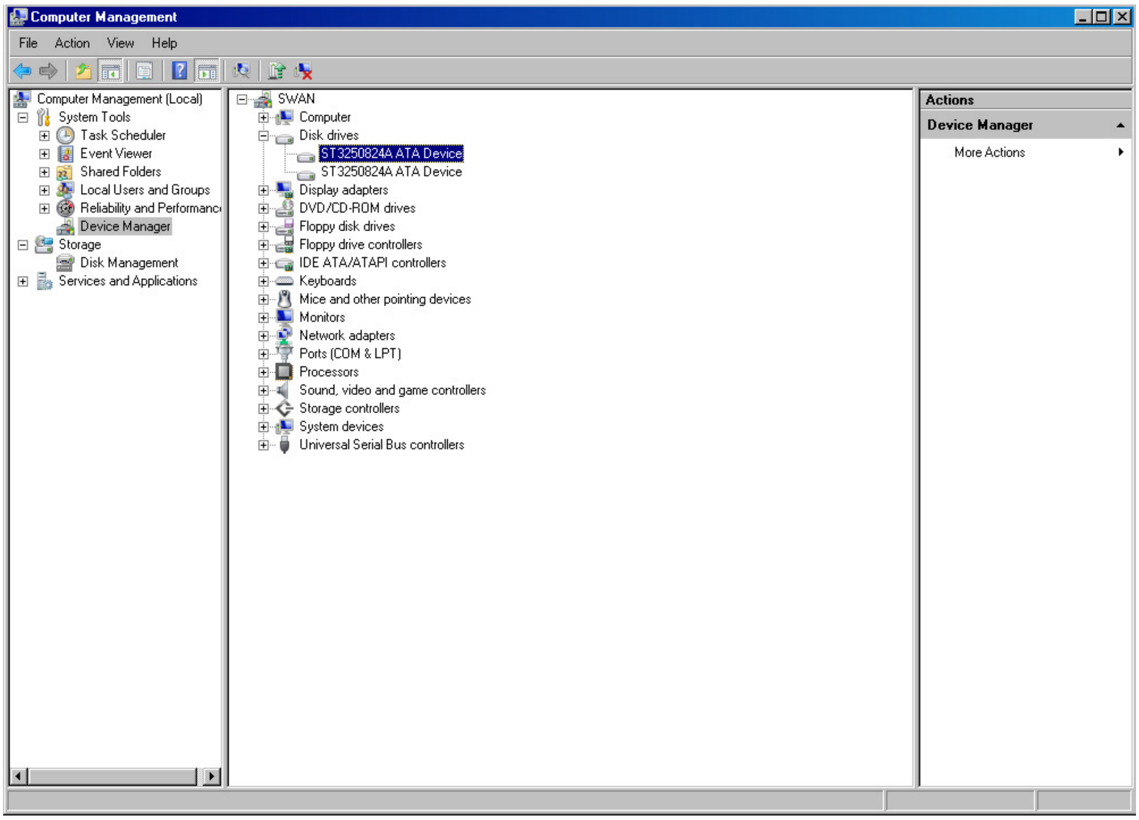
Selecting any specific device from the list makes the "Copy path to clipboard" button available. Copying to clipboard helps to avoid a typing error when entering the device name into a CHARON-VAX configuration file.

If SCSIcheck cannot be used for some reason (for example, for some kind of NAS / SAN network storage devices), the alternative way to find out SCSI configuration details it to use Windows build-in tools.

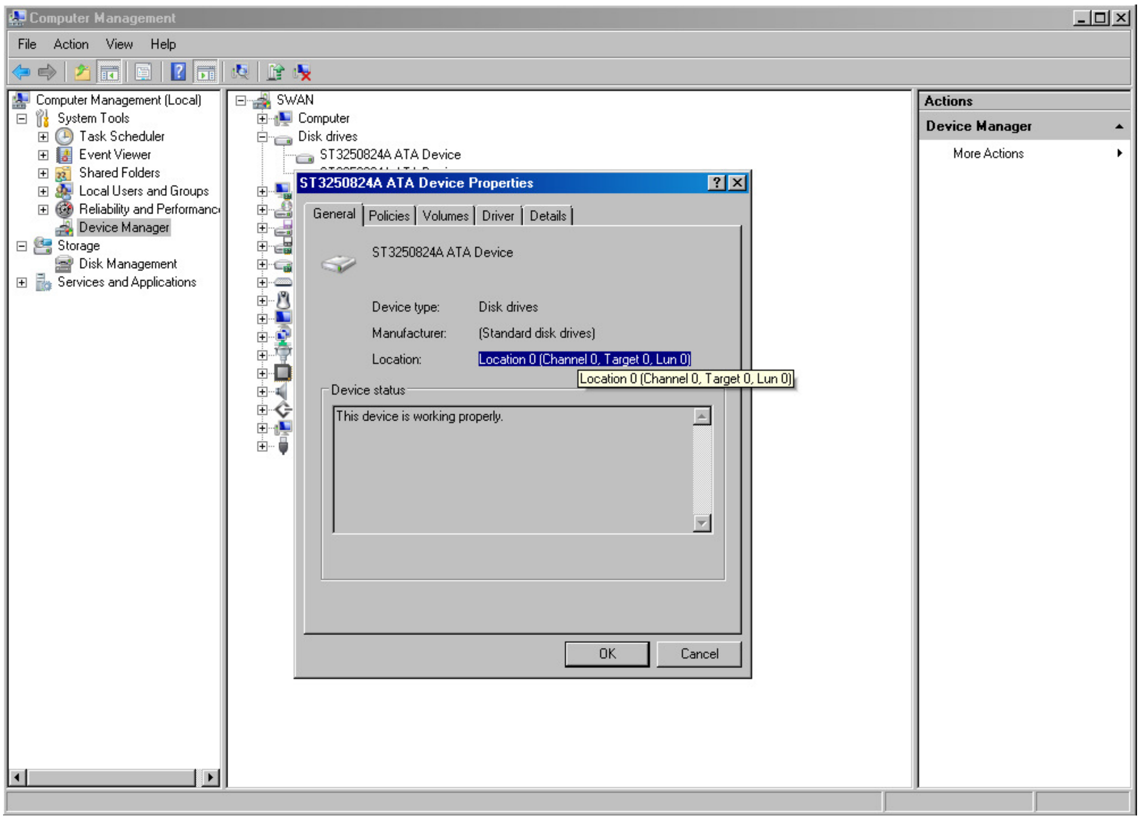
To find proper SCSI device information (to be used as a CHARON emulator configuration file parameter), open “*Computer Management*” application and select “*Device Manager*”:



On the right panel please select the proper physical device:



Click right mouse button and choose the "*Property*" item at the pop-up menu appears.



ST3250824A ATA Device

Device type: Disk drives

Manufacturer: (Standard disk drives)

Location: Location 0 (Channel 0, Target 0, Lun 0)

Device status

This device is working properly.

The information from ”*Location*” field to be used for selected device configuration

7.7 MTD Utility

The "MTD" utility allows creating CHARON tape image from a physical tape and writing tape image to a physical tape. It is a command line utility. Usage is the following:

```
>mtd <tape device name> <tape container name> [options]
```

Where the “options” are:

`/log = <file name>` – create the execution log in the file “file name”.

