



## SUPPORT GUIDE:

### Migrating from the CPC660x to the CPC662x Ethernet Switch

## INTRODUCTION

Performance Technologies (PTI) has recently announced the End Of Life (EOL) for its CPC660x Ethernet switch. The CPC662x Ethernet switch is a next generation switch that replaces the CPC660x Ethernet switch. The purpose of this document is to provide Performance Technologies' customers with a streamlined migration path from the CPC660x to the CPC662x.

The operational aspects of the CPC662x switches are quite similar to those of the CPC660x product line, but the feature set has been greatly enhanced, while maintaining the same pricing structure. This provides our customers with an opportunity to greatly enhance the operation of their products and extend their life, with minimal software changes and no significant change in cost of goods.

While attempts were made to minimize the user interface changes, there are areas where this was not possible. This Support Guide outlines the differences between these two products and includes guidance for making the transition to the CPC662x platform as seamless as possible.

## OVERVIEW OF CHANGES

The CPC662x is a pin-for-pin replacement for the CPC660x, and thus can be inserted into the same slots as the CPC660x product. The CPC662x uses the same 5-, 10-, and 24-port Rear Transition Modules (RTMs) as the CPC660x.

Table 1, "Feature Comparison," lists the features that have changed and provides a link to the section of this Support Guide that describes each change in more detail. Features that remain the same between the products are not listed. Each feature is described after the table.

**Table 1:** Feature Comparison

Feature	CPC660x	CPC662x	Reference
CPU	300MHz MPC8245 PowerPC	800MHz AMCC 440GX PowerPC	<a href="#">"Hardware" on page 3</a>
RAM	32MB	256MB	<a href="#">"Hardware" on page 3</a>
Flash	8MB	64MB	<a href="#">"Hardware" on page 3</a>
Switch Chip	Two BCM5691 Connected via HiGIG	Single BCM56502	<a href="#">"Hardware" on page 3</a>

**Table 1: Feature Comparison (Continued)**

Feature	CPC660x	CPC662x	Reference
Port Density	24 10/100/1000M Copper	24 10/100/1000M + Two 10G CX-4	"Hardware" on page 3
Power	55.9 Watts max. 42 Watts typical	54 Watts max. 37 Watts typical	"Hardware" on page 3
SFP Module Support	None	Four 10/100/1000 ports on the CPC6622	"Hardware" on page 3
IPMI Sensors	Power Good	Power Good, Multiple Temperature and Voltage Sensors	"Hardware" on page 3
Operating System	VxWorks 5.4	NexusWare Linux 2.6.20	"Operating System" on page 3
CLI	See Reference	See Reference	"Command Line Interface" on page 3
Lua	–	Added Lua Library to perform any CLI function	"Lua Scripting Language" on page 5
SNMP	–	Common Switch MIB file Names change, IP MIB to support IPv6	"SNMP" on page 6
Software Installation	FTP file to install. Requires VxWorks shell to recover.	Install from NFS network mount, automatic recovery to previous version on failure to boot	"Software Installation" on page 8
DHCP	WindRiver/VxWorks implementation	Internet Systems Consortium implementation	"DHCP" on page 8
File System	TFFS mounted on flash: 1M RAM-based file-system at ramdisk:	JFFS mounted on /flash 1M RAM-based file-system at /ramdisk	"File System" on page 9
Packet Filtering	7 masks and 128 rules inspect arbitrary fields in first 80 bytes of frame	Predefined protocol-specific 'masks,' 2K 'rules,' inspect first 128 bytes of frame	"Packet Filtering" on page 9
GVRP/GMRP	Supported	Not Supported	"GVRP/GMRP" on page 9
Layer 3 Switching	IPv4 only	IPv4 and IPv6	"Layer 3 Switching" on page 9
Switch Access	Web, Telnet, SSH, FTP, TFTP, SFTP	Telnet, SSH, FTP, TFTP, SFTP	"Switch Access" on page 10
Spanning Tree	STP or RSTP	STP Compatibility Mode, RSTP	"Spanning Tree" on page 10

## 1. HARDWARE

The CPC662x uses a more state-of-the-art CPU subsystem and switching fabric than was used on the CPC660x. The processor speed and memory capacity are greatly improved over the CPC660x, supporting much faster updates of hardware address tables in the event of movement and failovers.

