User Guide

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FCC STATEMENT

This device complies with **Part 15** of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

--Reorient or relocate the receiving antenna.

--Increase the separation between the equipment and receiver.

--Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

--Consult the dealer or an experienced radio/TV technician for help

VCCI & CE...

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INTRODUCTION

This chapter describes the features of your HomePNA3.1 over Coax MDU Master Bridge -- **CC100**. Refer to "HomePNA3.1 over Coax" as HCNA from this point.

Features

- One HCNA port for driving HomePNA3.1 signal into existing coaxial cable
- One TV/Antenna port for TV set connection or for TV signal from VHF/UHF antenna/CATV
- Two fast Ethernet ports with Auto-Detect MDIX Function(Auto Crossover) and Auto-Negotiating Half/Full Duplex 10M/100M for expansion or link to FTTx/xDSL Modem
- One reset button
- Priority queue based QoS support for 802.1p, IP TOS, UDP/TCP protocols
- Support for up to 31 end point (Endpoint, as CC101 Slave Unit) concurrent connections
- Built-in diagnostic function for individual end point connection
- Built-in web server and telnet server to support remote configuration via web browser or telnet protocol
- Supports remote HTTP/TFTP upgrade function for system firmware and HCNA driver
- Supports HCNA driver upgrade on-line for connected end points
- Supports SNMP function

Glossary

- HCNA — HomePNA3.1 over coaxial cable
- MDU — Multiple Dwelling Unit
- Coax — Coaxial cable
- SyncMode — HCNA device operates in Synchronous mode
- AsyncMode — HCNA device operates in Asynchronous mode
- Master — Master HCNA device in one coax network
- Slave — Slave HCNA device in one coax network
- EP — Endpoint, equivalent to Slave HCNA device, CC101
- Smart EP — Smart Endpoint, as CC101. CC100 could configure Smart EP's Ethernet properties.
- QoS — Quality of Service
- Mixer — Coax device sums two or more signals into one
- Splitter — Coax device divides a signal into two or more smaller and approximately equal signals.
- Combiner — Coax device adds several discrete signal inputs to one and has high isolation between inputs
- Duplexer — Coax device separates 2 signals within the same band
- Diplexer — Coax device separates 2 signals in different bands
- Tap — Coax device uses for matching impedance or connecting subscriber drops
- dB — Decibel, to express either a gain or loss power ration(log) after the signal has been transmitted

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2

INSTALLATION

This chapter describes the installation procedure for your bridge.

Packing List

Your package should come with the equipment listed below,

- One Main Unit (HCNA to Ethernet Master Bridge) CC100
- One DC 5V Power Adaptor
- One F-Type Coaxial Cable (RG-59U)
- One RJ-45 Ethernet Cable (CAT-5)

Rear Panel

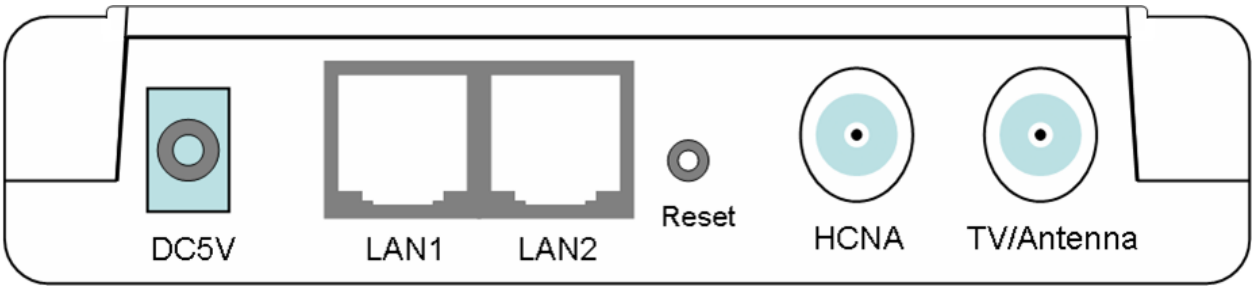

Figure 1: Rear Panel of CC100

Connectors

1. **DC5V**: Connect to the power adapter plug.
2. **LAN1/LAN2**: Two fast Ethernet ports to connect Switch/FTTx/xDSL Modem for Internet access.
3. **Reset**: While CC100 is turned on, press and release this button to reboot CC100. Pressing it for 5 seconds will restore all settings back to factory default. For example, the IP address will restore to default '**192.168.1.1**'.
4. **HCNA**: Attach to existing coaxial cable and use it as the networking backbone in one or more MDUs. CC100 is the HCNA **Master** device and controls the other **Slave** HCNA devices (refer to Endpoint or **EP**, as CC101) on the same coax network. Refer "Connecting the Cables" for more details.
5. **TV/Antenna**: Connect to TV Set. Or connect to VHF/UHF antenna or CATV to bypass TV signal to HCNA port.

LED Indicators

1. **Power**: Lights up when power on.
2. **LAN1**: Lights up when LAN1 port is active and flashing when there is any data traffic.
3. **LAN2**: Lights up when LAN2 port is active and flashing when there is any data traffic.
4. **Link/Act**: Lights up when HCNA port is active and flashing when there is any data traffic.
5. **SyncMode**: Lights up when HCNA port is working in HCNA **Synchronous MAC** mode.
6. **Diagnosis**: Lights up when CC100 is diagnosing EP.

NOTE: HCNA always adopts the **Synchronous MAC** protocol layer in coax system in order to coordinate all the transmissions and eliminate any collisions. The SyncMode LED should always be on as long as power is on.

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Connecting the Cables

To establish a new coax networking system through the CC100, reroute the CATV/Antenna signal source over coax toward the CC100 '**TV/Antenna**' port and connect the CC100 '**HCNA**' port to the original coax entrance to the building. The CC100 works as a **Combiner** for TV and HCNA signal. In each dwelling unit, use the HCNA **EP** to extract the TV signal and Ethernet packets. See Figure 2 for the detailed cabling in one MDU,

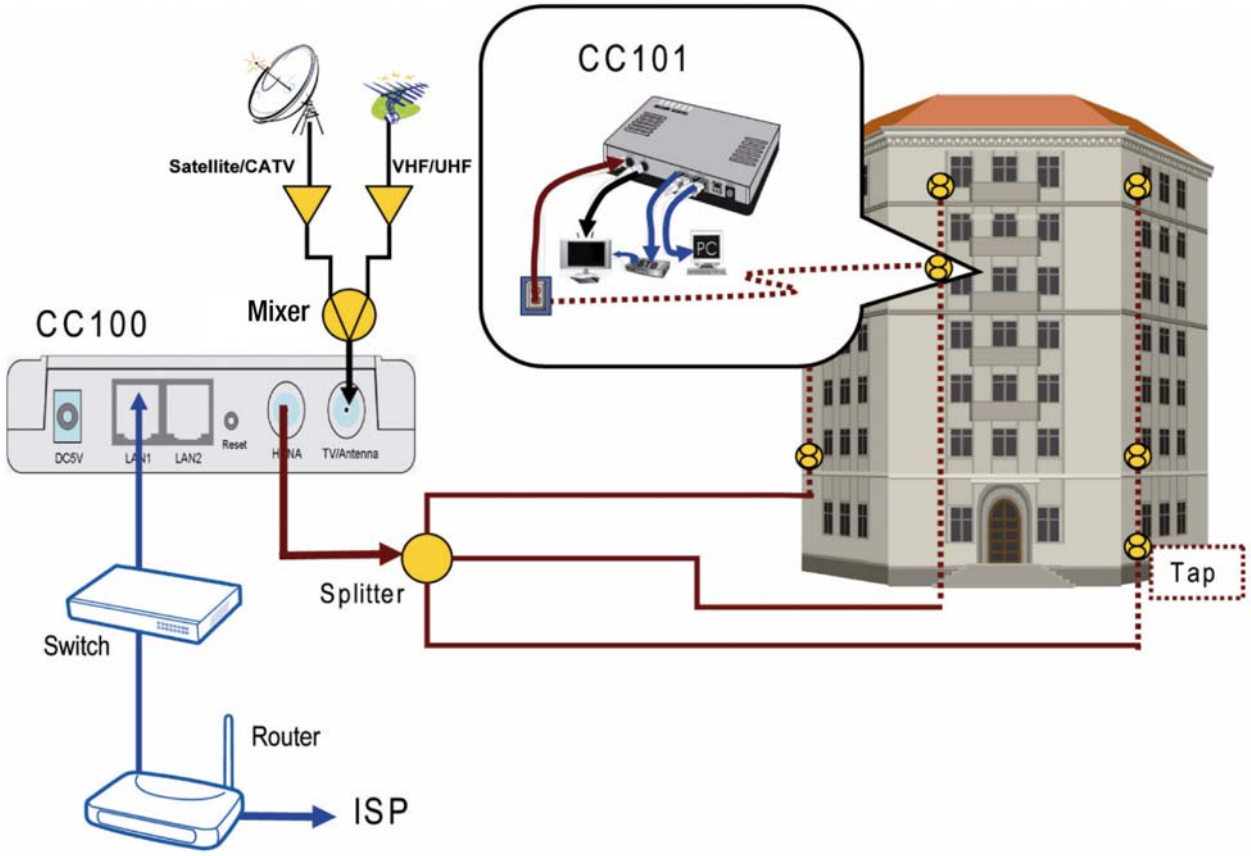

Figure 2: Detailed cabling of CC100

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You can also use other Combiner's or Mixer-Splitter's with the CC100 to build the same system. See the following Figure 3 for different cabling.

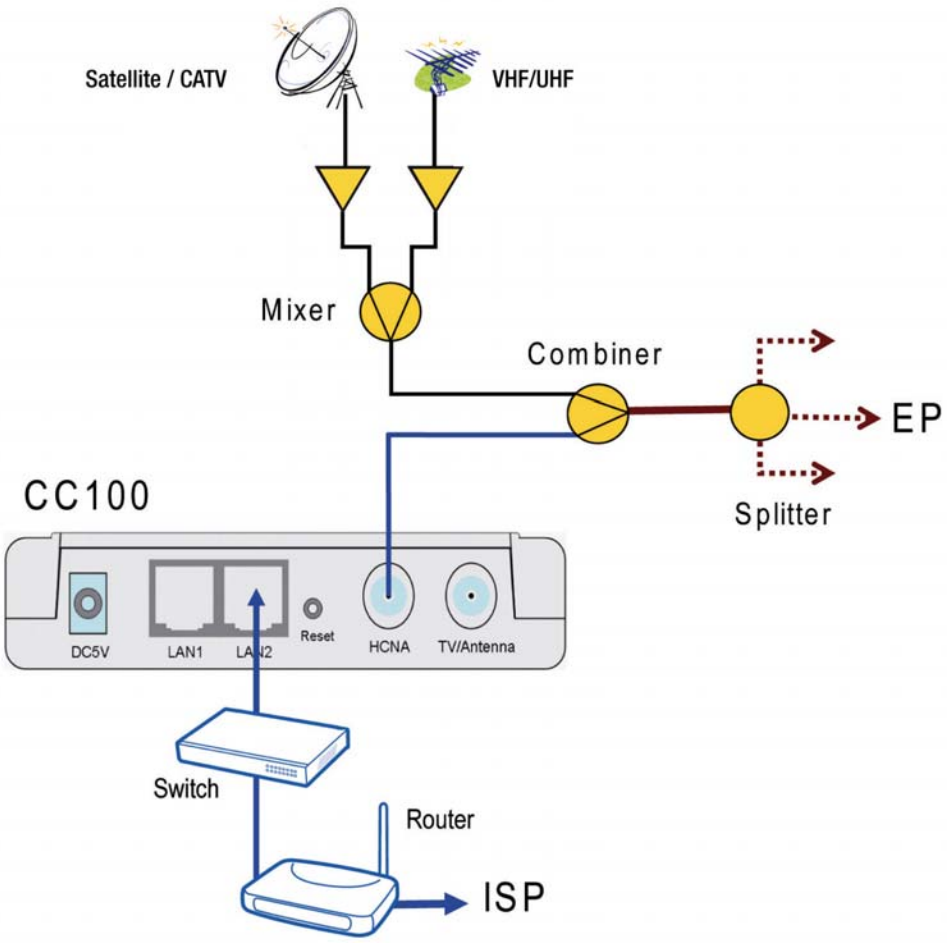

Figure 3: Different Cabling of CC100

NOTE: After powering up the CC100, the LED '**SynMode**' will always be glowing and LED '**Link/Act**' will light up if at least one EP is detected on the HCNA network. A dimmed LED '**Link/Act**' shows if no EP is attached to the HCNA network.

NOTE: The minimum attenuation between Master and EP is 12dB. The EP is usually connected to the coaxial cable via a **Tap** device that provides enough attenuation (contributes more than 20dB). If you intend to connect the Master and EP directly for test purposes, please add the attenuator that exceeds 12dB to the coaxial cable.

Verification

After you have finished the installation, you should be able to access the CC100 through **Ethernet** link.