`/reads = <number>` – a number of attempts to read a damaged data bock

`/ignore` – ignore bad blocks and continue processing w/o interruption

Example:

```
>mtd \\.\Tape0  C:\TapeImages\tape1.vtape /log=”tape1.txt”
/reads=10 /ignore
```

Using the following syntax it is possible to write a content of a tape container to a physical tape:

```
>mtd <tape container name> <tape device name>
```

Example:

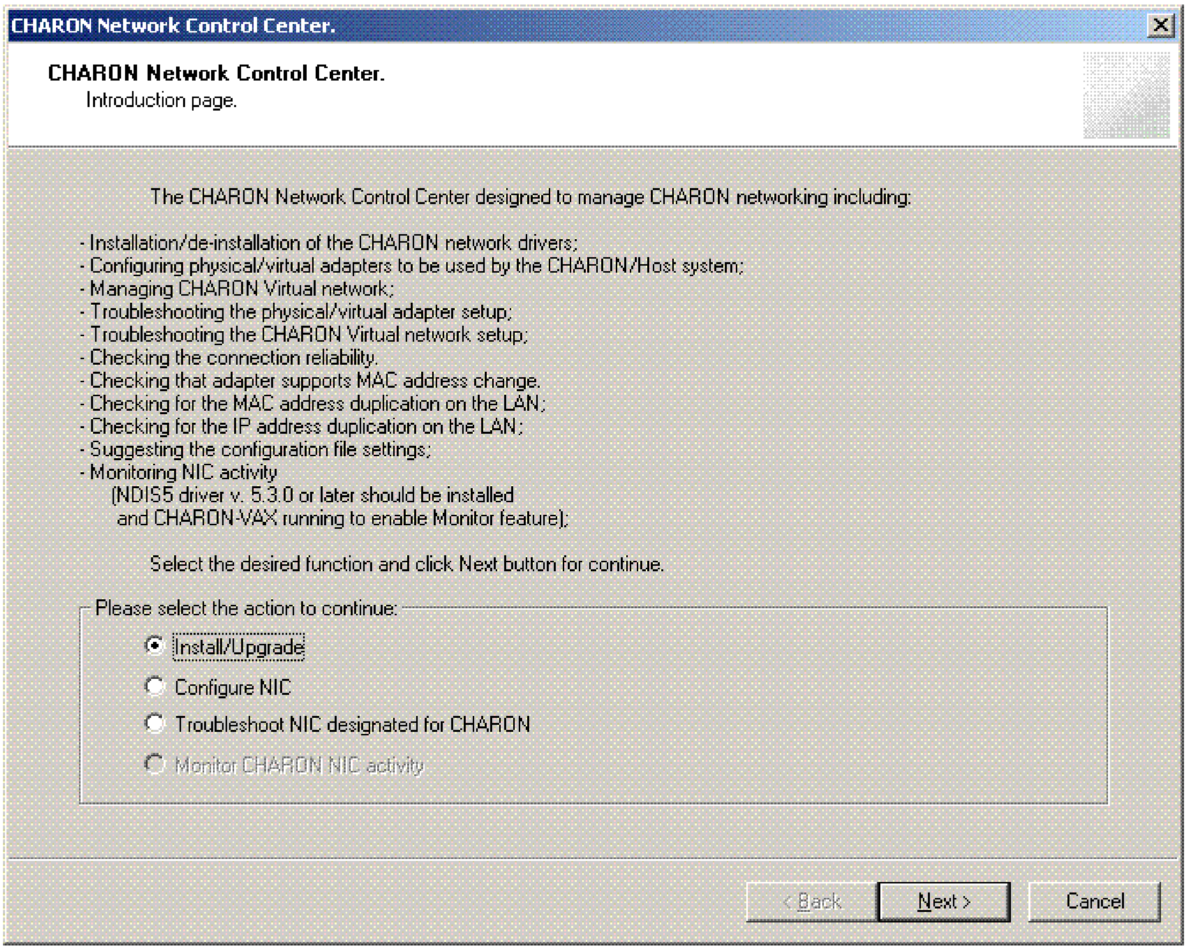
```
>mtd C:\TapeImages\tape1.vtape \\.\Tape0.
```

7.8 The CHARON Network Control Center

The CHARON network center performs the following operations:

- Installation/deinstallation/upgrade of the NDIS6 Packet Driver
- Configuring physical/virtual adapters for CHARON
- Troubleshooting physical/virtual adapters
- Checking the connection reliability
- Checking the MAC/IP address duplication on LAN
- Suggesting the configuration file settings
- Monitoring the network activity

The start dialog of the utility provides a choice of the basic operations that can be performed using this utility:


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/virtual adapters to be used by the CHARON/Host system;
- Managing CHARON Virtual network;
- Troubleshooting the physical/virtual adapter setup;
- Troubleshooting the CHARON Virtual network 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;
- Monitoring NIC activity
  (NDIS5 driver v. 5.3.0 or later should be installed
  and CHARON-VAX running to enable Monitor feature);

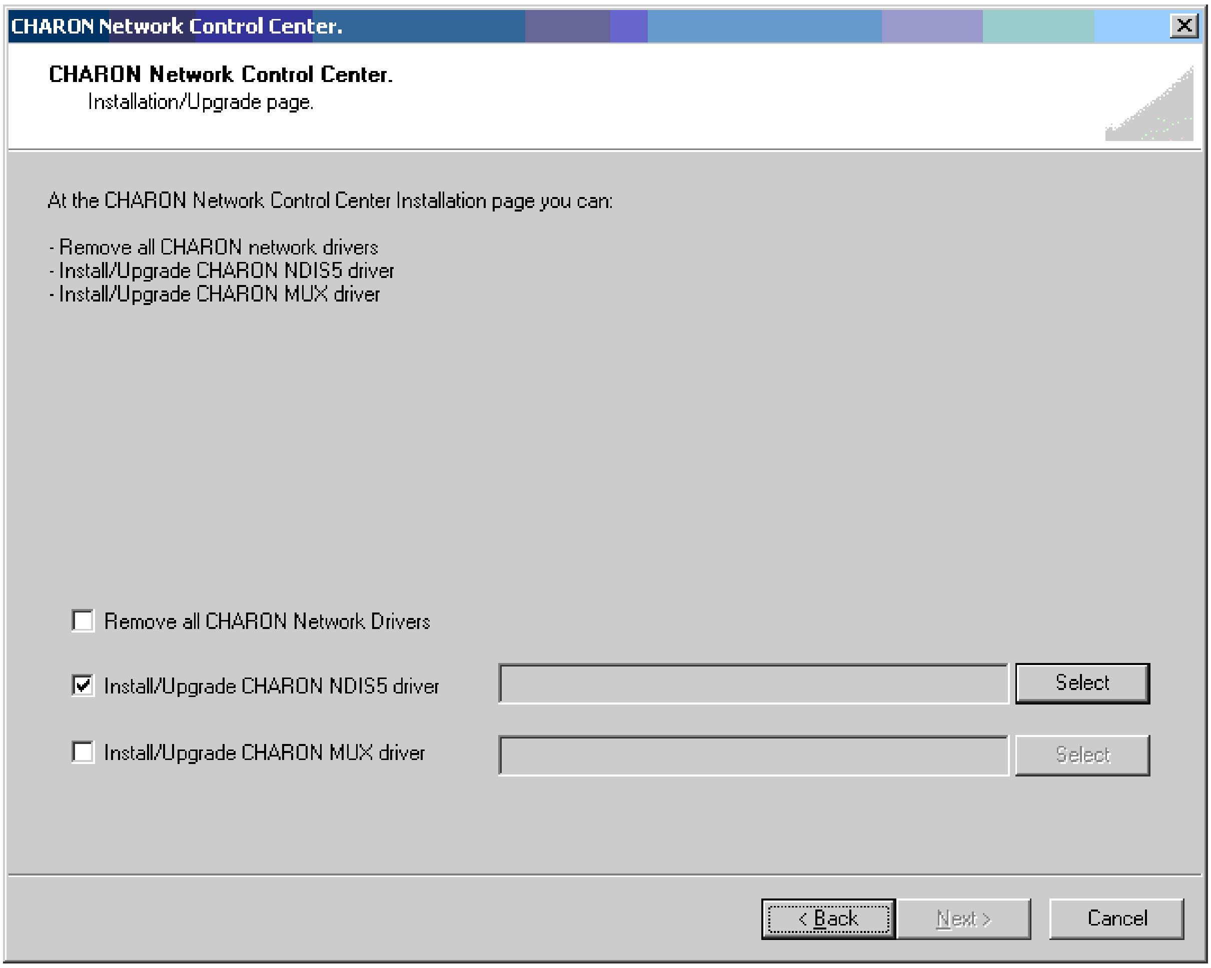
Select the desired function and click Next button for continue.