Even with these improved performance capabilities, the power envelope of the CPC662x module is slightly less than that of the CPC660x. Please refer to the product specifications in Chapter 8 in the *CPC662x Hardware User's and System Integrator's Guide*. See ["Related Documents"](#) on page 10.

The switch fabric is a single monolithic chip rather than two chips tied together, avoiding the complexity of maintaining address table synchronization. The CPC662x switch fabric is based on the Broadcom BCM56502, which supports IPv6 Layer 3 switching. The address table sizes on the BCM56502 are:

- 16K MAC addresses
- Up to 8K IPv4 or 4K IPv6 Layer 3 IP addresses

The CPC662x supports 24 10/100/1000M Ethernet ports with an option for four of these via SFP module to support fiber-optic interfaces. The CPC662x also supports two 10G CX-4 Ethernet interfaces.

The CPC662x provides greater support for System Management over IPMI with the addition of multiple temperature and voltage sensors. A local IPMI Peripheral Management (PM) controller conforms to the *PICMG 2.9, R1.0 CompactPCI System Management* specification.

Please refer to Chapter 2 in the *CPC662x Hardware User's and System Integrator's Guide*. See ["Related Documents"](#) on page 10.

## 2. OPERATING SYSTEM

The CPC662x uses PTI's Carrier-Grade Linux (CGL) distribution, NexusWare® for its base operating system services. This operating system is based on the Linux 2.6.20 kernel. The CPC660x used WindRivers' VxWorks Real-Time Operating System. The use of NexusWare affords a greater degree of freedom and access to open-source software. Some of the software that was used in building the CPC662x, such as Quagga Routing Engine and OpenSSH, leverage an extremely wide-spread deployed base and allowed PTI to quickly come to market with a very stable and highly functional product.

## 3. COMMAND LINE INTERFACE

The intention during development of the CPC662x was to retain as many of the CPC660x CLI commands as possible. In order to support the new IPv6 feature, however, some IP-related commands were modified. New commands were added to support additional functionality and a few commands were removed to adapt to deleted features (Web, GARP, GVRP, GMRP, and Legacy STP).

Table 2, "CLI Command Changes," highlights the CLI changes.

**Table 2:** CLI Command Changes

CPC660x CLI Command	CPC662x CLI Command	Notes
route	ip route	All IP commands are under ip group.
ip forward	ip ipv4 forwarding	IPv4 distinguished from IPv6.
ip ttl	ip ipv4 ttl	IPv4 distinguished from IPv6.
–	ip ipv4 base_reachable	New command to set Neighbor Refresh Timer.
–	ip ipv6	IPv6 added.
–	ip mtu	New command to set MTU.
filter rule filter mask	filter action filter criteria filter rule filter udf	Underlying hardware was significantly redesigned. See <a href="#">"Packet Filtering"</a> on page 9.
garp, gmrp, gvrp	–	CPC662x does not support GARP, GMRP, or GVRP.
gvrp admitall gvrp ifilter gvrp pvid	port admitall port ifilter port pvid	Port settings for VLAN moved from GVRP group to port group.
–	interface	New command to show all interface entries.
–	port pre_emphasis	Added support for 10G CX-4 port control.
–	port counters	New command to display statistics counters.
–	port state	New command to support presence and enable. This is used primarily for SFP modules.
–	script vars	Added command to control user-defined MIB variables used for Lua scripting.
–	snmp user snmp vacm snmp engineid	Added commands to support configuration of SNMP EngineID and SNMPv3 users and security.
span version	–	Removed support for running legacy STP protocol.
switch security web	–	Web support removed in CPC662x
–	switch uninstall	Added feature to allow code to be rolled back to previous install. See <a href="#">"Software Installation"</a> on page 8 for additional details regarding new software installation features.
–	user	Added support for additional user accounts.
–	vrrp primary vrrp associated	Enhanced VRRP support.

**Table 2: CLI Command Changes (Continued)**

CPC660x CLI Command	CPC662x CLI Command	Notes
–	cat chmod cp df diff grep head ls mv rm tail vi	Added useful utility commands.
–	ping6 traceroute6	Added IPv6 connectivity utilities.