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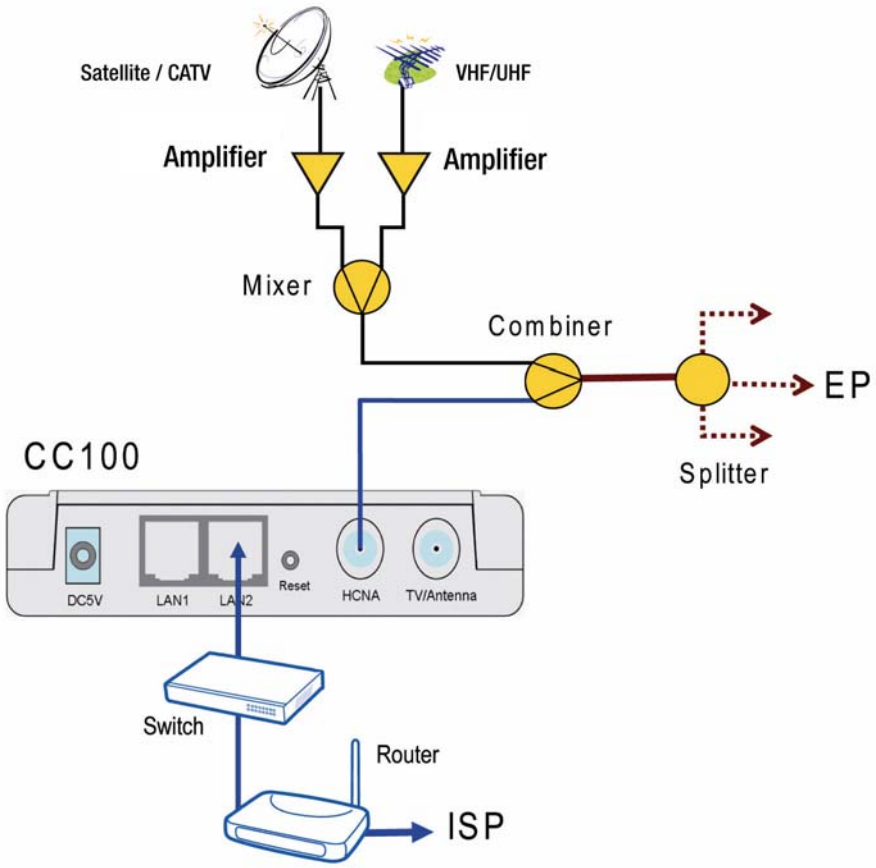
Installing the CC100 with an amplifier

TV Signal Amplifiers may cause interference when used in conjunction with this product. This interference may occur with particular types of TV Signal Amplifiers when they are connected to the coaxial cable and are placed in between the Master (CC100) and any of the Slaves (CC101). In order to avoid potential interference, please make sure that the Master is installed "downstream" of the TV Signal Amplifier such that the Amplifier is not on the cable that runs in between the master and the slave units.
The below figure shows the recommended setup to install CC100 with an amplifier:



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3

CONFIGURATION

This chapter describes the configuration procedure for your bridge.

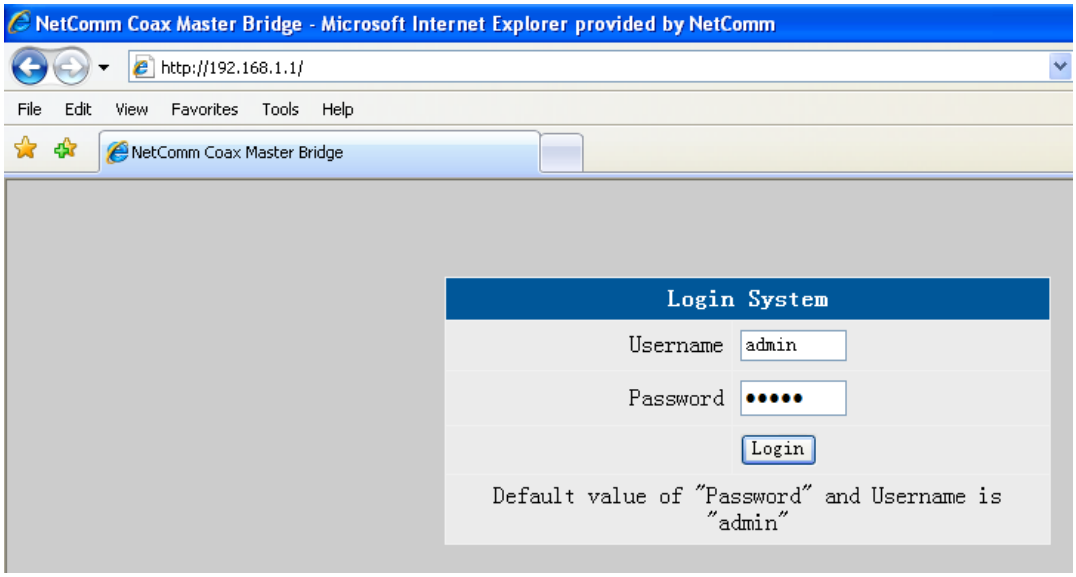
Configuration Methods

To access and configure your bridge, choose one of the following methods:

- Use Web Browser
- Use Telnet Program
- Use SNMP Manager or MIB Browser

Use Web Browser

Web browser is the easiest tool to use to configure the bridge. The factory default IP address of CC100 is '**192.168.1.1**' and the default subnet mask is '**255.255.255.0**'. To access the bridge with default IP, your PC should be within the same IP network as the bridge, CC100. That is, your PC's IP address should be "192.168.1.xxx". For instance, you may connect your PC with the bridge directly by Ethernet cable between your PC's Ethernet adapter and bridge's port LAN1. You can also configure your PC's TCP/IP setting to fixed IP as "192.168.1.xxx", subnet mask as "255.255.255.0", disable DHCP option. Make your PC and the bridge within the same "192.168.1.xxx" network. Type in **192.168.1.1** in your browser as seen in the following picture.



The bridge will prompt you for password authorization. The factory default **Username** is '**admin**', and default **Password** is '**admin**'. Please change it to a more secured password after you login successfully. Here shows the main configuration menus on the browser,

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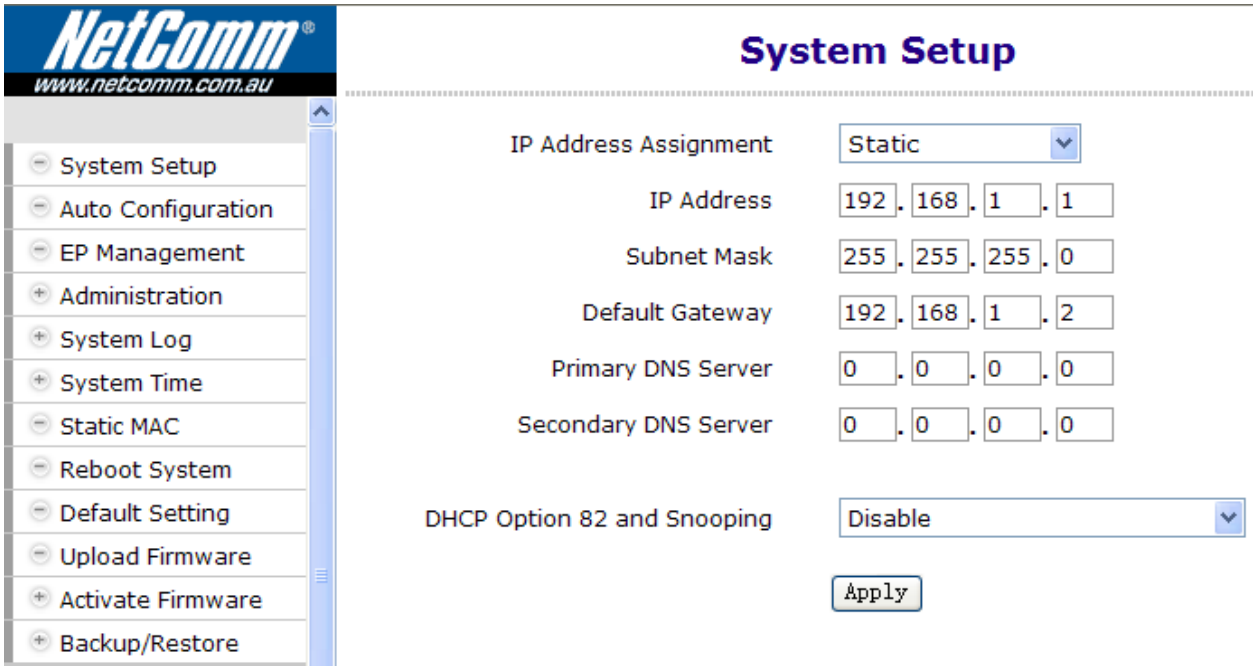
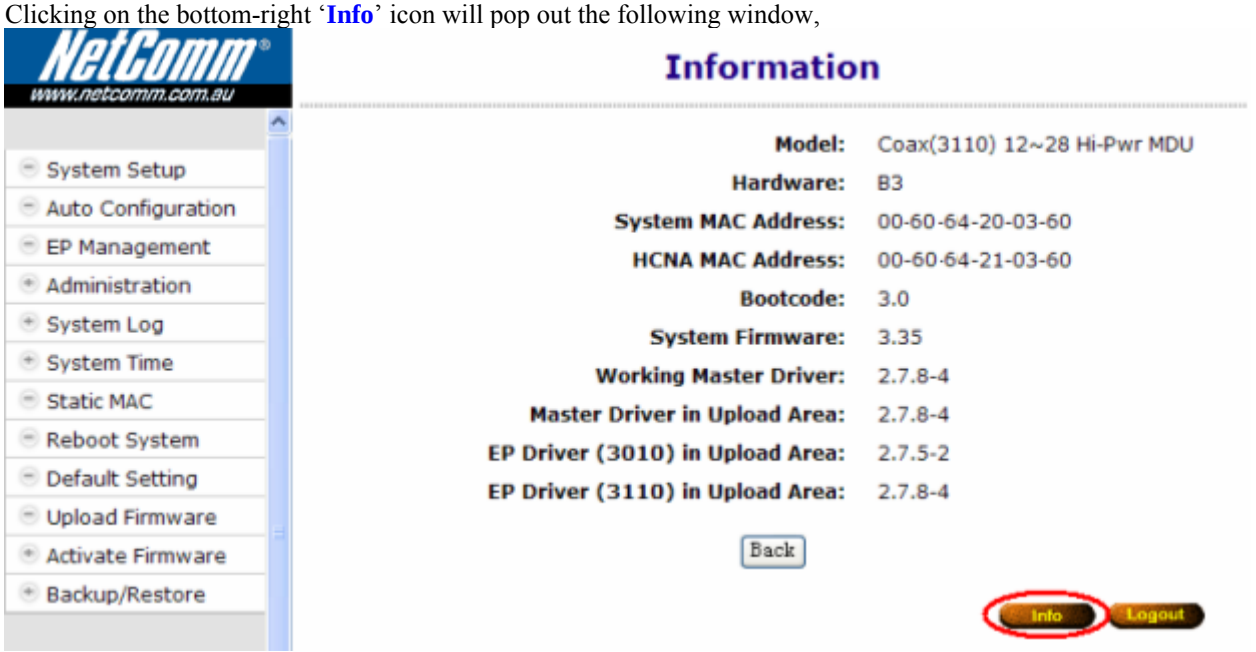
System Setup (TCP/IP Properties)



The main window contains the left sub-window for the items to be configured, and the right sub-window displays the contents for the selected item. Moving your mouse on the item in the left window will pop out the corresponding window. Clicking on the '**Apply**' button (or '**OK**' button in some screens) will submit your new settings into the bridge and will take effect immediately.

System Assets (Information)

Clicking on the bottom-right '**Info**' icon will pop out the following window,



EP (User) Management

Refer to the following Figure 4 as the example for generic EP management. Each EP is identified by its built-in **HCNA MAC** address. The HCNA device residing at CC100 is regarded as the **Master** (Local) device, and is used to manage other connected **Slave** EPs. The HCNA MAC exists only in HCNA (coax) domain, and is unaware for any EP end-user. System management use system **IP** addresses and **Ethernet MAC** addresses to access the CC100. Each CC100 device should be stamped with both Ethernet MAC and HCNA MAC for identification.