Please select the action to continue:

● Install/Upgrade
○ Configure NIC
○ Troubleshoot NIC designated for CHARON
○ Monitor CHARON NIC activity

Each dialog of the Network Control Center contains detailed information on available options and actions that can be done on each particular page.

Once “Install/Upgrade” is selected and the “Next“ button is pressed the following dialog appears for specifying the particular desired action and the paths to the drivers. Once the option is selected and the drivers are specified (if needed) just press “Next” button to proceed.



CHARON Network Control Center.
Installation/Upgrade page.

At the CHARON Network Control Center Installation page you can:

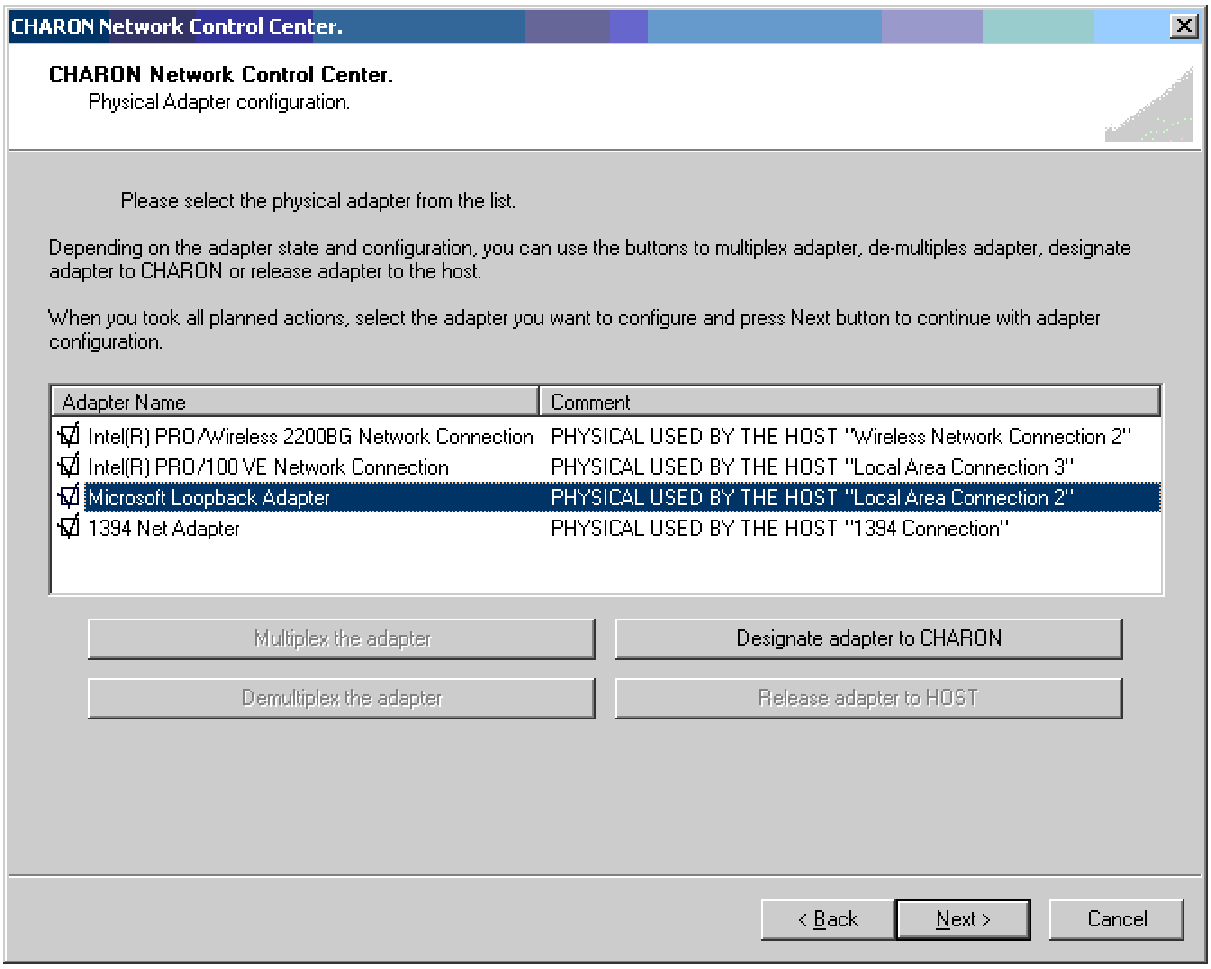
- Remove all CHARON network drivers
- Install/Upgrade CHARON NDIS5 driver
- Install/Upgrade CHARON MUX driver

☐ Remove all CHARON Network Drivers

☑ Install/Upgrade CHARON NDIS5 driver

☐ Install/Upgrade CHARON MUX driver

The following dialog is used for configuring particular network adapter:



CHARON Network Control Center.
Physical Adapter configuration.

Please select the physical adapter from the list.