Please refer to Chapter 5 in the *NexusWare Switch Software Manual* for more CLI information for the CPC662x. See [“Related Documents” on page 10](#).

## 4. LUA SCRIPTING LANGUAGE

The CPC662x uses the same Lua Interpreter as was used on the CPC660x, so none of the Lua syntax has changed. In addition, the library functions added to Lua for the CPC660x have been ported as-is to the CPC662x. These functions include: `addEvent()`, `arpAdd()`, `...idbU32Set()`,..., etc.

Since the Lua IDB access functions use the MIB Object names and since the CPC662x has renamed most of the private MIB variables, any Lua programs that use IDB access to private MIB variables will need to be ported. Please see [“SNMP” on page 6](#) of this document for guidance regarding SNMP MIB variable name changes.

### 4.1 Lua API Functions

The CPC662x adds a powerful new feature to the Lua language. The API to most of the internal Lua functions that are used to implement the CLI is documented and available for use in customer programs. Chapter 5 of the *NexusWare Switch Software Manual* contains a description of the Lua API function(s) that are used to implement each command. See [“Related Documents” on page 10](#).

For example, if you want add a VLAN, you could use IDB to create an entry in the **dot1qVlanStaticTable** using a paradigm that mimics SNMP, or you could simply make a call to the Lua function, `vlan_add_static_entry()` as follows:

```
if vlan_add_static_entry(vid, vlan_name, tagged, untagged)then
    print("VLAN Add Succeeded")
else
    print("VLAN Add Failed")
end
```

The Lua library function performs all of the necessary IDB table sets to add the VLAN and returns a Success/Fail response.

For a complete list of the CPC662x Lua API functions, please refer Chapter 5 of the *NexusWare Switch Software Manual*. See [“Related Documents” on page 10](#).

## 5. SNMP

The CPC662x supports most of the same public MIBs that the CPC660x supported. Some public MIB tables that the CPC662x does not support, which were supported by the CPC660x, include:

- **RFC1213-MIB : atTable** – this table does not support IPv6 addresses and has been replaced by a private table, **ptiSwitchNeighborTable**
- **Q-BRIDGE-MIB : dot1qGvrpStatus** – The CPC662x does not support GVRP
- **P-BRIDGE-MIB : dot1dGmrpStatus** – The CPC662x does not support GMRP
- **P-BRIDGE-MIB : dot1dGarp** – The CPC662x does not support GARP
- **P-BRIDGE-MIB : dot1dGmrp** – The CPC662x does not support GMRP

There are many additional public MIBs and MIB tables that are supported by the CPC662x, which were not supported by the CPC660x, including:

- **RFC 3414** – SNMP User-Based Security Model MIB
- **RFC 3415** – SNMP View-Based Access Control Model MIB
- **IP-MIB : inetCidrRouteTable** – provides support for IPv6 Routes
- **RFC 4750** – OSPF MIB
- **RFC 1724** – RIP2 MIB

The CPC662x file system includes a copy of each ASN.1 document that defines the supported MIB objects. Each MIB file is described in the *NexusWare Switch Software Manual*. See [“Related Documents” on page 10](#).

### 5.1 IPMI MIBs

The PTI proprietary MIBs used to manage the IPMI Platform Manager and FRU Inventory (**ptiIPMIFRU.mib** and **ptiIPMIPM.mib**) are supported in the same manner as they were on the CPC660x.

### 5.2 Switch MIB

The CPC662x replaces the proprietary MIB, **cpc6600.mi2**, with a new proprietary MIB file, **ptiSwitch-MIB.mi2**. This file is intended to be a generic switch MIB file that will be used for any future PTI-designed Ethernet switches. As such, we have renamed all objects to include the prefix, 'ptiSwitch,' rather than the switch model: 'cpc4400,' 'cpc5400,' or 'cpc6600,' used in previous products.

