N+1 Redundancy with the VCom HD4040 Upconverter

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Introduction

This document shows how to configure N+1 redundancy with the VCom HD4040 upconverter.

Prerequisites

Requirements

Readers of this document should have knowledge of RF Technologies and Networking.

Components Used

The information in this document is based on the VCom HD4040 upconverter.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Set Up Communication with the Upconverter

In order to support redundancy switching, the cable modem termination system (CMTS) needs to communicate to the upconverter Ethernet port to set Simple Network Management Protocol (SNMP) Requests and to get SNMP Responses.

To communicate with and set up the upconverter, use a Cisco DB9 to RJ−45 console adapter attached to the serial port of a computer. Use a console (rollover) cable connected to the RS−232 port on the HD4040 upconverter (the bottom RJ−45 jack). Make sure the upconverter Z module is selected for RS−232.

Note: A straight, CAT5 Ethernet cable can be used with a special DB9 serial adapter. You can make your own DB9 serial to RJ−45 adapter by attaching the RJ−45 pins (or wires) to the DB9 pins as shown in this

table:

RJ–45 Pin (Wire Color)	DB9 Pin
1 (blue)	8
2 (orange)	6
3 (black)	2
4 (red)	5
5 (green)	
6 (yellow)	3
7 (brown)	4
8 (white)	7

1. Go to HyperTerminal or some equivalent program.

   To reach HyperTerminal from a Windows system, choose **Start > Programs > Accessories > Communications > HyperTerminal**.
2. Set the upconverter to an appropriate serial port (such as **COM1**) and set its baud rate to **115,200**.

   Tip: Simultaneously press the **Select** key and **Down** key on the upconverter for about 1 second to activate the serial port. This only works if the SNMP function is disabled. You can also cycle the power on the upconverter. You also may need to reboot your computer for the COM1 port to activate.
3. Assign a valid IP address, Subnet mask, and gateway address.
4. Set the Read/Write SNMP Community Strings to **private**.

   The default setting of **public** is not supported. Refer to the Vecima Networks ⬚ web site for more details and documentation.
5. Once an IP address is set up, SNMP will be operational. Attach an Ethernet CAT5 cable to the RJ–45 jack on the back of the upconverter and to a switch or hub common to all N+1 components.

   Note: You can enable or disable SNMP operation through the Ethernet port with an SNMP agent or using the VXR. The test command is **test hccp 1 1 channel–switch** *uc* **snmp/front–panel**, where *uc* is the name assigned to the upconverter in the CMTS configuration file. Working or Protect interfaces have to be configured on the CMTS for this command to work. VCom has released a new version of code that allows you to use the front panel SNMP–breakout feature. To disable SNMP mode on the HD4040 from the front panel, hold down the **Select** button for approximately 6 seconds, then release it. If the upconverter is not SNMP–enabled and a failure occurs, it goes into SNMP mode automatically; but it is best to place it into SNMP mode manually with the **test** command. The Protect upconverter frequency will automatically be set for the same frequency as the Working upconverter or upconverters that it will be protecting, so there is no need to assign it. Be sure to set the frequencies and power levels, and be sure to enable the output on the Working modules and disable the output on the Protect modules.

For non–SNMP capable upconverters to be used with the High Availability solution, they need to have an RF output less than −3 dBmV when intermediate frequency (IF) input is absent and a ramp–up time less than 1 second. If neither of these requirements are met, the integrity of the high availability system could be compromised. This solution is less expensive, has no Ethernet connectivity concerns, has possibly quicker convergence time, and uses fewer command–line interface (CLI) configurations in the CMTS.

One caveat to this solution is the downstream (DS) frequency must be the same for an entire Hot Standby Connection–to–Connection Protocol (HCCP) Group. One could still have different DS frequencies in a

chassis, though.

In the new Cisco IOS® Software code, the configuration of an HCCP UPx statement triggers IF output. If no HCCP UPx statement is present, then IF−muting will be enabled (no IF output).

In the non−SNMP solution, the Protect upconverter frequency needs to be set for the same frequency as the Working upconverter or upconverters that it will be protecting. Be sure to set the frequencies and power levels, and be sure to enable the output on the Working and Protect modules.

Note: The only way to set the power level is to have IF input from the linecard. When IF−muting is enabled on the Protect interface and HCCP configurations are present, issuing the **cab downstream if−output** command is only cosmetic. This is the recommended procedure to set the RF output on the Protect UPx:

1. Disconnect the Protect UPx RF Output cable from the cable network.
2. Before you configure HCCP commands, issue the **cab downstream if−output** command to manually turn on the Protect linecard IF output.
3. Set the UPx frequency and level.
4. Issue the **no cab downstream if−output** command to turn off the Protect linecard IF output.
5. Configure the Protect linecard HCCP commands.
6. Connect the UPx cable back into the cable network.

Caution: Be sure the Protect UPx RF output cable is disconnected while you are setting its RF output level. Once the Protect linecard cable is attached with its IF muted, there will be no IF input and, hence, no RF output; the UPx RF output cable, which is connected to the RF Switch, can be re−attached.

Tip: It may be advantageous to make the RF output of the Protect upconverter slightly higher in level than the Working modules that it is protecting. This is because of extra insertion loss through the switch when in the Protect mode, which could be from 0.5 to 2 dB, depending on the frequency used.

Be sure to pick a standard NTSC center frequency. For example, channel 62 would be 451.25 MHz, so the visual carrier is 453 MHz center frequency.