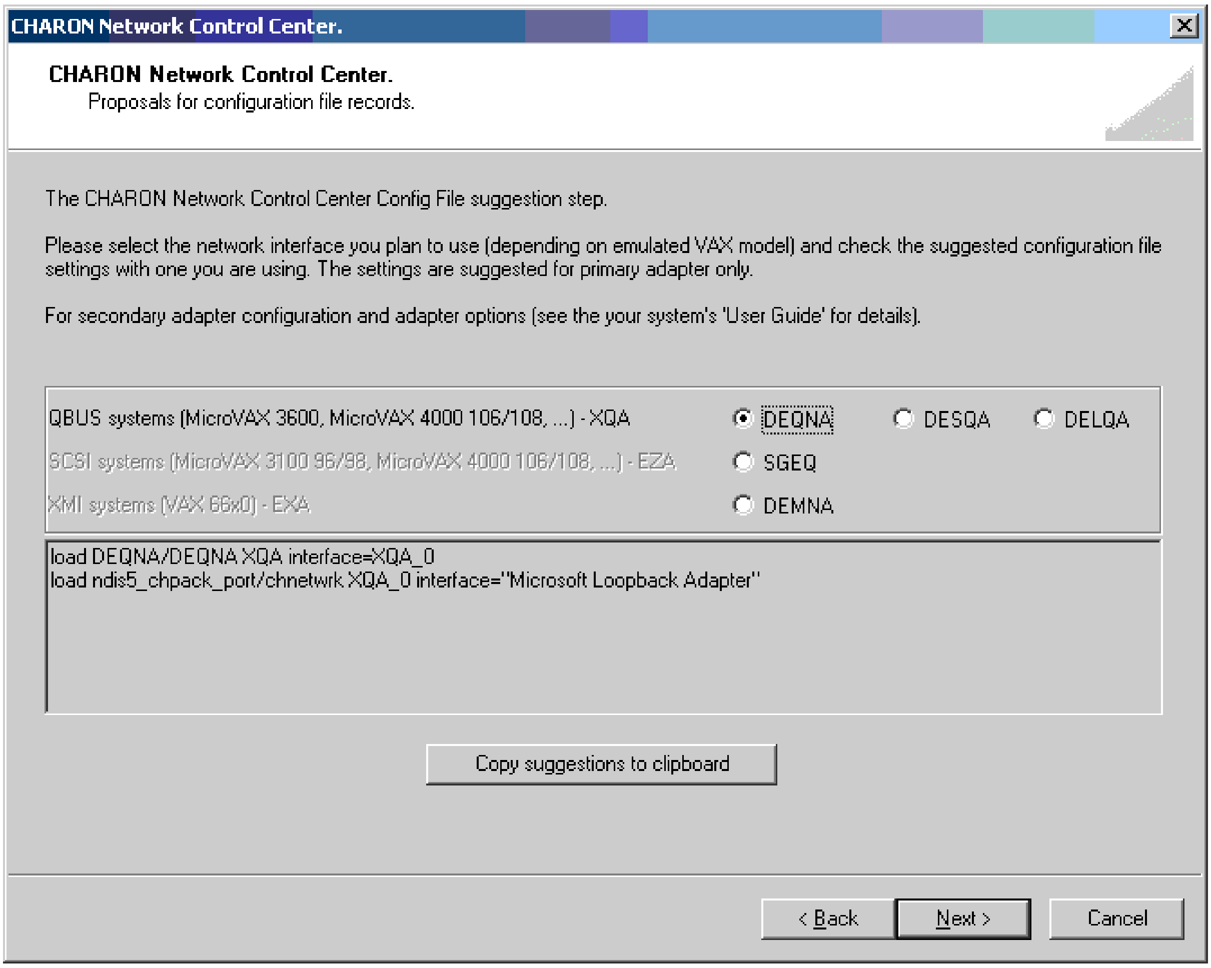
Depending on the adapter state and configuration, you can use the buttons to multiplex adapter, de-multiples adapter, designate adapter to CHARON or release adapter to the host.

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) PRO/Wireless 2200BG Network Connection	PHYSICAL USED BY THE HOST "Wireless Network Connection 2"
☑ Intel(R) PRO/100 VE Network Connection	PHYSICAL USED BY THE HOST "Local Area Connection 3"
☑ Microsoft Loopback Adapter	PHYSICAL USED BY THE HOST "Local Area Connection 2"
☑ 1394 Net Adapter	PHYSICAL USED BY THE HOST "1394 Connection"

Select desired adapter(s) to be used for CHARON and press “Next” to dedicate it to the emulator. It’s also possible to multiplex the chosen adapter is the MUX driver is installed.

Once an adapter is dedicated to CHARON the Network Control Center provides information to be inserted into configuration file for this particular adapter and various emulated adapters:



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 VAX 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).

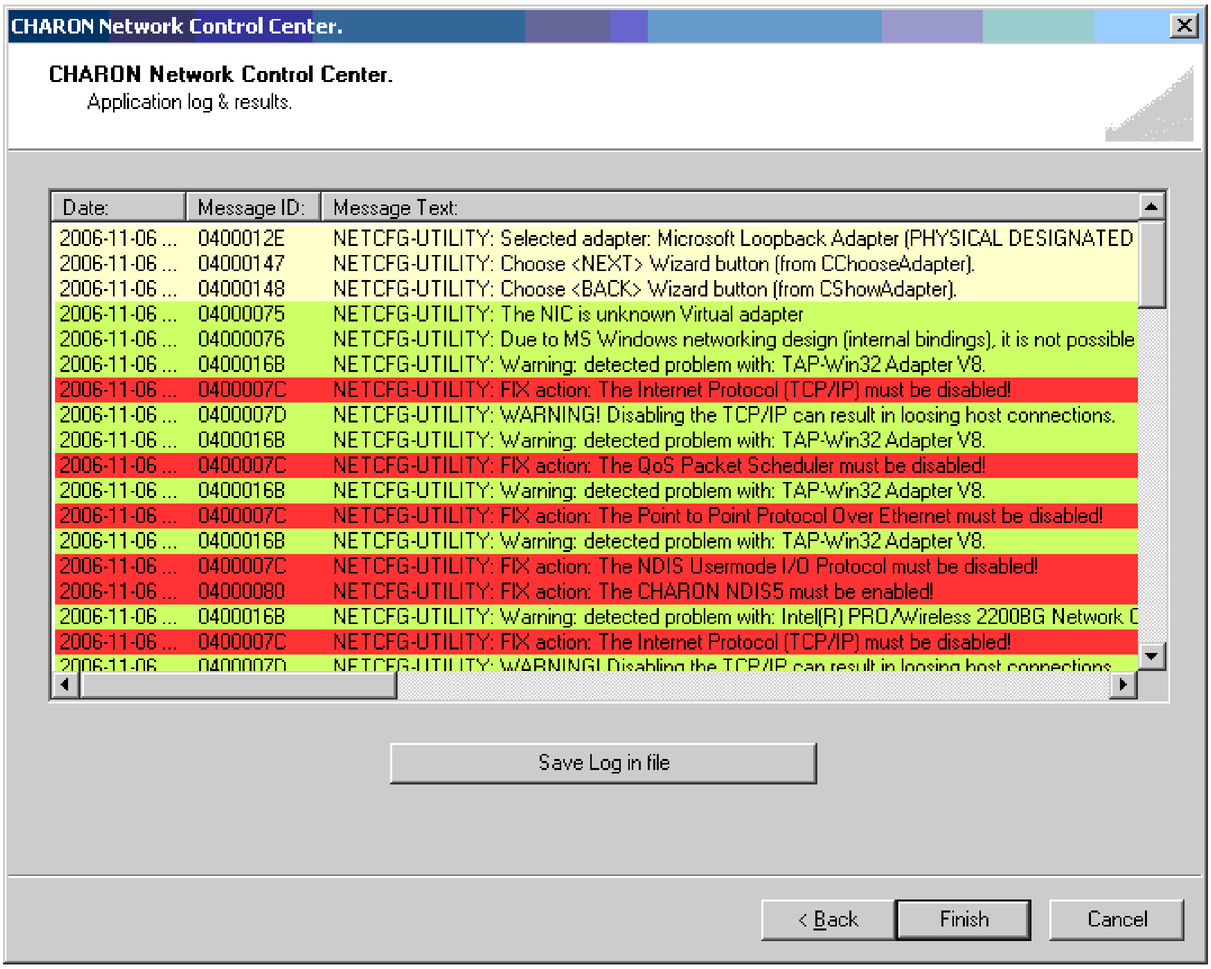
QBUS systems (MicroVAX 3600, MicroVAX 4000 106/108, ...) - XQA ● DEQNA ○ DESQA ○ DELQA