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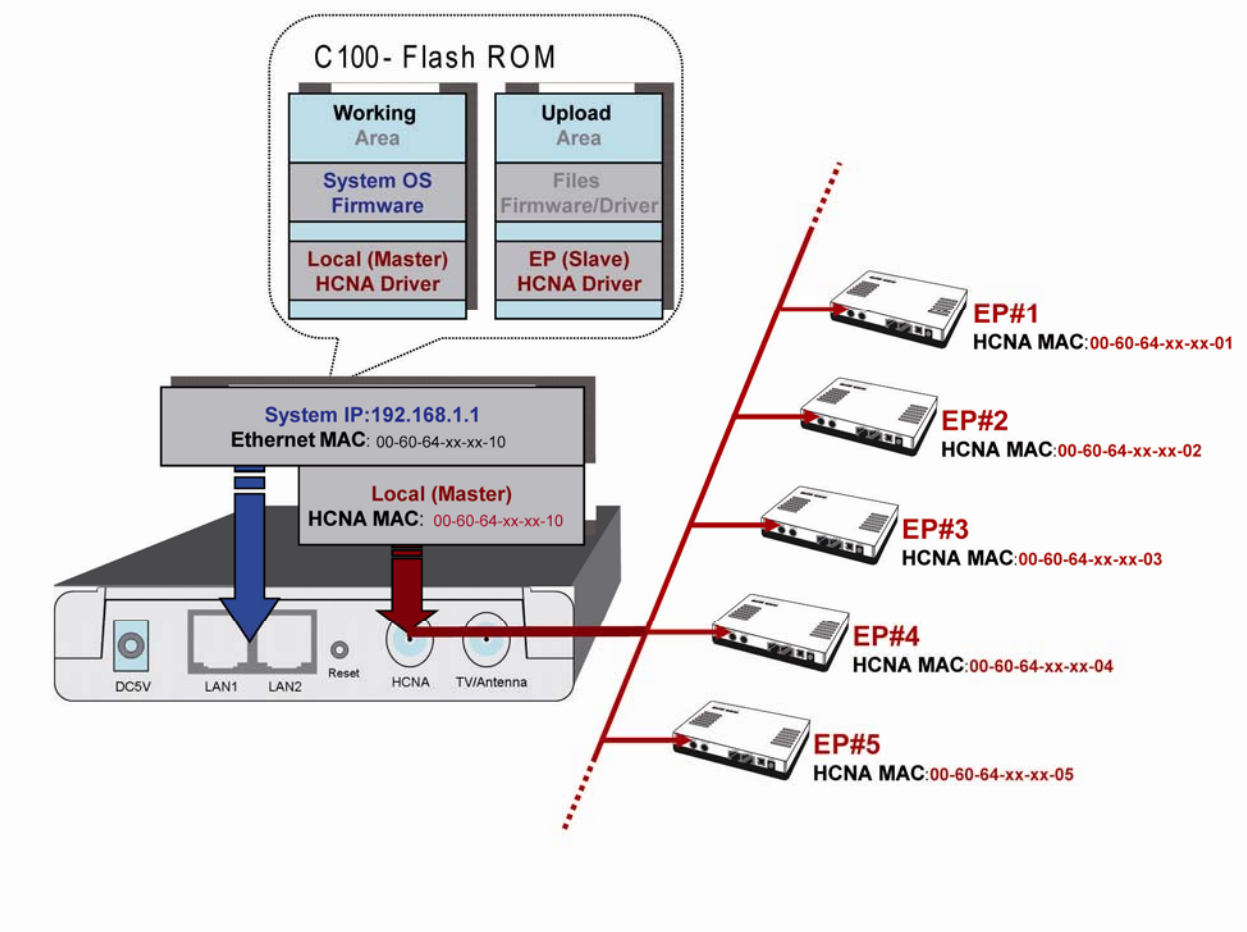

Figure 4: EP Management Architecture

Firmware/Driver Files

CC100 flash ROM is capable of storing the following files:
1. System boot code (OS boot loader)
2. System firmware (OS)
3. Local (Master) HCNA driver for chipset 3110 (resides at CC100)
4. EP (Slave) HCNA drivers for chipset 3010 (Please Note: NetComm do not supply an EP based on chipset 3010)
5. Smart EP (Slave) HCNA drivers for chipset 3110 (resides at Smart EP like CC101).
6. HCNA physical connection diagnosis utility

To upgrade any one of them, you need to follow the 2-stage procedure. First, '**Upload**' the file onto the CC100 **Upload Area**, then do the real upgrade by '**Activate**' it on demand -- the file will move into Working Area for running. Refer to the following section entitled "**Example to Upload then Activate System Firmware and HCNA Driver**" for more details.

EP

Open the 'EP Management' window, and click on the '**Refresh**' button to scan all connected EPs. For example,

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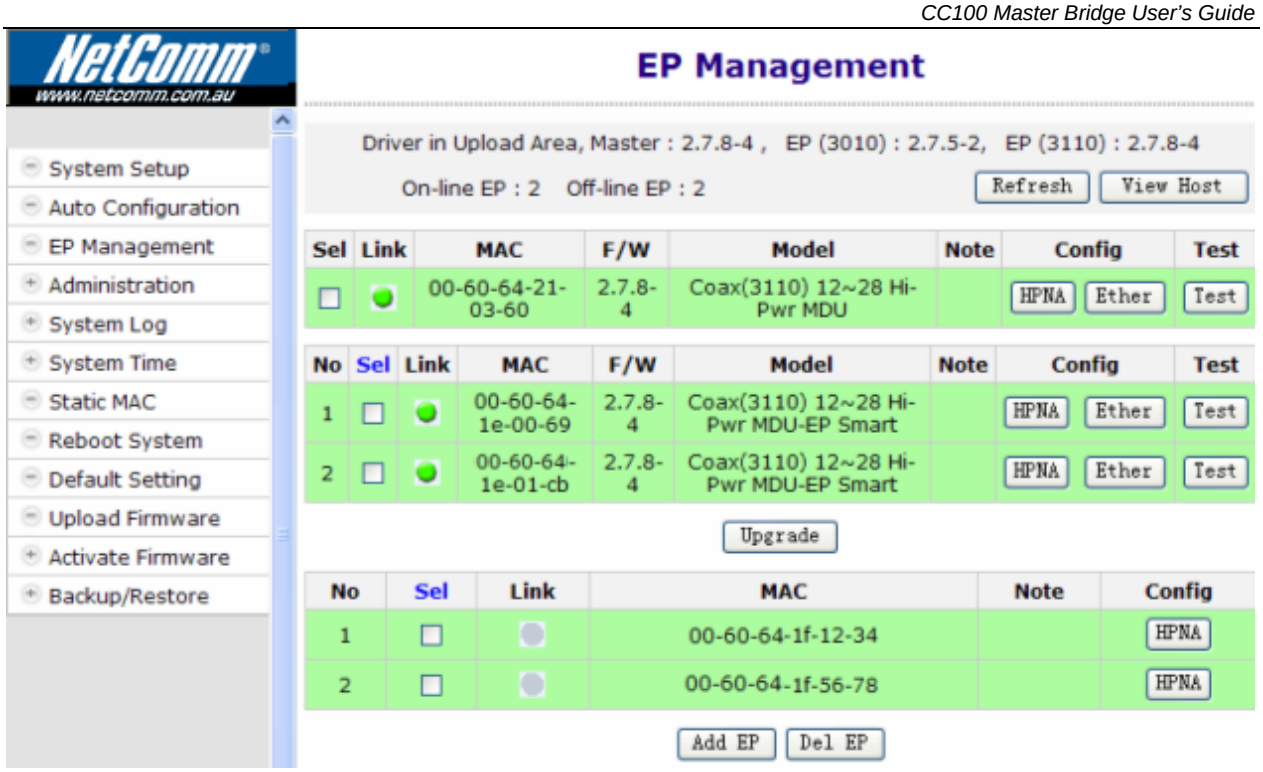

Each row represents one EP. Here we have one Master (Local) HCNA device (on the top) and 4 extra Slave EP devices shown in the window. The first two are Smart EPs based on 3110, and the last two EPs that are powered off.

Smart EP

Denotes an EP whose Ethernet properties are configurable. Based on 3110 chipset, with built-in simple management function, its Ethernet settings can be configured by the CC100. Refer to "Master/EP Ethernet Properties". In contrast to the Smart EP, EP based on 3010 chipset will not be denoted as **'Smart**' and is not configurable in its Ethernet properties.

For each shown column,

Sel **:** clicking on the '**Sel**' button will select all listed on-line EPs at once for EP HCNA driver upgrade, or just designate the EP one by one for EP HCNA driver upgrade. The top row is the Master device

Link **:** a light for HCNA device current connection status.
Green: EP is active -- on-line. For Master device, it is always green.
Grey: EP is not active -- off-line, either the user has powered it off or there is a cabling issue. ('**NA**' means value **N**ot **A**pplicable/**A**vailable since setting value in this field is stored inside EP and the EP is currently unreachable.)

MAC **:** HCNA MAC address.

F/W **:** the current queried **working** (running) HCNA driver version

Model **:** the current queried **working** HCNA model name

Note **:** used to denote EP end-user, for recording username or address or specific message. Mark '**Local**' for Master HCNA device.

Config **:** configure Master's/Smart EP's HomePNA and Ethernet properties or EP's sole HomePNA properties.

Del **:** Delete the off-line EP's profile, to save the EP properties profile space of CC100.

Test **:** run the built-in diagnostic functions. Refer to "Diagnosis" for more details.

Clicking on each device's **'HPNA'** button can open the window to configure its HomePNA properties. Click on the **'Ether'** button to configure its Ethernet properties—only Master and Smart EP support this Ether-configure function.

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Clicking on the '**Test**' button can diagnose the noise of HCNA itself and the physical connection quality between Master and EP.

Properties Profile – Stored the Settings

CC100 will query and store the **setting** values of individual on-line EP's into its nonvolatile memory automatically, including HomePNA properties and Ethernet properties as a profile. It shows the monitored EP status: green light in the 'Link' field means the EP is '**ON'**, grey light indicates it is off. While the EP is off-line and doesn't need any service, you may delete its obsolete profile manually to save CC100 storage space. CC100 can keep up to 32 profiles, and serve up to 1 master plus 31 on-line EPs concurrently.

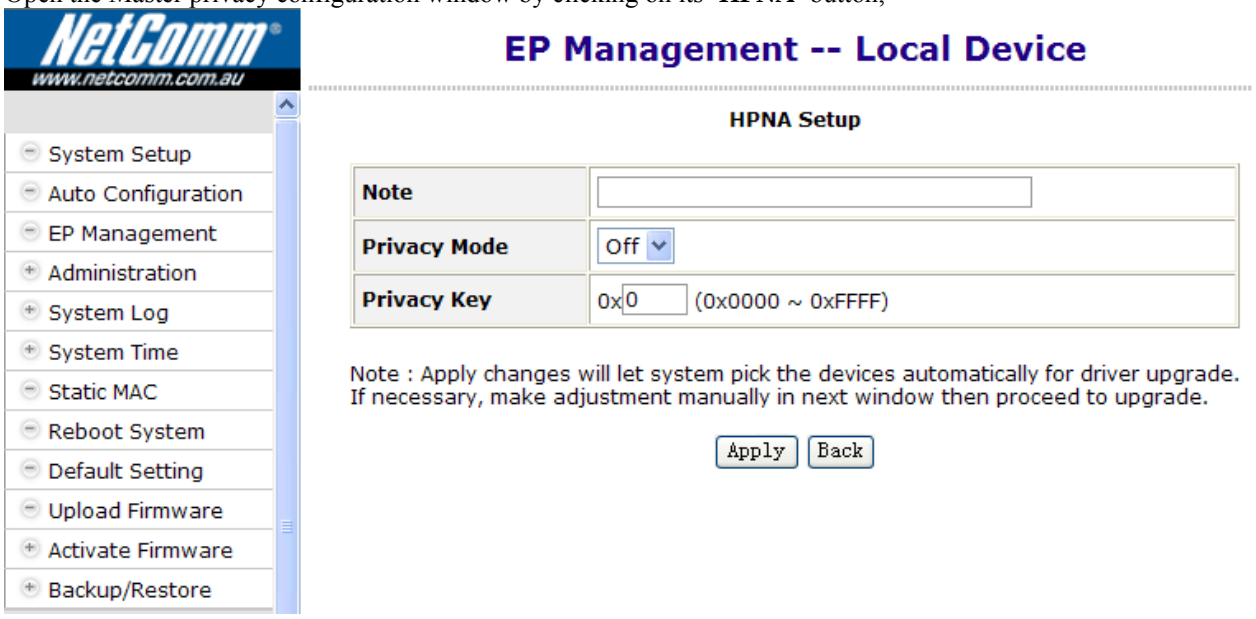
Master HomePNA Properties (HPNA)

Security Mode

The communication between EP's is isolated intentionally. EP's cannot talk to each other. It is the default security mode and unchangeable.

Privacy Mode

Privacy prevents unauthorized EP's from accessing the HCNA network controlled by the **Master** HCNA device. While '**Privacy Mode**' is '**ON**', the Master will serve the EP only if its '**Privacy Key**' matches with the Master's. The '**Privacy Key**' acts like the EP's password granted by the Master.
Open the Master privacy configuration window by clicking on its '**HPNA**' button,



The **'Privacy Mode'** value for Master (Local device):

Off: It allows all EPs to transmit and receive packets through the CC100. Regardless of the '**Privacy Key**' values are set in the Master device.

On: CC100 will communicate with EPs if they own the same **'Privacy Key'** while the **'Privacy Mode'** is turned **'ON'**. There should be only one key in one coax networking system. EP's with unmatched keys will not be allowed to transmit any packets through the CC100 if **'Privacy Mode'** is **'ON'**.

The factory default mode is '**Off**' and key is '**0x0**' (states in hexadecimal). Once you activate the **'Privacy Mode'** and set up the **'Privacy Key'** in the CC100 (the **setting** values), you need to upgrade the Master and all allowable EPs' HCNA driver with the new values (replace the running **working** values with the new **setting**s) before any connected EP's can access the network controlled by the CC100.

Privacy Mode Usage Example

For example, first activate the **'Privacy Mode'** by apply the '**ON**' setting and change the **'Privacy Key'** to '**0x1234'.** The CC100 will request to upgrade the Master's HCNA driver, and all allowable EP's HCNA driver.