It is recommended that you install a 10 dB pad on the upconverter input to keep the 44 MHz IF input below 32 dBmV. It might be best to install the RF attenuators on the IF input of the upconverter rather than on the IF output of the linecard. This makes it easier to disconnect cables from the upconverter, if necessary. The IF connectors are very close together and are not perfectly round, which makes it easier to cross−thread; be careful.

Figure 1 − VCom HD4040 Upconverter   Rear View

Modules are labeled as A through P and correlate to modules 1 through 16, when you are setting up the configurations in the 7200. The modules in Figure 1 are shown from right to left because Figure 1 is the rear view.

Upconverter output cabling failures are covered in a switchover through the Keepalive feature. The switch is not smart enough to detect any failures, but the Protect VXR can detect failures and tell the switch what to do. The best scenario is to monitor the MIBs from the upconverter; but, for now, the Keepalive function indicates third party failures.

There are two test points on each upconverter module. The one on the top is a −30 dB test point for IF input. The one below it is a −20 dB test point for RF output. The LED between the two test points indicates RF output, which means that there is no IF input or that it is disabled. The red LED at the bottom indicates no IF input.

Figure 2 – VCom HD4040 Upconverter   Front View

Note: The upconverter has its own redundancy feature, but do not enable it. This feature is for upconverter redundancy when one IF signal is split to feed two adjacent upconverter modules and the RF output is combined through a splitter. SNMP takes care of this upconverter redundancy feature.

Note: Be sure that the upconverter is configured properly before you attach the RF output cable to the switch. The Protect linecard IF of 44 MHz is active even when the interface is shut . If the upconverter is enabled and sees IF input, it could insert the signal on top of carriers that already exist. Be sure to enable the upconverter to set its output power, then disable the Protect upconverter module. It will enable its output and set the frequency through SNMP when it needs to do so, based on the Working DS frequency programmed in the 10K configuration.

Note: If you replace a bad upconverter while in the Protect mode, you must enable it to set the power level. This creates another carrier to be placed on the cable plant if the RF output is connected, which in most cases it will be. The frequency would need to be set to the proper frequency and would be stepping on the Protect upconverter frequency. The best way to set the level and frequency would be through SNMP. For now, it is recommended that the upconverter be set for the proper frequency and level while the RF output of the upconverter is disconnected this is easier and allows analyzer testing. Then disable the output on the upconverter and connect the cable. This all has to be done while SNMP is disabled, unless it can be done through SNMP.

VCom has released a new version of code that allows you to update your HD4040 upconverter cards from Rev 19 to Rev 20. This version also allows you to upgrade the HD4008 controller to version 2.08. You must install this firmware to take advantage of the new front panel SNMP–breakout feature.

To disable SNMP mode on the HD4040 from the front panel, hold down the **Select** button for approximately 6 seconds, then release it.

Before you use the SNMP–breakout feature, you must also flash the SNMP controller from a terminal session.

1. Once connected, you can either power cycle the unit or simultaneously press the **Select** and **Down** buttons on the front panel to restart the SNMP agent. This reboot causes a welcome screen and menu

to appear in the terminal connection.

2. Press **1** for Flash Update.
3. When prompted to begin the file transfer, select **send text file** from the terminal server menu, then browse to file **snmp_rom_file_2_02b.HEX**.
4. Run the HD4000_302.exe program to update the flash of the controller. The appropriate files will be loaded automatically.

Note: For this to work, the VCom HD4040 can not be in SNMP mode.

You will also find an updated MIB file (wcHD4040) with the added alarm for SNMPAlarm, to indicate that SNMP has been disabled from the front panel. The only way to re−enable SNMP is to set the MIB object **hd4000SNMPEnable** to **1** or issue the **test hccp 1 1 channel−switch** *uc* **snmp** command.

VCom Dual4040D or MA4040D Upconverters

The Dual4040D and MA4040D with SNMP modules are supported, but not as a part of the reference design.

1. Read the MAC address of the Ethernet port of the upconverter.

   There is a white sticker on the Ethernet port which shows the hardware address (the MAC address).
2. Create an Address Resolution Protocol (ARP) entry in the uBR7200 with this MAC address and the desired IP address.

   The IP address is the one that you want to set on the Ethernet port of the upconverter.

   ```
   Router(config)# arp 10.10.10.1 MAC_address arpa
   ```
3. Connect the uBR7200 FE port to the Ethernet port of the upconverter with a straight cable (through a hub).

   The upconverter is a data terminal equipment (DTE) with 10BASE−T, so a crossover cable works, if you are connecting directly to each other.
4. On the 7200, try to issue the **telnet** command to reach the IP address and port of the upconverter Ethernet interface, where the port number is **1**.

   This Telnet session will fail. It will, however, assign the IP address to the Ethernet port of the upconverter.

   ```
   !--- If you have created an ARP entry in the CMTS with the
   !--- IP address 10.10.10.1 then issue this command:

   telnet 10.10.10.1 1
   ```
5. Issue this **telnet** command, where *IP_address* is the IP address of upconverter Ethernet interface:

   ```
   telnet IP_address 9999
   ```

   You will be able to reach the upconverter now. You can set various parameters from this Telnet session.

   Tip: It may be possible to hack into the SNMP mode, if you press the **Up Arrow** key when the Z module is highlighted. This will make the address of the SNMP module change from 999 to 001, and SNMP should manually disable. This trick does not work for the HD4040.

Related Information

- **Vecima Networks, Inc. (formerly WaveCom Electronics, Inc.)** ⬀
- **Cisco Cable/Broadband Downloads (registered customers only)**
- **Broadband Cable Technology Support**
- **Technical Support – Cisco Systems**

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