SCSI systems (MicroVAX 3100 96/98, MicroVAX 4000 106/108, ...) - EZA ○ SGEQ

XMI systems (VAX 66x0) - EXA ○ DEMNA

```
load DEQNA/DEQNA XQA interface=XQA_0
load ndis5_chpack_port/chnetwrk XQA_0 interface="Microsoft Loopback Adapter"
```

At the end of each operation with a network interface the following dialog file is displayed providing a log:

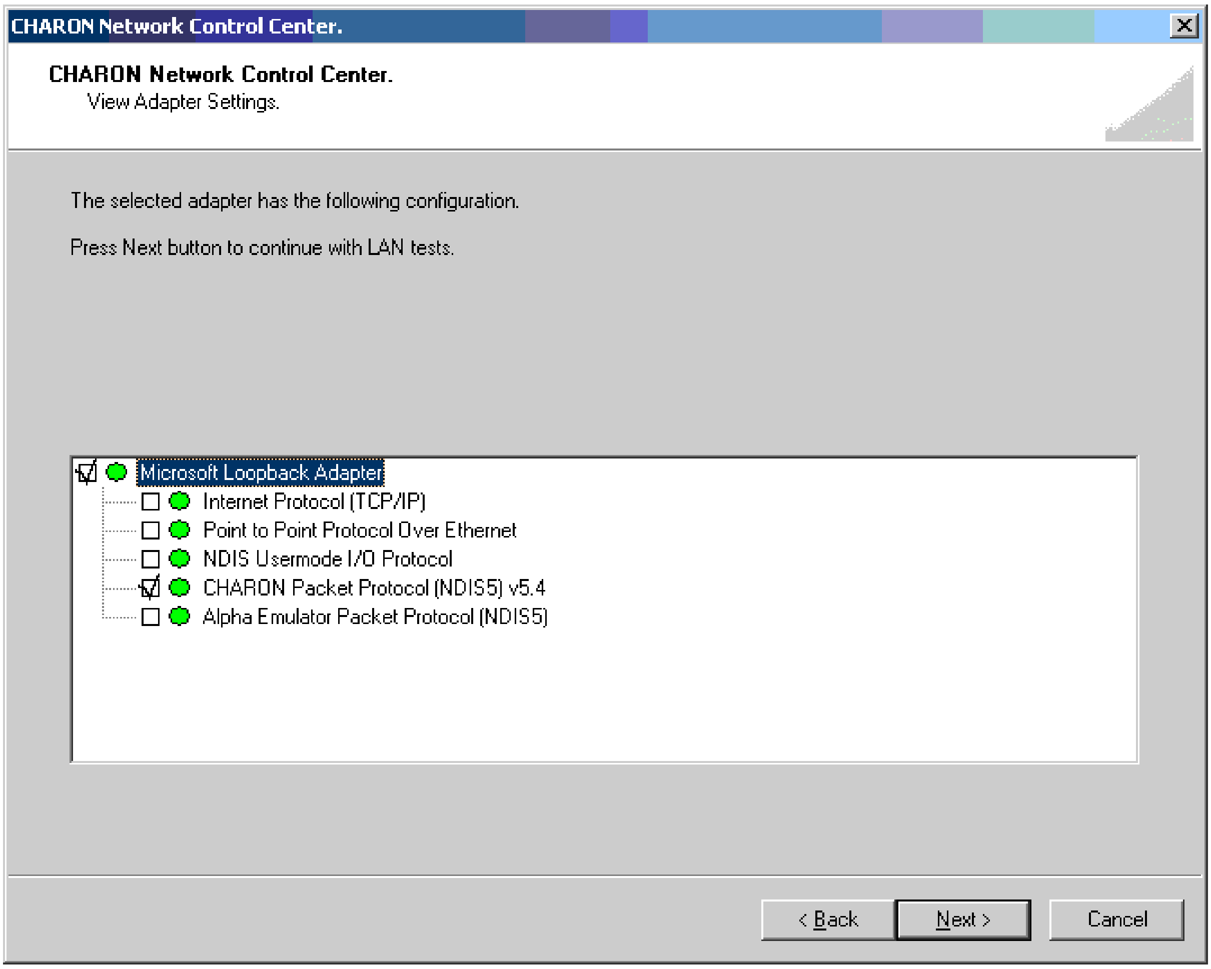


CHARON Network Control Center.

Application log & results.

Date:	Message ID:	Message Text:
2006-11-06 ...	0400012E	NETCFG-UTILITY: Selected adapter: Microsoft Loopback Adapter (PHYSICAL DESIGNATED
2006-11-06 ...	04000147	NETCFG-UTILITY: Choose <NEXT> Wizard button (from CChooseAdapter).
2006-11-06 ...	04000148	NETCFG-UTILITY: Choose <BACK> Wizard button (from CShowAdapter).
2006-11-06 ...	04000075	NETCFG-UTILITY: The NIC is unknown Virtual adapter
2006-11-06 ...	04000076	NETCFG-UTILITY: Due to MS Windows networking design (internal bindings), it is not possible
2006-11-06 ...	0400016B	NETCFG-UTILITY: Warning: detected problem with: TAP-Win32 Adapter V8.
2006-11-06 ...	0400007C	NETCFG-UTILITY: FIX action: The Internet Protocol (TCP/IP) must be disabled!
2006-11-06 ...	0400007D	NETCFG-UTILITY: WARNING! Disabling the TCP/IP can result in loosing host connections.
2006-11-06 ...	0400016B	NETCFG-UTILITY: Warning: detected problem with: TAP-Win32 Adapter V8.
2006-11-06 ...	0400007C	NETCFG-UTILITY: FIX action: The QoS Packet Scheduler must be disabled!
2006-11-06 ...	0400016B	NETCFG-UTILITY: Warning: detected problem with: TAP-Win32 Adapter V8.
2006-11-06 ...	0400007C	NETCFG-UTILITY: FIX action: The Point to Point Protocol Over Ethernet must be disabled!
2006-11-06 ...	0400016B	NETCFG-UTILITY: Warning: detected problem with: TAP-Win32 Adapter V8.
2006-11-06 ...	0400007C	NETCFG-UTILITY: FIX action: The NDIS Usermode I/O Protocol must be disabled!
2006-11-06 ...	04000080	NETCFG-UTILITY: FIX action: The CHARON NDIS5 must be enabled!
2006-11-06 ...	0400016B	NETCFG-UTILITY: Warning: detected problem with: Intel(R) PRO/Wireless 2200BG Network C
2006-11-06 ...	0400007C	NETCFG-UTILITY: FIX action: The Internet Protocol (TCP/IP) must be disabled!
2006-11-06	0400007D	NETCFG-UTILITY: WARNING! Disabling the TCP/IP can result in loosing host connections

It is also possible to check the status of the adapter dedicated to CHARON. Green means that the adapter is ready for using with CHARON, red – some problems are detected:



CHARON Network Control Center.