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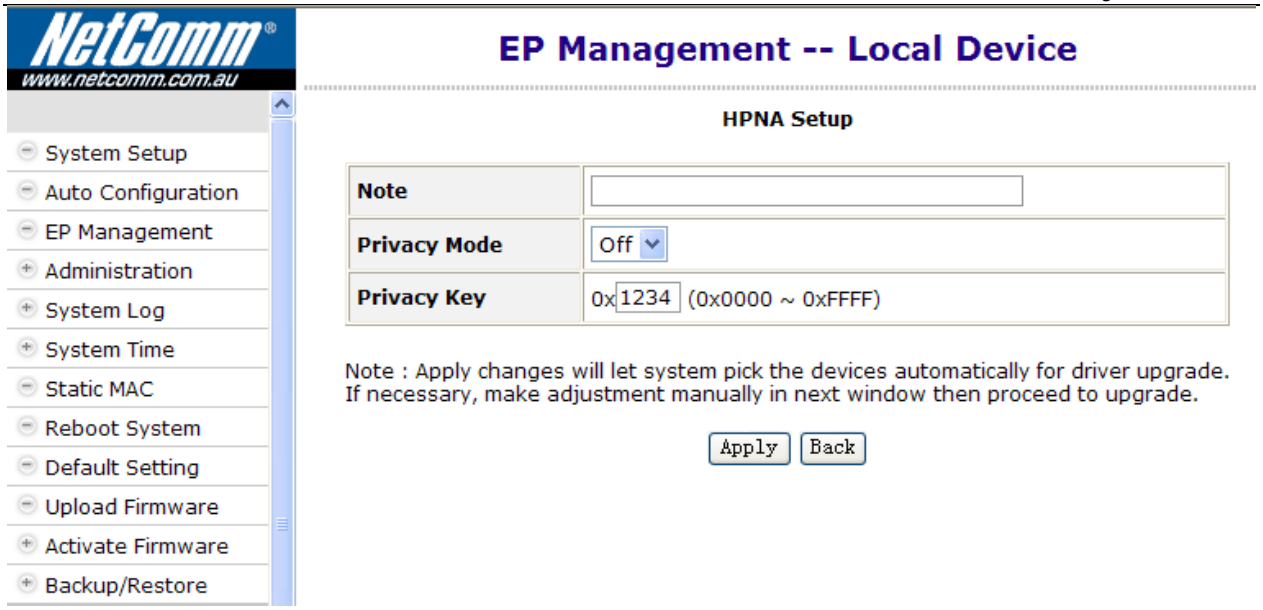
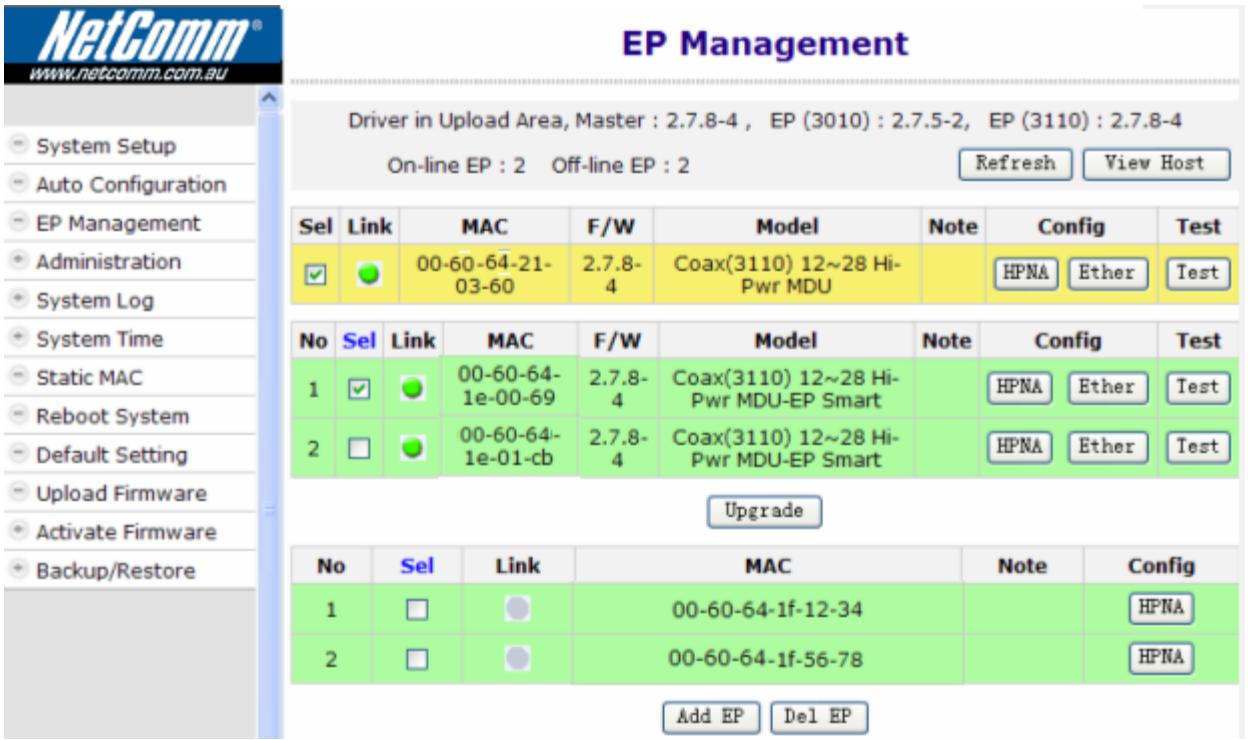


Clicking the '**Apply**' button will change the Master row background color to yellow (refer to 'Profile Status'). Pick all allowable EP's for automatic driver upgrade. You may change the selection and proceed to upgrade, in the below figure only one EP is selected for the performed upgrade.



Click '**Upgrade**' button,

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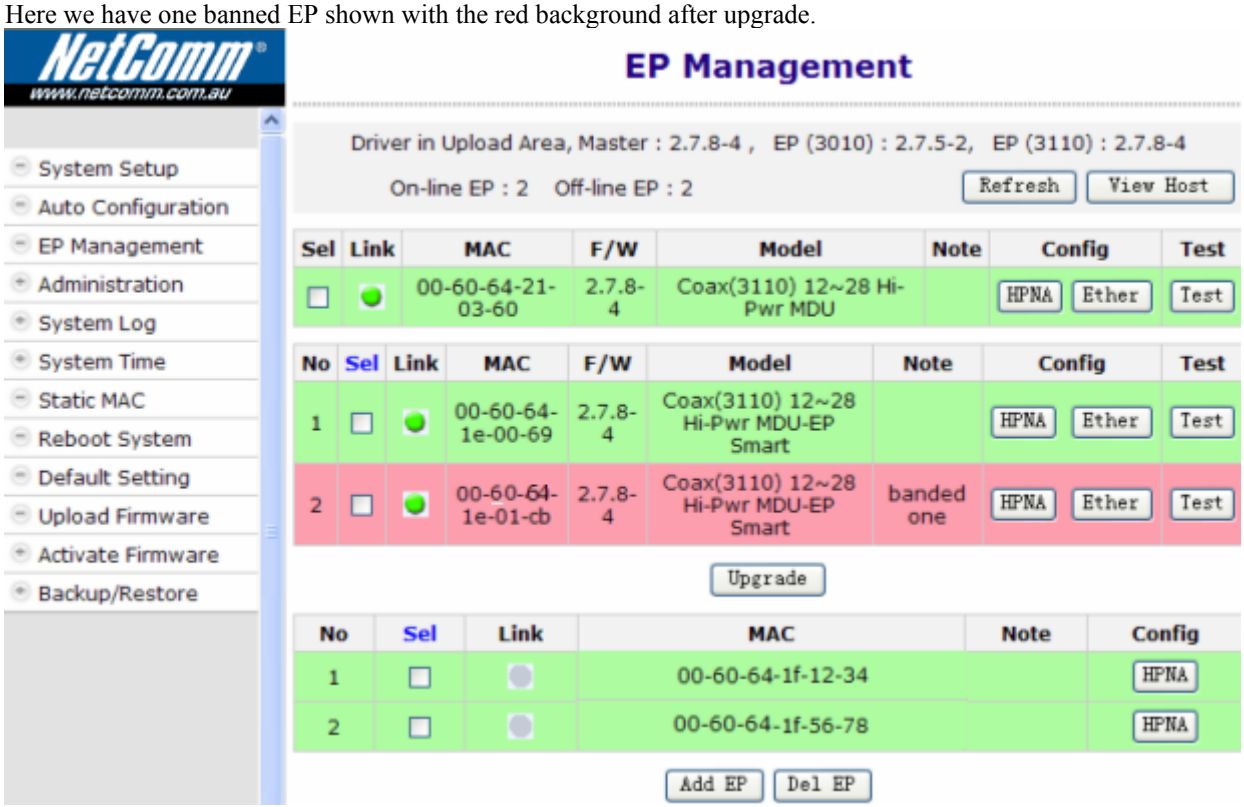
After the upgrade has been completed, press Refresh to update the EP management page.
Here we have one banned EP shown with the red background after upgrade.



Then power on the 2 extra off-line EPs. They will also be banned since their '**Privacy Mode/Key**' (as default '**OFF**'/'**0x0'**) doesn't match with the Master's (now key is '**ON**'/'**0x1234**').

EP's are classified by the shown background color, green for allowed EP, red for banned EP.

Privacy Mode/Key Summary

EP's can't communicate with each other regardless of the settings of **'Privacy Mode'** and '**Privacy Key**'. EP's can access the coax network controlled by the CC100 only if EP has the right **'Privacy Mode'** and '**Privacy Key**'. Please refer to the following diagram for more details,

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EP **Privacy Mode** \ Master **Privacy Mode**	**On**	**Off**
On	✓ (**Key** match) ✘ (**Key** not match)	✘
Off	✘	✓ (factory default)

✓: EP can access the network

✘**:** EP can't access the network

Upgrading the EP's HCNA driver is the only way to change the EP's **'Privacy Mode'** and '**Privacy Key**'—by applying the setting values of the Master HCNA device to selected EP's.

Profile Status for Master and EP

Each listed device status can also be classified by the shown background color:

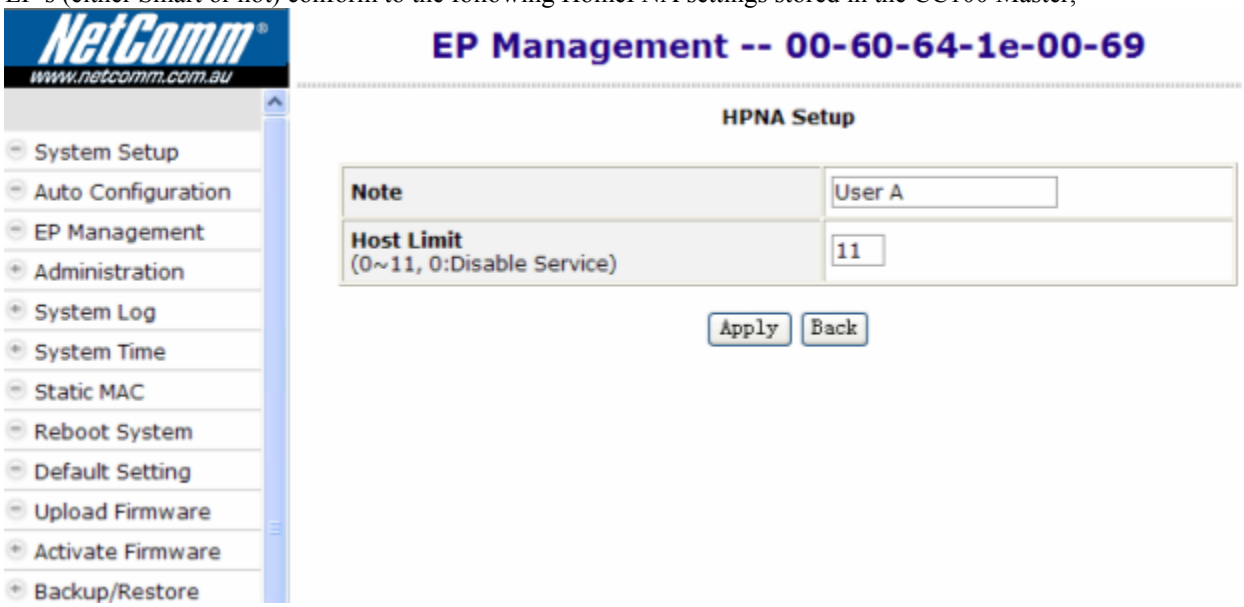
Green: For Master, the '**Privacy Mode/Key**' **working** values in device is consistent with the profile stored **setting** values in the CC100. For EP, it can access the network.

Yellow: For Master, it has inconsistent '**Privacy Mode/Key'** settings. You may upgrade the Master's driver to synchronize its **working** values. (to replace the running **working** values with the **setting** ones).

Red: For banned EP's, either '**Privacy Mode/Key'** in the EP is not matched or the '**Host Limit**' value in the EP is 0. The CC100 will refuse to serve this EP.

EP HomePNA Properties (HPNA)

EP's (either Smart or not) conform to the following HomePNA settings stored in the CC100 Master,



Note

Footnote to the EP (user).