In addition to the prefix name change, the organization of the MIB objects has been greatly improved. There is generally a single grouping of closely related objects in the new MIB, such as: **ptiSwitchVerGroup** and **ptiSwitchIcmpSnoop**, rather than multi-level groupings like: **cpc6600CommonGroup.cpc6600CommonVerGroup** and **cpc6600CommonGroup.cpc6600CommonIcmpSnoop**. We have avoided grouping unrelated objects together as we had previously done under **cpc6600CommonMiscGroup**. We believe that these changes will make it much easier to locate objects.

In the new MIB, objects that augment a public MIB have been reorganized into groups with an appropriate name, such as:

- **ptiSwitchRipAugmentGroup**
- **ptiSwitchOspfAugmentGroup**
- **ptiSwitchVRRPAugment**
- **ptiSwitchLACPAugment**
- **ptiSwitchRSTPAugment**
- **ptiSwitchBridgeAugment**

These groups contain objects that are not part of the standard MIB that is used to manage a particular function, but which are added to our private MIB to provide some non-standard enhancement.

### 5.3 MIB Name Changes

If you currently have SNMP applications and are accessing private MIB objects, you should first try to see if the same object exists in the new MIB, but simply has a new name. For MIB objects that have simply changed name, you should be able to search for the suffix of the object's name in the new MIB file.

As an example, the object **cpc6600CommonMiscSlotID** is now named **ptiSwitchSystemSlotID**. The suffix, **SlotID**, specifies the object in the old group, **cpc6600CommonMiscGroup**, and is now included in the new group, **ptiSwitchSystemGroup**. Be sure to review the MIB object description to ensure that the new MIB object operates in the same way as the old one.

It may be useful to load the new MIB into a browser and inspect the organization visually to familiarize yourself with the new organization.

### 5.4 Unsupported MIBs

Some tables that have been removed in the new MIB include:

- **cpc6600CommonLoadGroup** – No support for loading and running code via SNMP in CPC662x
- **cpc6600FsGroup** – No support for file system access via SNMP in CPC662x

The packet filter functionality has been significantly altered on the CPC662x and the SNMP management of that feature has been altered accordingly. Please review the MIB table, **ptiSwitchFilterGroup** for the SNMP packet filter management capabilities on the CPC662x. Also, see "[Packet Filtering](#)" on page 9 of this document for more information.

Any MIB tables or objects that deal with IP Addresses, including ARP Cache, IP Interface, Routes, etc., have been modified or replaced as needed to support IPv6. These include:

- **cpc6600L3IpSubnet/ptiSwitchL3IpSubnet** – deprecated in favor of **ptiSwitchIpGroup**
- **atTable** – replaced by **ptiSwitchNeighborTable**
- **cpc6600L3IpRoute** – replaced by **inetCidrRouteTable**

## 5.5 VRRP MIB

Note that the same VRRP MIB is supported by both the CPC660x and the CPC662x, but that the CPC662x supports multiple entries in the **vrrpAssocIpAddrTable** and the CPC660x does not. For this reason, when you configure VRRP on the CPC662x, you must create and activate at least one row in the **vrrpAssocIpAddrTable**, whereas, on the CPC660x, this was not required.

## 5.6 Additional SNMP Information

For additional information, please refer to Chapter 7 in the *NexusWare Switch Software Manual* for more SNMP information on the CPC662x. See “[Related Documents](#)” on page 10.

## 6. SOFTWARE INSTALLATION

The firmware installation on the CPC662x is quite similar to that of the CPC660x. Both rely on the user loading and executing a Lua script, named **install.lua**. This script prompts the user for the necessary information in order to perform the update. The boot process on the CPC662x has been enhanced to support an automatic failed-boot recovery mechanism as described in the *NexusWare Switch Software Manual*. See “[Related Documents](#)” on page 10.

The CPC662x uses a PTI-developed boot loader, named PTBMON, rather than the VxWorks boot loader. PTBMON performs the functions previously performed by the CPC660x boot rom, boot loader, and script.4th. Updating the boot loader follows a similar process on the CPC662x as the CPC660x used for updating its boot files.

Refer to Chapter 19 of the *NexusWare Switch Software Manual* for more information about the software update process and boot parameters. See “[Related Documents](#)” on page 10.

## 7. DHCP

The CPC662x uses an open-source implementation of DHCP whose configuration is very familiar to most network administrators, but which does differ considerably from that of the CPC660x.