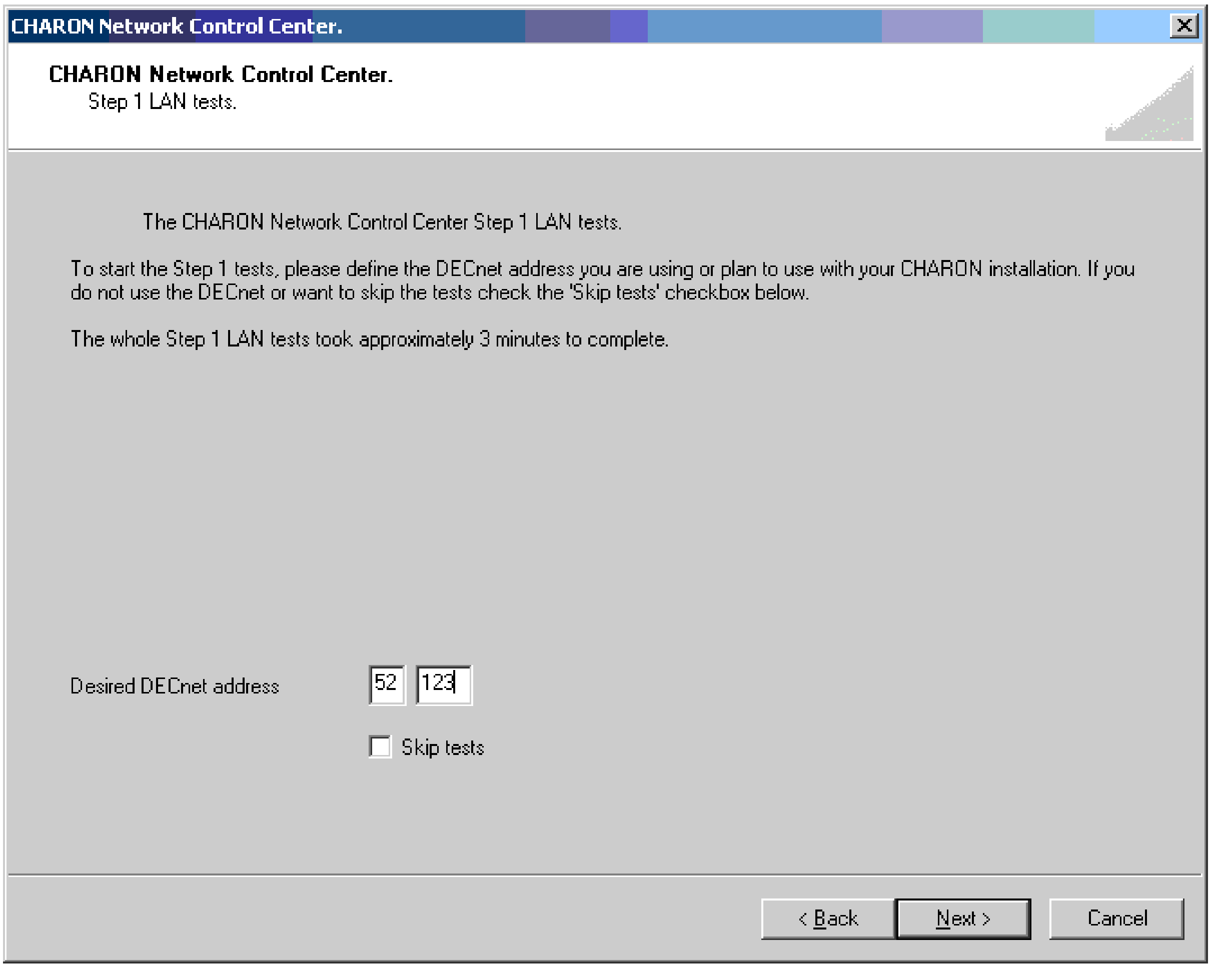
View Adapter Settings.

The selected adapter has the following configuration.

Press Next button to continue with LAN tests.

- ☑ ● Microsoft Loopback Adapter
  - ☐ ● Internet Protocol (TCP/IP)
  - ☐ ● Point to Point Protocol Over Ethernet
  - ☐ ● NDIS Usermode I/O Protocol
  - ☑ ● CHARON Packet Protocol (NDIS5) v5.4
  - ☐ ● Alpha Emulator Packet Protocol (NDIS5)

The following 2 screenshots demonstrate an ability of the utility to check whether chosen DECnet of TCPIP addresses are free for CHARON:



CHARON Network Control Center.

CHARON Network Control Center.
Step 1 LAN tests.

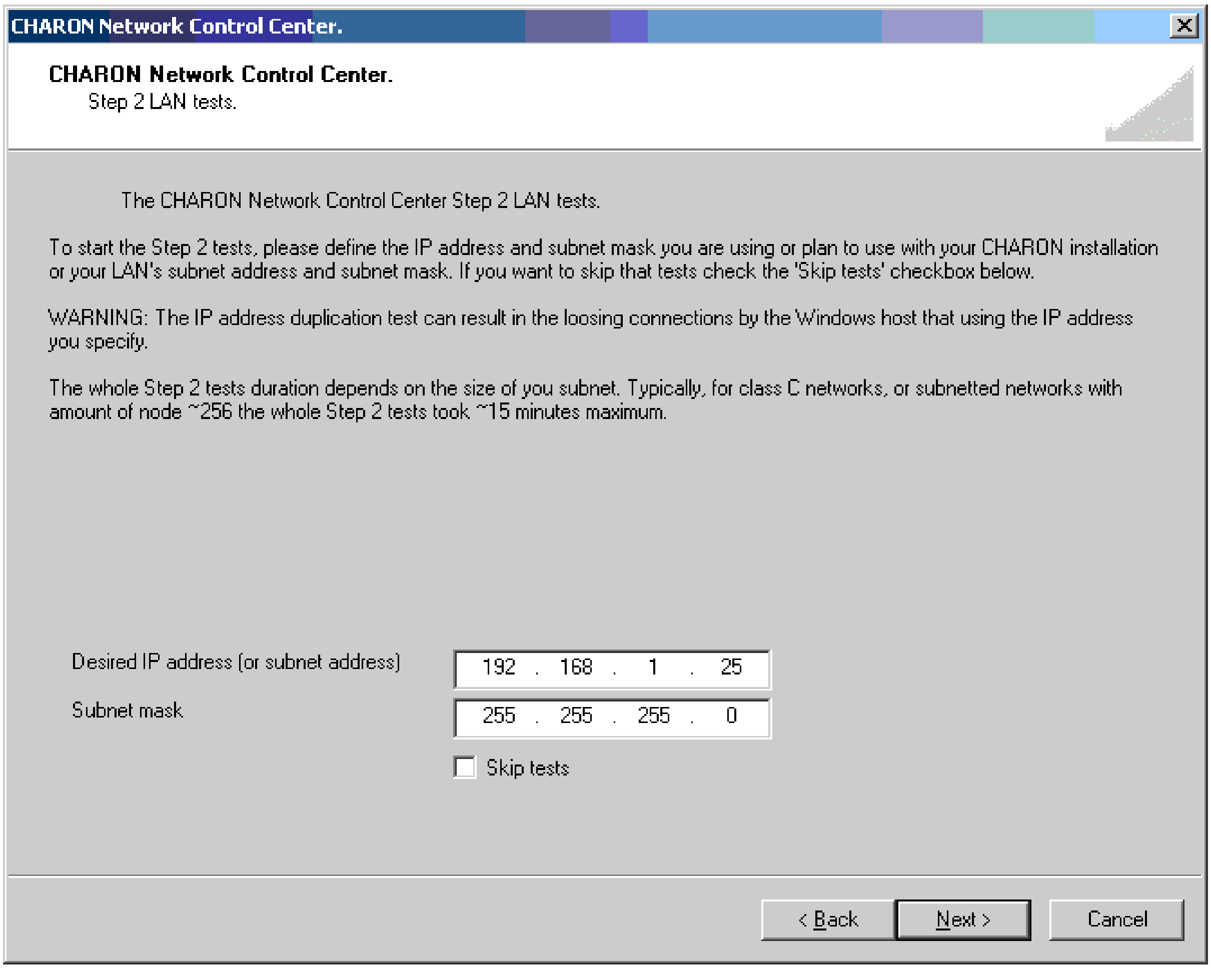
The CHARON Network Control Center Step 1 LAN tests.