Host Limit

Specify the maximum allowable host (as PC) numbers attached on this EP:

0: Service is disabled, no host is allowed

1~11: The factory default value is 11 for unrestricted.

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Master/Smart EP Ethernet Properties (Ether)

The Ethernet properties of the Master device and Smart EP device are configurable. For those EPs equipped with the fixed Ethernet properties are remarked as un-configurable EPs – usually based on 3010 chipset.

Port Setup

To configure built-in Ethernet switch port properties, including speed, flow control, and maximum In/Out rate (bandwidth control) of ports LAN1/LAN2/HCNA.

Service and Speed/Duplex

Change '**Service**' to enable or disable the port. This setting opens or closes the related Ethernet switch port in EP's. The default setting in the field '**Speed/Duplex**' is '**Auto**' which states for auto-negotiation.

Bandwidth Control

Consider port HCNA as the network backbone and refer to the following diagram to set up bandwidth control parameters in the EP's Ethernet switch (Regarded as Hardware bandwidth control, works for both upstream and downstream). The maximum allowed rate should be the setting value multiplied by 64Kbps. If maximum rate exceeds 100Mbps (as the value 1563), there will be no bandwidth control at all.

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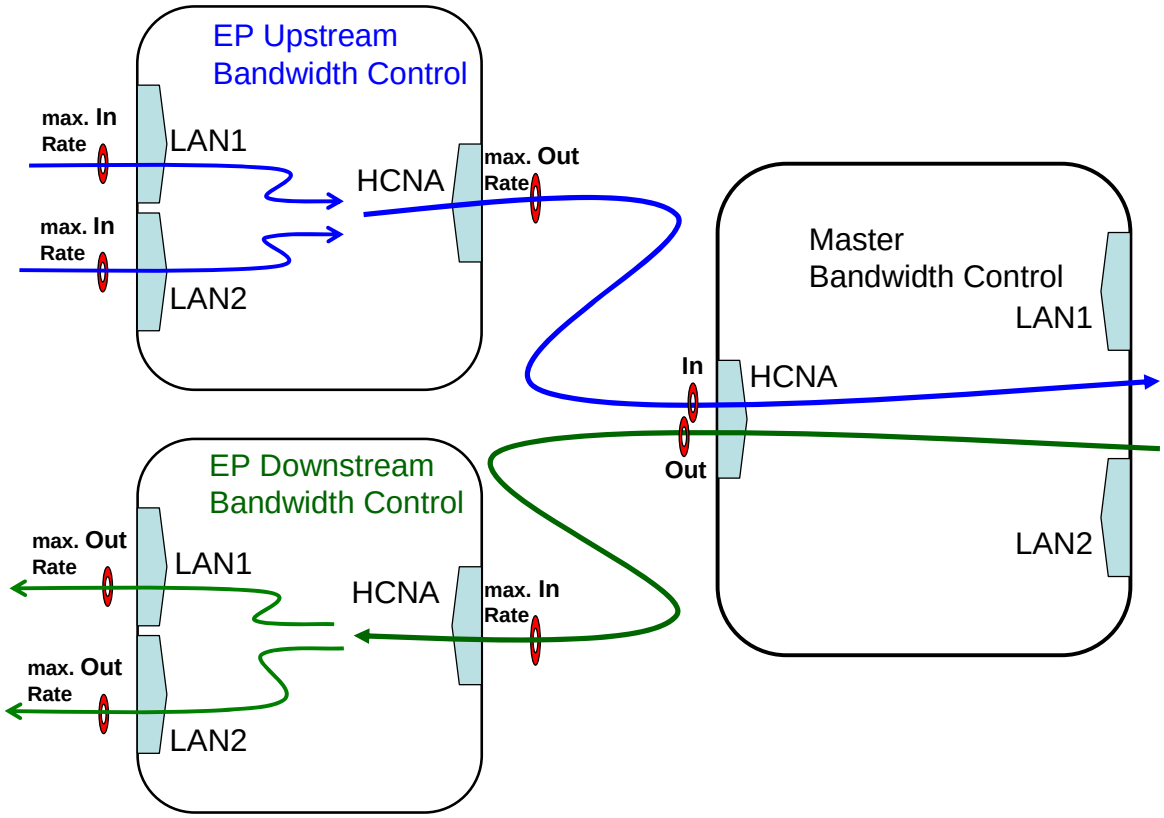

QoS Setup

A total of 4 prioritized queues are provided for Ethernet packets, denoted as **Queue0** (lowest priority), **Queue1**, **Queue2** and **Queue3** (highest priority). You may assign the different packet dropping ratio and service weights for different queues. Refer to Chapter "ADVANCED FEATURES" for more CC100 QoS mechanism details.

For example, according to the following setting diagram we classify TCP/UDP packet with port '1234' or '80' (decimal) as the highest priority packet goes to Queue3, port '23' goes to Queue2 and port '161' goes to Queue1. Queue3 will not discard any packet (Drop Ratio 0%), and packets in Queue3 are transmitted 4 times faster than packets in Queue0 according to their '**Service Weight**'. Packets in Queue0/Queue1/Queue2 will be discarded according to their '**Drop Ratio**' in case of any congestion.

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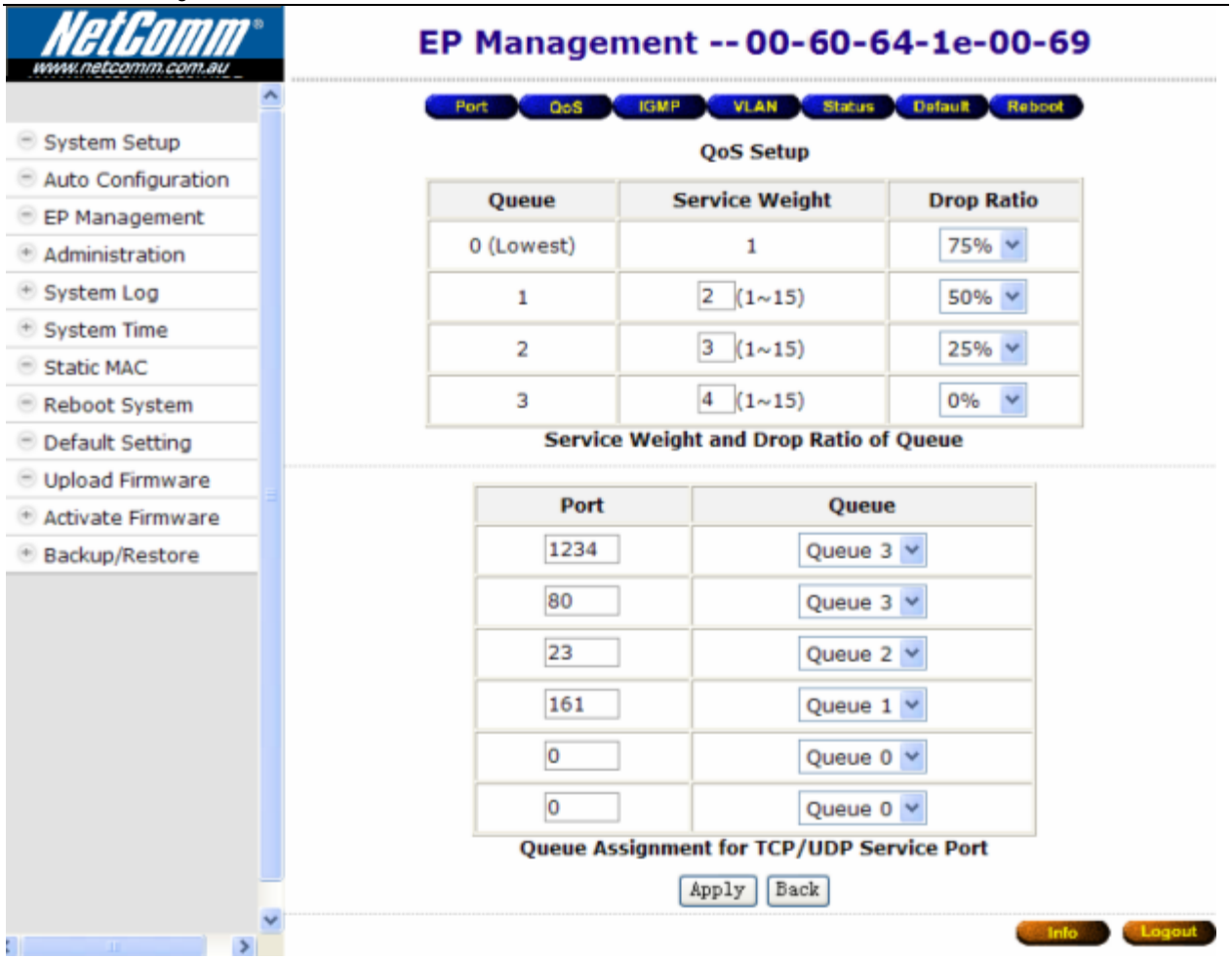

IGMP v2 Snooping Setup
Supports IGMP V2/V1 snooping only. Shut it if IGMP V3 is adopted in the network.

Tag VLAN Setup
Enable the 802.1Q Tag VLAN function and set up the values in the field '**VID'** and '**Priority'**. VID range is 1~4095 and Priority is 0~7.

Regard HCNA port as the network trunk. Once Tag VLAN is enabled, by default the LAN1 port and the HCNA port are set to the same VLAN; also the LAN2 port and the HCNA port are within the same VLAN. The LAN1 port and the LAN2 port are not within the same VLAN if assigned with different VID.

Take the following VLAN setting diagrams for example.
First example, enable Tag VLAN in both Master and EP '**VLAN**' settings,

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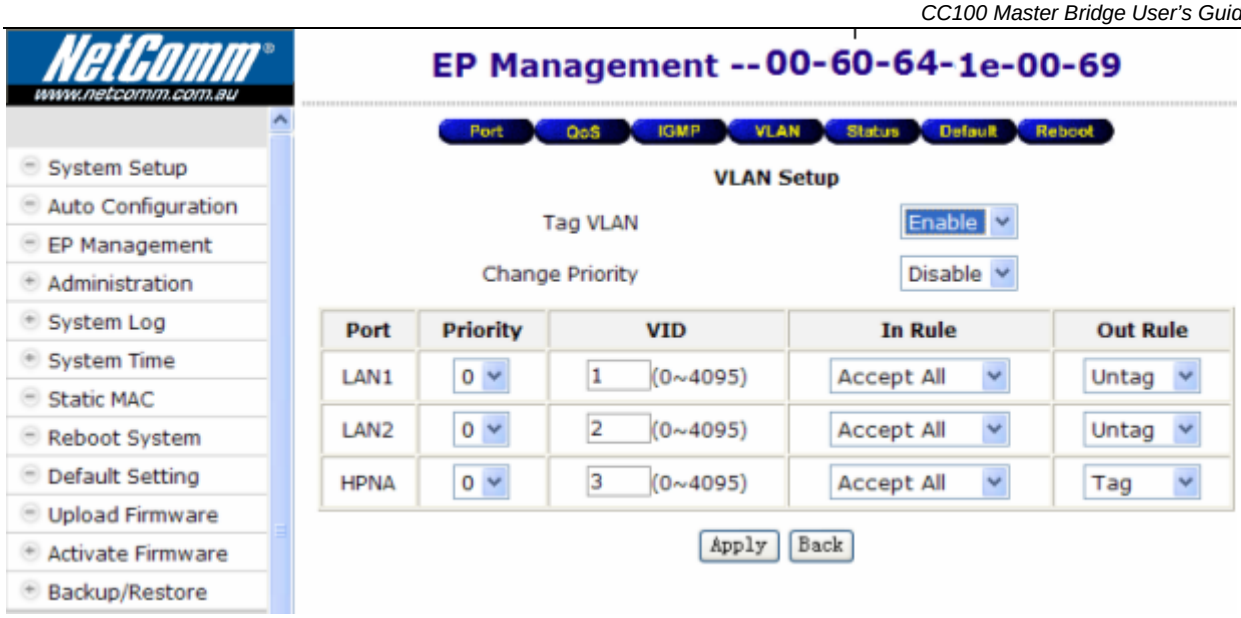
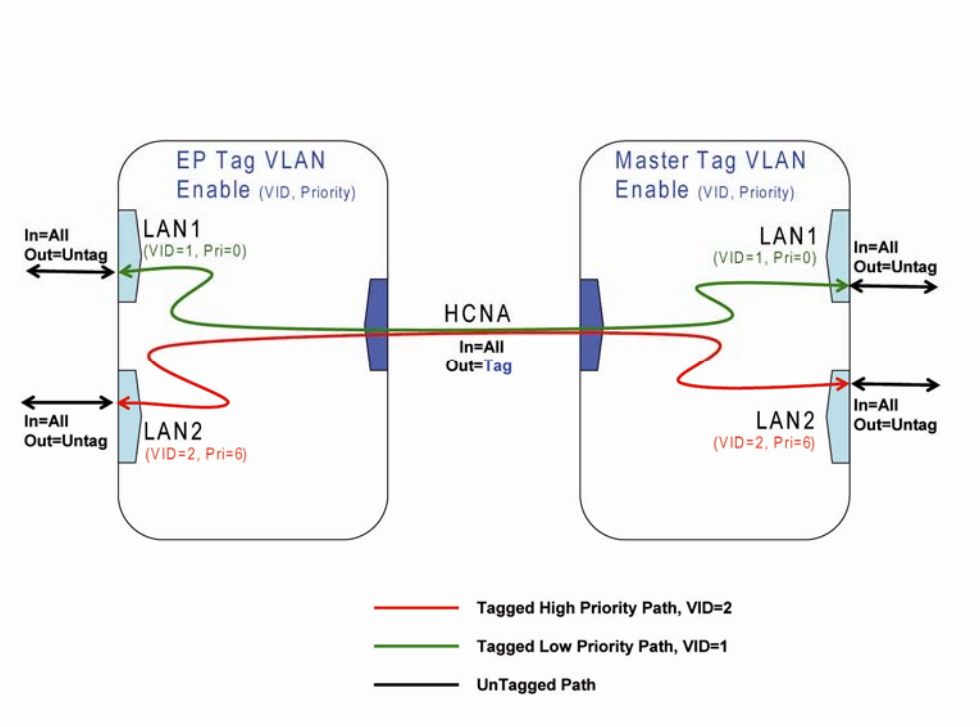


The following diagram denotes the path for tagged packets according to the above settings,



Second example, enable Tag VLAN in EP only, and keep Master Tag VLAN disabled as default, as seen in the following packet path diagram.