Please refer to Chapter 17 in the *NexusWare Switch Software Manual* for more information about DHCP on the CPC662x. See “[Related Documents](#)” on page 10.

## 8. FILE SYSTEM

The CPC662x provides a 26 megabyte (MB) JFFS2 flash file system for permanent storage and a 1MB ramdisk for temporary storage. Some of the special files previously used by the CPC660x have been modified. An example is the log file where system messages are stored used to be `/log.msg`, and is now `/var/log/messages`.

Please refer to Chapter 19 in the *NexusWare Switch Software Manual* for more information about the file system on the CPC662x. See [“Related Documents” on page 10](#).

## 9. PACKET FILTERING

The CPC660x packet filter engine required the user to create definitions of the fields that were of interest and only seven of these field definitions could be created. These fields could be located within the first 80 bytes of the packet. Only 128 matches could be defined and the processing of unknown MAC Addresses was very restricted.

The CPC662x packet filter processing engine is greatly improved over that of the CPC660x. The CPC662x packet filter engine supports up to 2K shared filters, covering a packet depth of 128 bytes. The filter engine has predefined filter groups that cover standard packet fields from the Ethernet header out through TCP/UDP ports and TCP/IP header flags. The engine automatically adjusts for variations in the location of fields due to options in protocol headers, avoiding the need for the user to 'count bits.'

An example of the type of filtering that the CPC662x is able to perform might be:

### [Identify SYN and FIN in TCP Header and Send Packet to Specific Port](#)

Since the underlying packet filter hardware capability was so drastically changed, the management of this feature has changed greatly on the CPC662x. If you are utilizing the packet filter engine of the CPC660x, it is recommended that you review the documentation provided in Chapter 11 in the *NexusWare Switch Software Manual* regarding packet filters to see how the new switch can support your needs. See [“Related Documents” on page 10](#).

## 10. GVRP/GMRP

The CPC662x does not support the GARP protocols: GVRP and GMRP. These protocols were found to be of limited use in the vast majority of our customer's applications and in fact, they interfered with some of the Layer 3 switching functionality by dynamically modifying VLAN and multicast group memberships.

## 11. LAYER 3 SWITCHING

The CPC662x supports wire-speed Layer 3 switching for both IPv4 and IPv6. The CPC662x also supports several tunneling protocols to ease the migration from IPv4 to IPv6 by allowing IPv6 packets to traverse IPv4 networks.

Please refer to Chapter 12 in the *NexusWare Switch Software Manual* for more information regarding Layer 3 switching and IPv6 on the CPC662x. See [“Related Documents” on page 10](#).

## 12. SWITCH ACCESS

The CPC662x supports Telnet, SSH, FTP, TFTP, and SFTP access protocols as did the CPC660x, but the CPC662x does not support Web access. Very few customers used the Web interface on the CPC660x and the cost of implementing this on the CPC662x was not deemed to be appropriate.

## 13. SPANNING TREE

The CPC662x supports Rapid Spanning Tree and also a normal Spanning Tree compatibility mode on ports where legacy STP devices are detected. This is not the same method used on the CPC660x. On the CPC660x, STP was enabled by default for legacy support reasons, and RSTP was available as an option.

Please refer to Chapter 14 in the *NexusWare Switch Software Manual* for more information regarding Spanning Tree on the CPC662x. See “[Related Documents](#)” on page 10.

## RELATED DOCUMENTS

Table 3, “[CPC662x User Guides](#),” lists the CPC662x user guides, which are available for download from the PTI Web site:

**Table 3:** CPC662x User Guides

CPC662x Ethernet Switch	
Hardware Manual	Software Manual
<i>CPC662x Hardware User's and System Integrator's Guide</i>	<i>NexusWare Switch Software Manual</i>
<a href="http://pt.com/file/pdfs/manuals/cpc662x-manual.pdf">http://pt.com/file/pdfs/manuals/cpc662x-manual.pdf</a>	<a href="http://pt.com/file/pdfs/manuals/nexusware-switch-sw-manual.pdf">http://pt.com/file/pdfs/manuals/nexusware-switch-sw-manual.pdf</a>