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 52 123

□ Skip tests



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 . 25

Subnet mask 255 . 255 . 255 . 0

□ Skip tests

8 Installing and transferring VAX software

There are several ways to transfer data from a VAX system to CHARON-VAX:

8.1 Using the Local Area Network

First perform a standard installation of your VAX Operating System from the manufacturer's original media using the Windows CD-ROM drive. Then configure a network (DECnet and/or TCP/IP) to add your CHARON-VAX/66X0 to your existing Network with a unique address and use DECnet or TCP/IP to copy your applications and data to your CHARON-VAX/66X0. If for any reason installing a VAX Operating System from scratch is a problem, call your CHARON-VAX/66X0 sales contact for help. Once you have CHARON-VAX/66X0 connected to your network, you may use standard utilities to copy across the required data. Before copying the data you will have to configure CHARON-VAX/66X0 with adequate free space on disks or on disk images that can be created with the MKDISK utility. The installation also creates a folder named VDISK containing empty disk images in zipped form.

8.2 Using a physical disk drive

You can remove a SCSI disk from your VAX system and reconnect it to a SCSI adapter in your Windows system. Assign the SCSI disk in the CHARON-VAX/66X0 configuration file to a disk controller and it becomes a disk drive in the CHARON-VAX/66X0. If the SCSI disk is a bootable VAX/VMS disk from a VAX 6000-610, you can boot CHARON-VAX/66X0 from it.

8.3 Using a tape

CHARON-VAX/66X0 supports the connection of a SCSI tape drive to a SCSI adapter in your Windows system. Assign the tape drive in the CHARON-VAX/66X0 configuration file to operate the tape drive as usual by the VAX operating system. This way you can boot from standalone tape to restore your system backup.

It is also possible to use tape images previously created using physical tapes with the MTD utility. See the CHARON-VAX Utilities Manual for details.

Note that the reliability of a physical tape connection depends on factors like SCSI controller type, tape drive model and host CPU speed. Tape connections are not guaranteed to work in all cases.

9 Configuration file examples

The next pages provide the following configuration file examples:

- **The VAX 66X0 user configuration template.** (e.g. vx6k610.cfg) This file contains the basic information to set the parameters on the devices used by CHARON-VAX/66X0. Make a copy and edit it to set up the connections to your disks, disks images, tape drives, network adapters etc.

  Note: In the CHARON-VAX/66X0 installation directory you can find the vx6k610cfg, vx6k620.cfg, vx6k630.cfg or vx6k660.cfg file version for the particular model installed.

  Note: The most common solution for a console is using the Putty emulator. Note that Putty is installed by default by the CHARON-VAX/66X0 installation procedure.

9.1 VAX 6610 user configuration template

```
#
# Copyright (C) 1999-2007 Software Resources International.
# All rights reserved.
#
# The software contained on this media is proprietary to and embodies
# the confidential technology of Software Resources International.
# Possession, use, duplication, or dissemination of the software and
# media is authorized only pursuant to a valid written license from
# Software Resources International.
#

#
# Sample configuration file for:
#
#  *  Charon-VAX/6610
#
# Emulator of the VAX model:
#
#  *  VAX 6610
#
set session hw_model="VAX_6610"

#
# Define the log file.
#

#set session log="vx6k610.log" log_method="append"
set session log="vx6k610.log" log_method="overwrite"

#
# To enable automatic boot, define the default boot device in the VAX
# console and uncomment the line below.
#
```

```
#set xmi boot=auto

#
# TOY date/time, boot options, ...
#

set toy container="vx6k610.dat"

#
# EEPROM settings, e.g. default boot drive
#

set eeprom container="vx6k610.rom"

#
#
# Specify the size of RAM (default 32MB). Note that DIT (when enabled)
# also needs certain amount of memory which grows linearly following
# the size of memory specified here. Also remember that the dongle
# license might limit the maximum amount of memory.
#
# The valid settings are: 32,64,128,256,512,768,1024, ... 3584,

# 32bit systems only: Please note, that to be able to run the ~2Gb
# (2048) of simulated memory you should enable /3GB switch
#

set ram size=512
#set ram size=768
#set ram size=1024
#set ram size=2048
#set ram size=3584

#
# Now assign built-in console serial line. Currently the emulator
# offers two possible ways of using built-in serial lines. First of
# them is to attach a third party terminal emulator (virtual_serial_line).
# The second is connection to COM ports (via physical_serial_line).
#
# Once the way of the connection is defined corresponding mapping
# to the host resources can be performed.
#
# Connection to a third party terminal emulator:
#

load virtual_serial_line/chserial OPA0
#set OPA0 port=10003 application="opa0.ht"
set OPA0 port=10003 application="putty.exe -load OPA0"
#set OPA0 port=10003 application="c:\kea\user\opa0.ktc"

#
# Connection to a physical COM port of the host:
#

# load physical_serial_line/chserial OPA0
# set OPA0 line="COM1:"

#
# Load the MSCP controller with the name DUA
#

load KDM70/KDM70 DUA xmi_node_id=11

#
# Map the storage units for loaded MSCP controller DUA.
#
# In VMS, the DUA0 will correspond to the 'DUA container[0]', etc...
#
# Examples:
#
# set DUA container[0]="C:\Disk-Images\charon-6000\dua0.vdisk"
# set DUA container[1]="\\.\PhysicalDrive1"
# set DUA container[2]="\\.\CdRom0"
# set DUA container[3]="\\.\A:"
#
# It is also possible to map a tape drive identified by the host
# operating system to the DUA controller.
#
# Example:
#
# set DUA container[3]="\\.\Tape0"
#

#set DUA container[0]="..."

#
# Support of CI:
# Load CIXCD adapter into slot 12 (C) of the XMI.
#

#load CIXCD PAA xmi_node_id=12 ci_node_id=0x01

#
# Support of CI:
# Connect HSJ50 controller to the CIXCD adapter PAA.
#

#load HSJ50 PUA ci_node_id=0x0B mscp_allocation_class=1

#
# Map the storage units for the loaded HSJ50 controller PUA.
#
# In VMS, the PUA will correspond to the 'DUA container[0]', etc...
#
# Examples:
#
# set PUA container[0]="C:\Disk-Images\charon-6000\dua0.vdisk"
# set PUA container[1]="\\.\PhysicalDrive1"
# set PUA container[2]="\\.\CdRom0"
# set PUA container[3]="\\.\A:"
#
# It is also possible to map a tape drive identified by the host
# operating system to the PUA controller.
#
# Example:
#
# set PUA container[3]="\\.\Tape0"
#

#set PUA container[0]="..."

#
# IMPORTANT NOTE:
#
# Make sure that DUA and PUA do not conflict in the VMS environment, since
# the disks on those controllers have the same name "DUA[x]" preceded by
# their allocation class (for the HSJ50 controller it is set in the
# configuration file). Assign the allocation class in such a way to avoid
# name conflicts or enable only either DUA or PUA.
#
# See CHARON-66x0 User Guide for more details.
#

#
# Load Ethernet Controllers
#
# 2 Ethernet controllers are loaded in this sample configuration file: EXA
# and EXB. Both of them are connected to corresponding network interfaces:
# EXA_0 and EXB_0. The initial settings for the interfaces are "disabled".
# The exact mapping to the host ethernet interfaces will be defined later
# in this configuration file.
#
```

```
load DEMNA/demna EXA xmi_node_id=13 interface=EXA_0
load ndis5_chpack_port/chnetwrk EXA_0 interface="(disabled)"

load DEMNA/demna EXB xmi_node_id=14 interface=EXB_0
load ndis5_chpack_port/chnetwrk EXB_0 interface="(disabled)"

#
# Map the Network connections.
#
# Each connection is instantiated by the two objects. One is DEMNA controler
# emulator EXn where n is A or B, and second is packet port EXn_0 where the
# n is A or B.
#
# In the emulated VMS, the network devices EXn will correspond to the
# EXn, EXn_0 pair in the configuration file.
#
# To assign the spesific permanent address to the desired EXn controller
# ucomment the corresponding line below.
#
# Example:
#
# set EXA station_address="00-63-50-1A-A3-1E"
#

#set EXA station_address="..."
#set EXB station_address="..."


#
# To connect the corresponding adapter to the external device, uncomment
# the line below and put the valid interface definition.
#
# Example:
#
# set EXA_0 interface="Cabletron DE500B PCI Fast Ethernet Adapter (21143-PC)"
#
```

```
#set EXA_0 interface="..."
#set EXB_0 interface="..."

#this is the end of the configuration file ##################################
```