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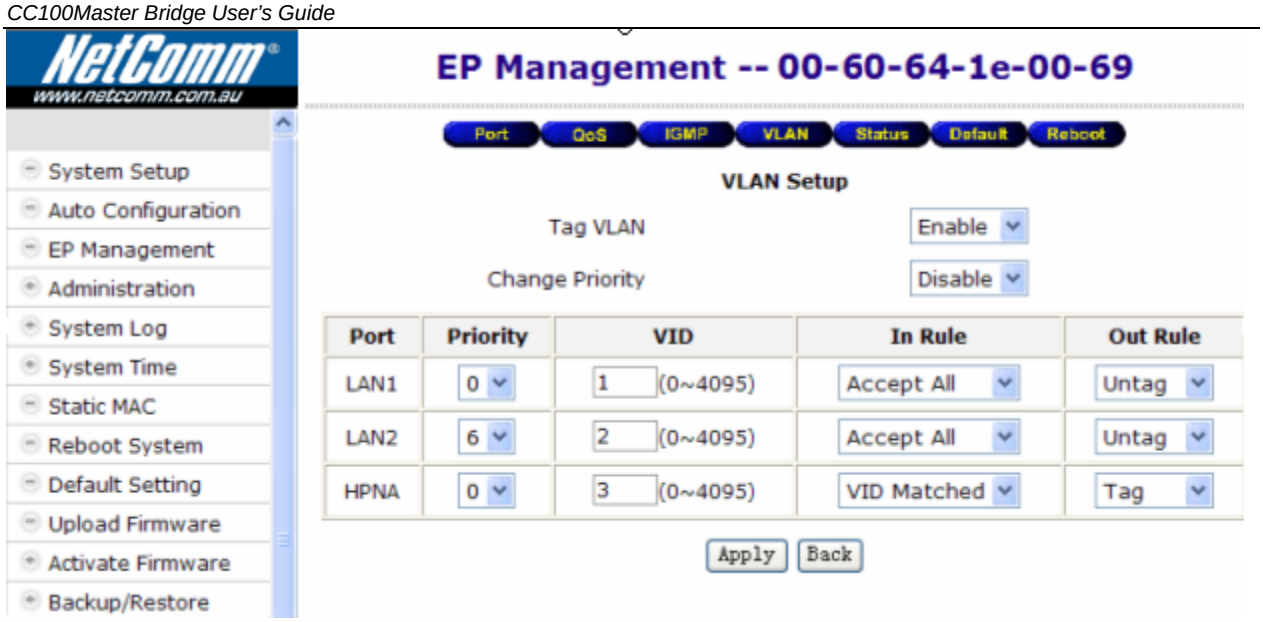

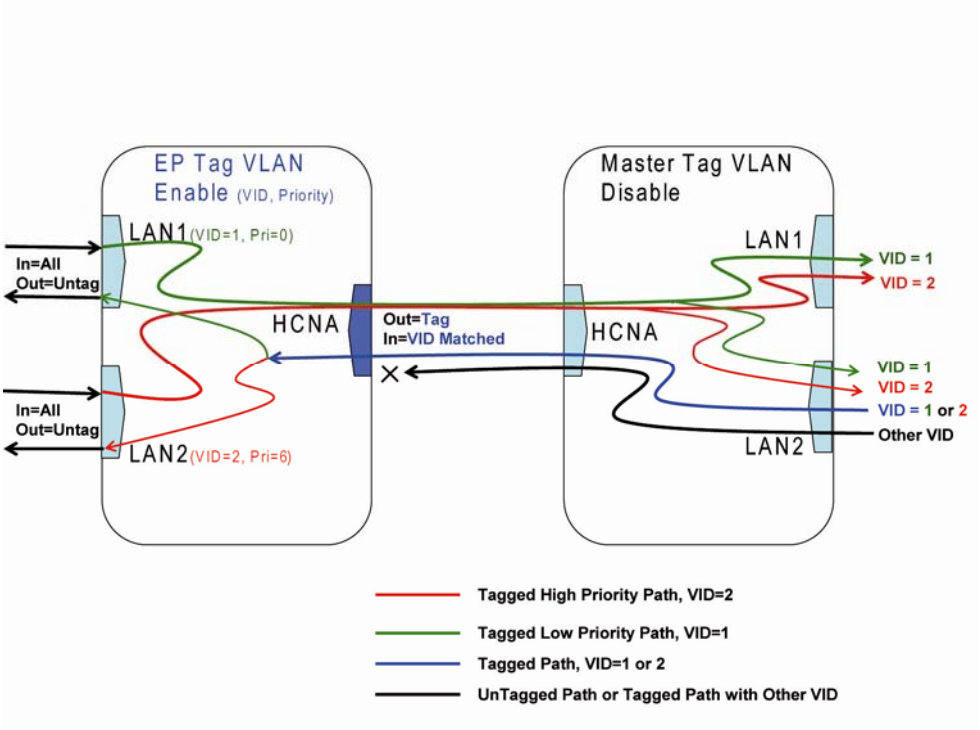

Status and Statistics

Show port LAN1/LAN2/HCNA Ethernet switch port link status and port statistics.

Reset to Default

Works for EP only, to reset all Ethernet settings/configurations of EP to factory default, including '**Port** Setup', '**QoS** Setup', '**IGMP** v2 Snooping Setup', and 'Tag **VLAN** Setup'.

Delete the Obsolete EP Profile

For the off-line EP's only, the light in the **Link** field is grey; clicking on the '**Del**' button will delete the EP profile.

Diagnosis

Click on the '**Test**' button to run the built-in diagnostic tools.

Device Noise in Master and EP

'**Noise Test**' measures each individual device HCNA interface noise level (noise floor). For example, use a Master alone with 75Ω terminator, here shows the Master noise frequency spectrum diagram after test,

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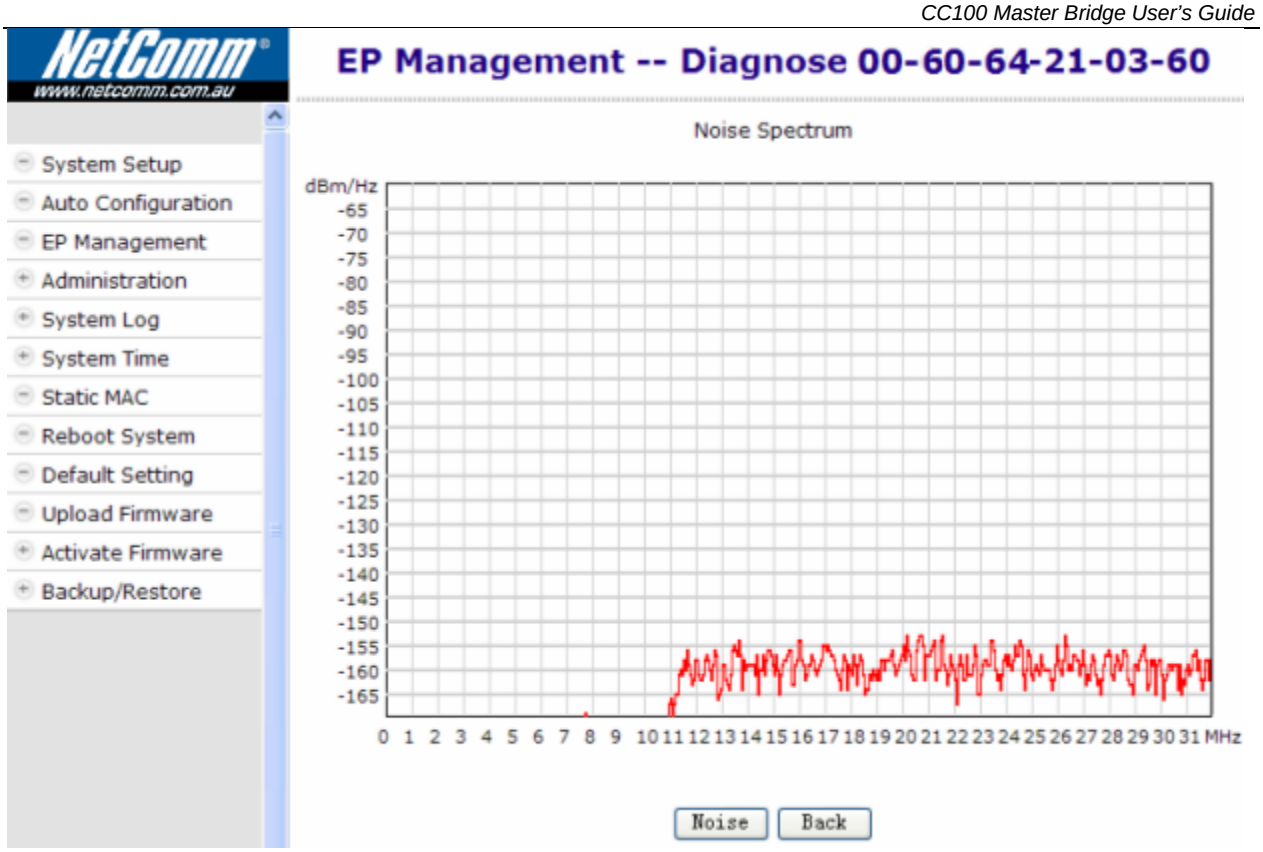
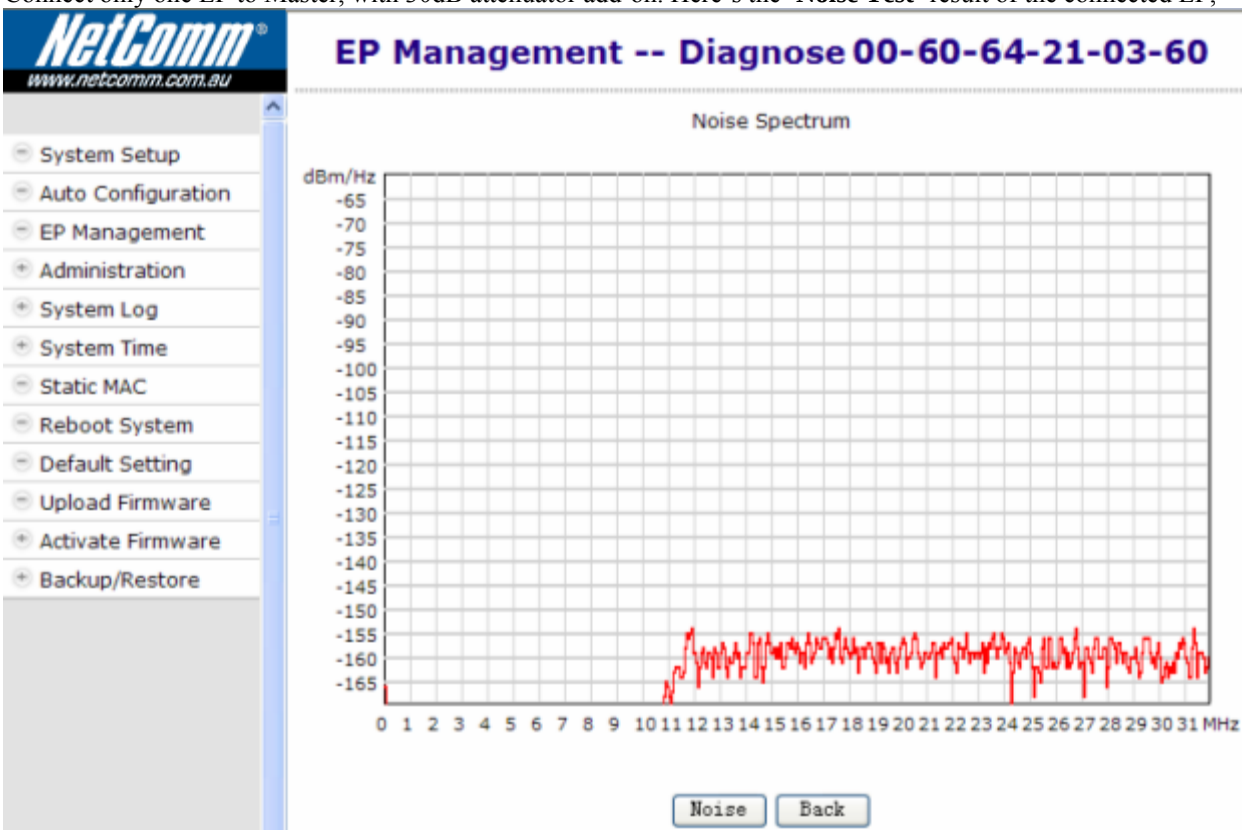


Connect only one EP to Master, with 30dB attenuator add-on. Here's the '**Noise Test**' result of the connected EP,



Physical Connection between Master and EP

Connect only one EP to Master, with 30dB attenuator add-on. Here's the result by clicking on '**Tx Diagnose**' button to perform a **Cert** test between CC100 and the connected EP,

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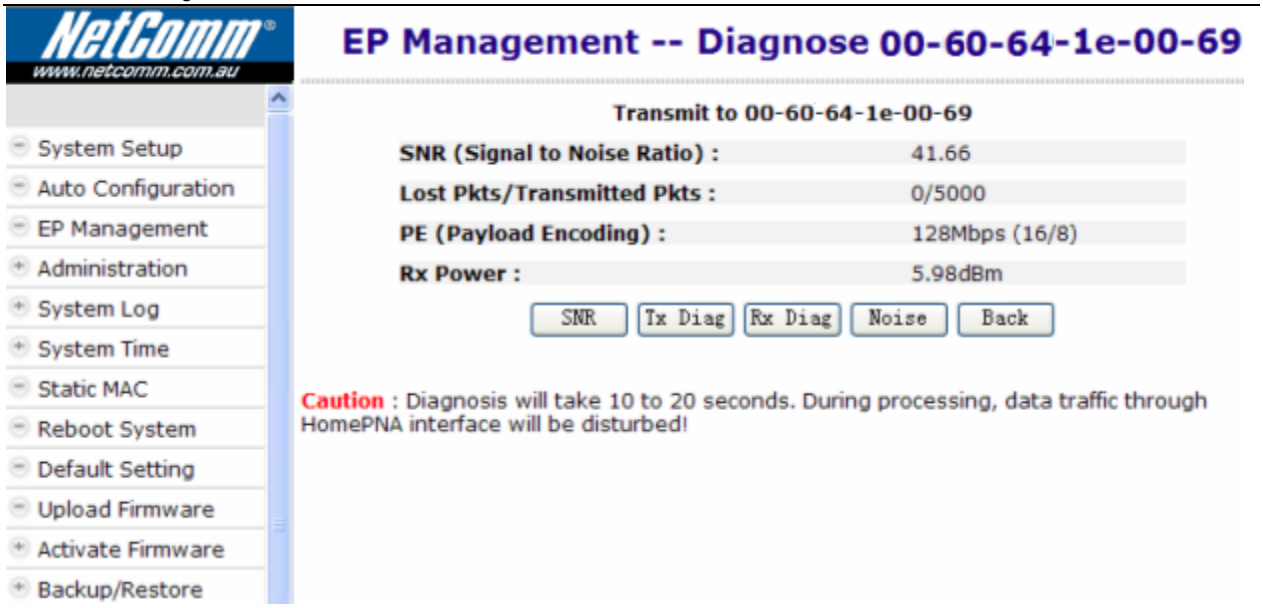
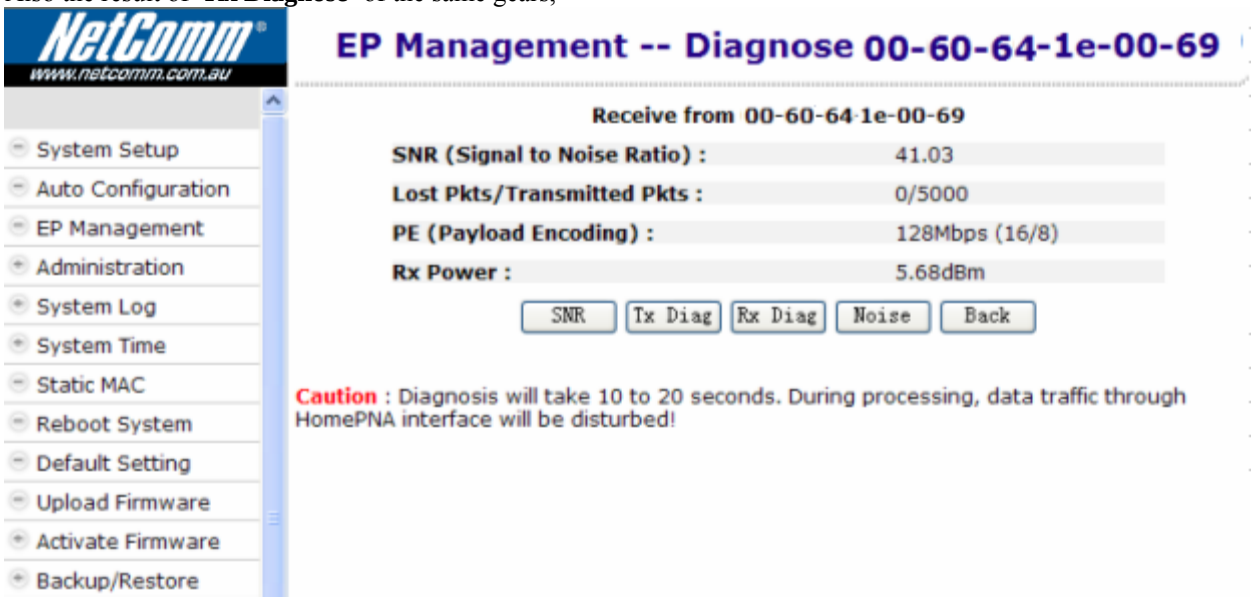


This diagnosis runs the downstream test from CC100 toward the EP.

Also the result of '**Rx Diagnose**' of the same gears,



This diagnosis runs the upstream test from EP to CC100.

The shown factors '**SNR**', '**Lost Pkts**', '**PE**' and '**RX Power**' are obtained during communication diagnosis between the tested EP device and Master device.

SNR: Normally between 38dB~42dB.

Lost Pkts: Denominator is the total number of transmitted packets in one test run. Numerator is the number of lost packets in one test run.

PE: 112Mbps/128Mbps/144Mbps (best connection carrier speed, in bits per second) for normal connection. CC100 will adopt lower carrier speed automatically for connection path with high attenuation (lower SNR).

Rx Power: measured signal power

Administration

The settings include the Administrator account, the allowable Host with specified source IP, and the protocols like HTTP/TELNET/ICMP/SNMP in CC100 management. Set up the criteria for management packets toward the CC100. Irrelevant for data packets passed through the CC100 toward the EP.

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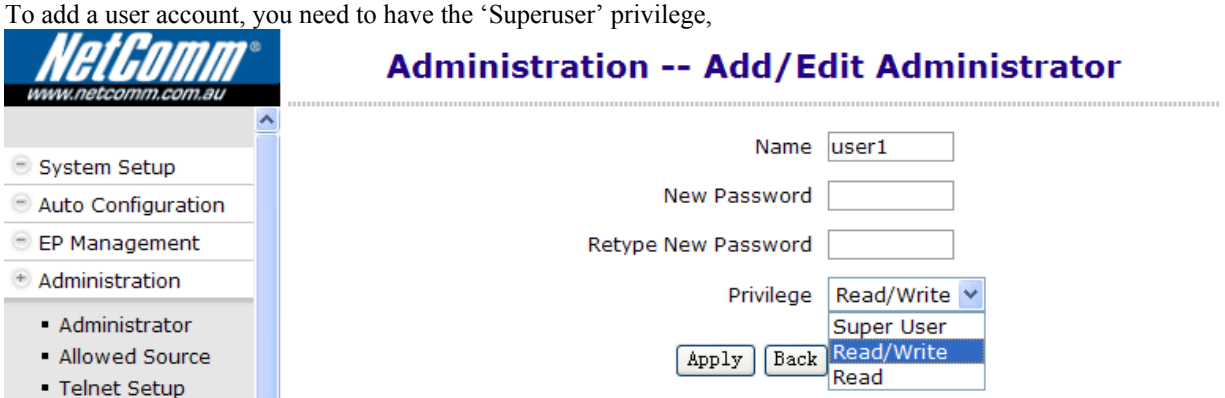
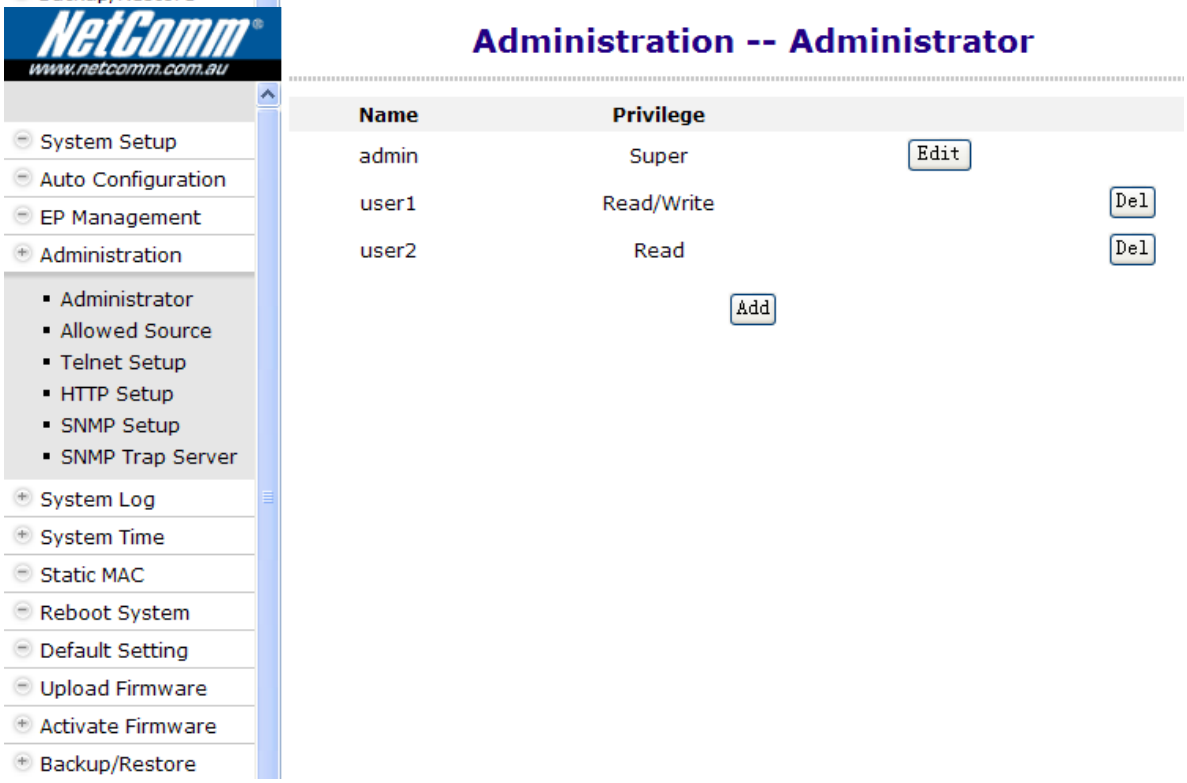
Administrator

For each account, 3 levels of privilege are provided: Superuser, Read, and ReadWrite. The unchangeable username 'admin' always has the 'Superuser' rights.

To add a user account, you need to have the 'Superuser' privilege,





Allowed Source

Factory default filter set for the 'IP address' is '**0.0.0.0**' and the 'Subnet Mask' is '**0.0.0.0**' in '**Allowed Source**' setting. If the incoming packet fulfills the following criterion, the CC100 will accept the management packet, else discard it.