10 Windows service disabling

Note: For these recommendations to be effective it is assumed that CHARON-VAX is the only user application running on the host system. Simultaneous use of other applications on the same Windows host system, with the exception of a terminal emulator, is outside the design specification of CHARON-VAX/66X0.

For CHARON-VAX/66X0, the default settings of the Windows operating system should be retained, with the exception of the functions listed in the "**In all cases**" section below.

Additional Windows services may be disabled beyond those listed in the "**Services that may be disabled**" section below. Note that disabling these additional services will in general not lead to a significant performance improvement but are intended to optimize stability disabling unused functionality.

In "**Services remaining enabled**" the services are listed that are important or critical to the operation of Windows or CHARON-VAX.

10.1 Services that should be disabled

It is recommended to disable the following tasks and services:

- Automatic Updates – may cause network and processor traffic that could disrupt CHARON-VAX. This also requires Windows network services to remain enabled, posing an intrusion risk.

- Task Scheduler – may unexpectedly launch tasks with an unpredictable impact on CHARON-VAX.

- Screensaver and Power saving features – could reduce processing resources required by CHARON-VAX.

- Any virus protection – can cause disruption by accessing CHARON-VAX files. See the Application note AN-029 for recommendations regarding the security of CHARON-VAX Host Platforms.

- Automatic background backup - may cause network and processor traffic that could disrupt CHARON-VAX.

- Windows Messenger - may cause network and processor traffic that could disrupt CHARON-VAX.

10.2 Services that may be disabled

Services that may be disabled	
Alerter	Application Layer Gateway Service
Application Management	Automatic Updates
Background Intelligent Transfer Service	ClipBook
Computer Browser	Cryptographic Services
DHCP Client	Distributed File System
Distributed Link Tracking Client	Distributed Link Tracking Server
Distributed Transaction Coordinator	DNS Client
File Replication	Help and Support
HTTP SSL	Human Interface Device Access
IMAPI CD-Burning COM Service	Indexing Service
Internet Connection Firewall (ICF) / Internet Connection Sharing (ICS)	Intersite Messaging
IPSEC Services	Kerberos Key Distribution Center
License Logging	Messenger
Microsoft Software Shadow Copy Provider	Net Logon
NetMeeting Remote Desktop Sharing	Network DDE
Network DDE DSDM	Network Location Awareness (NLA)
NT LM Security Support Provider	Portable Media Serial Number Service
Print Spooler	Protected Storage
Remote Access Auto Connection Manager	Remote Desktop Help Session Manager
Remote Registry	Removable Storage
Resultant Set of Policy Provider	Routing and Remote Access
Secondary Logon	Server
Shell Hardware Detection	Smart Card
Special Administration Console Helper	Task Scheduler
TCP/IP NetBIOS Helper	Telnet
Terminal Services	Terminal Services Session Directory
Themes	Uninterruptible Power Supply
Upload Manager	Volume Shadow Copy
WebClient	Windows Audio
Windows Image Acquisition (WIA)	Windows Time

WinHTTP Web Proxy Auto-Discovery Service	Wireless Configuration
Telephony	Virtual Disk Service

10.3 Services remaining enabled

Services that should not be disabled	
COM+ Event System	COM+ System Application
Error Reporting Service	Event Log
Logical Disk Manager	Logical Disk Manager Administrative Service
Network Connections	Performance Logs and Alerts
Plug and Play	Remote Access Connection Manager
Remote Procedure Call (RPC)	Remote Procedure Call (RPC) Locator
Security Accounts Manager	System Event Notification
Windows Management Instrumentation Driver Extensions	WMI Performance Adapter
Windows Installer	Windows Management Instrumentation
Workstation	

10.4 Exceptions

The above lists are valid for a standard CHARON-VAX/66X0 installation that aims at maximum stability. Specific configurations require modifications. For instance the use of external iSCSI storage requires host system networking on a second network adapter, hence the services relevant to host networking cannot be disabled.

Note that after disabling the services some delays may be observed in starting the CHARON-VAX License Key driver (about a minute).

If the host systems must support UPS, do not disable the "Uninterruptible Power Supply" service. For Wireless Ethernet do not disable the "Wireless Zero Configuration" service.

Reader’s Comment Form

We appreciate your comments, suggestions, criticism and updates for this manual. You can Email us your comments at: info@stromasys.com

Please refer to the document ***30-16-039-001***

If you found any errors, please list them with their page number.