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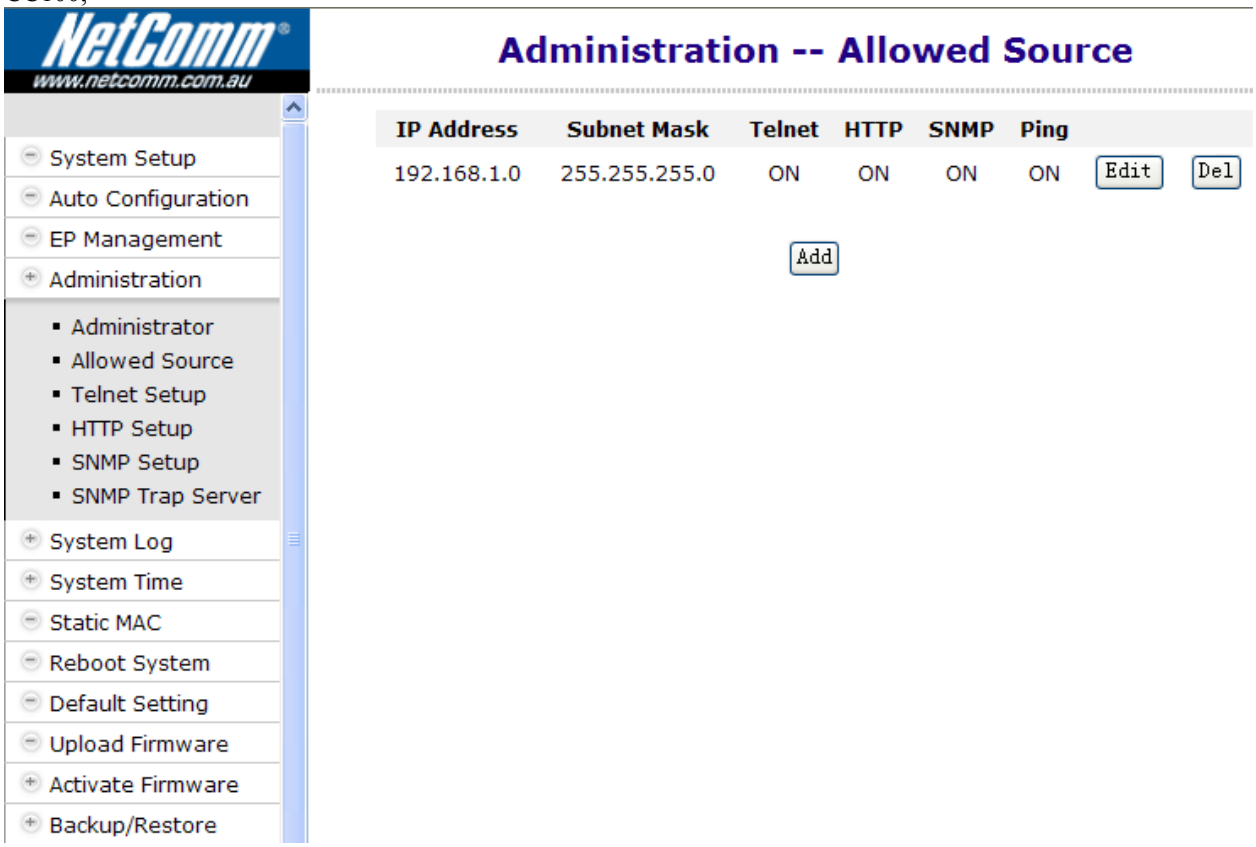
(Incoming Source IP Address & Subnet Mask) = (IP Address & Subnet Mask)

For the factory default setting, it will accept all incoming packets.

For example, the following filter set permits all Hosts with IP address '192.168.1.xxx' to access and configure the CC100,



For each programmed filter set, you can further specify if the protocols Telnet/Http/SNMP/Ping are enabled or not. Be careful not to block your current IP from accessing the CC100 remotely; else you have to press the Reset Button locally and restart from factory default settings.

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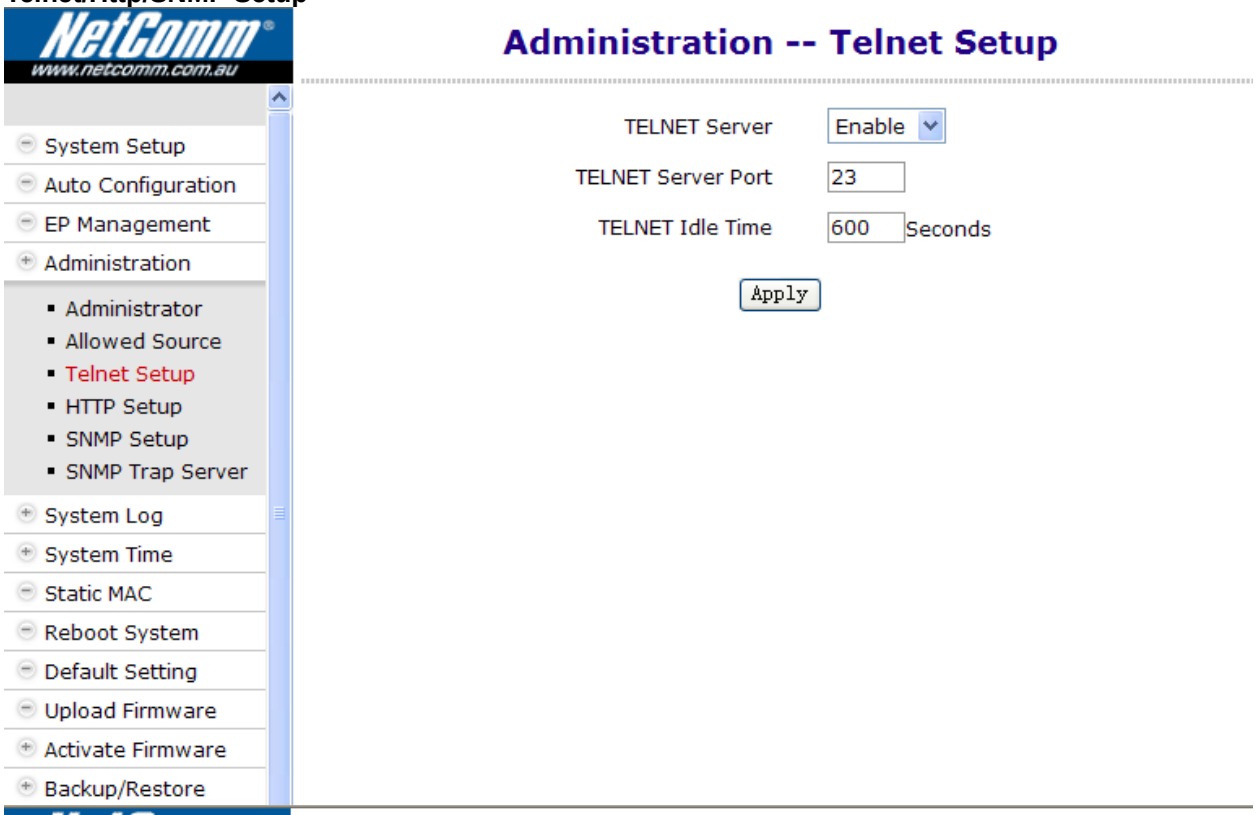
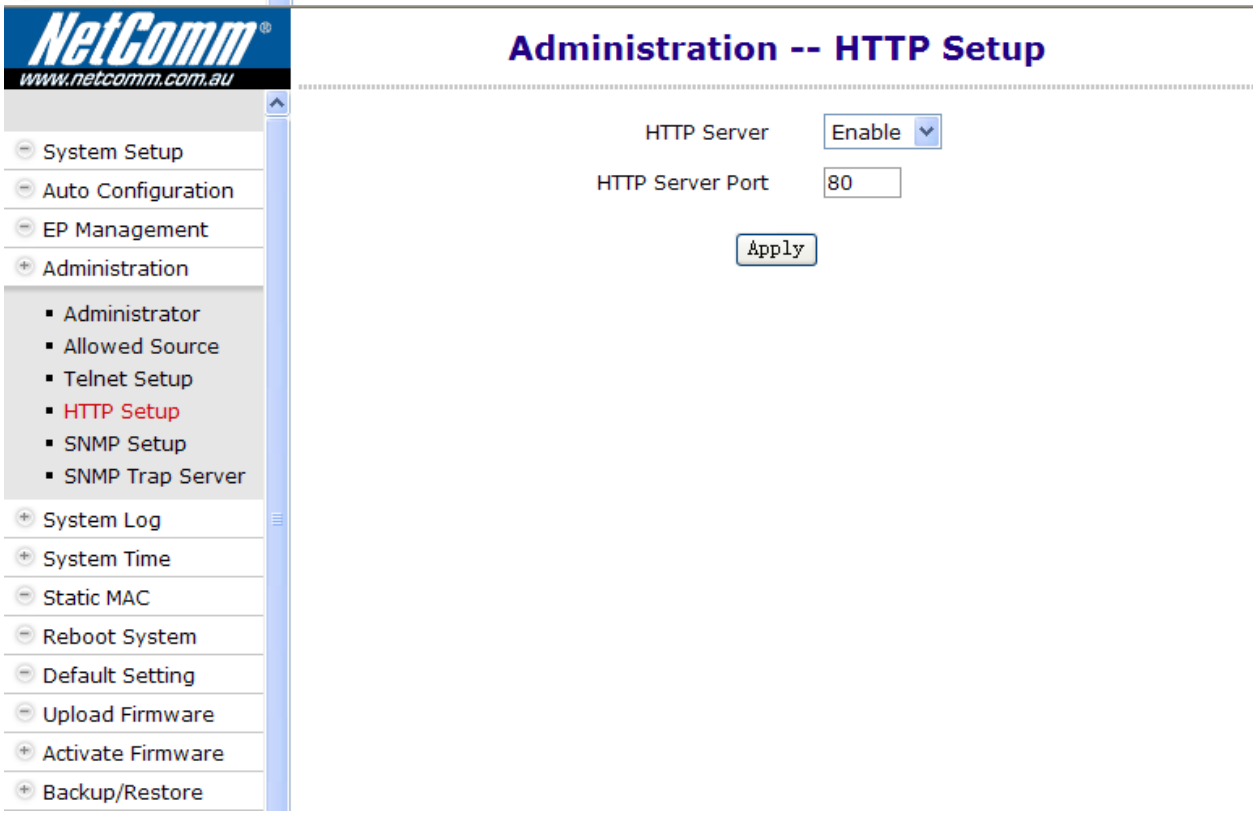
Telnet/Http/SNMP Setup





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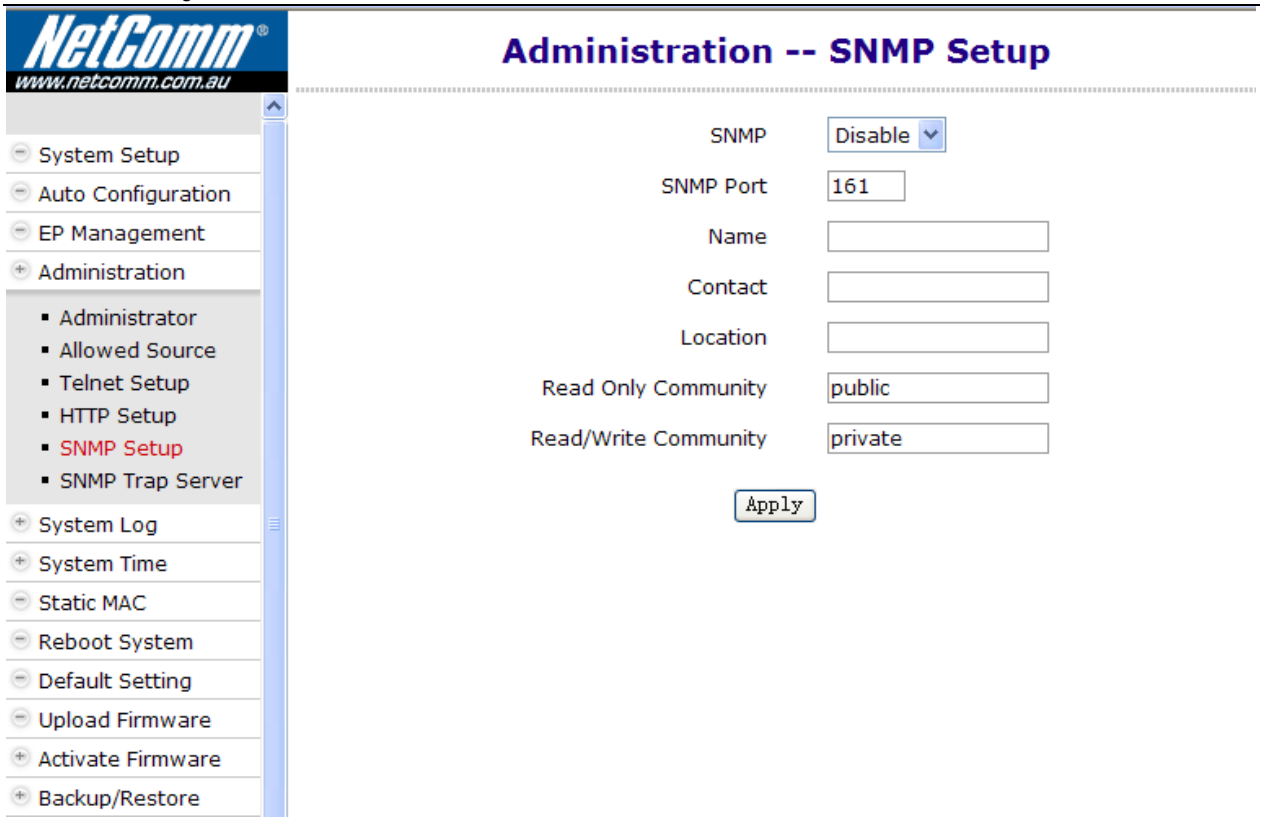

Specify that if the built-in Telnet server, Web server, and SNMP agent is enabled or not and assign the port number for the service.

System Log

By designating the **Syslog** server IP on the CC100, the CC100 will emit Unix-like **Syslog** events toward each server. Please refer to RFC-3164 for **Syslog** '**Severity'**, used to denote the log level – digit '0' to '7' for different severity levels:

0: EMERGENCY – log only severe events
1: ALERT
2: CRITICAL
3: ERROR
4: WARNING
5: NOTICE
6: INFO
7: DEBUG – log everything

For example, the CC100 will emit only 'EMERGENCY' events to Server with the IP address '**192.168.1.111**' according to the following setting.

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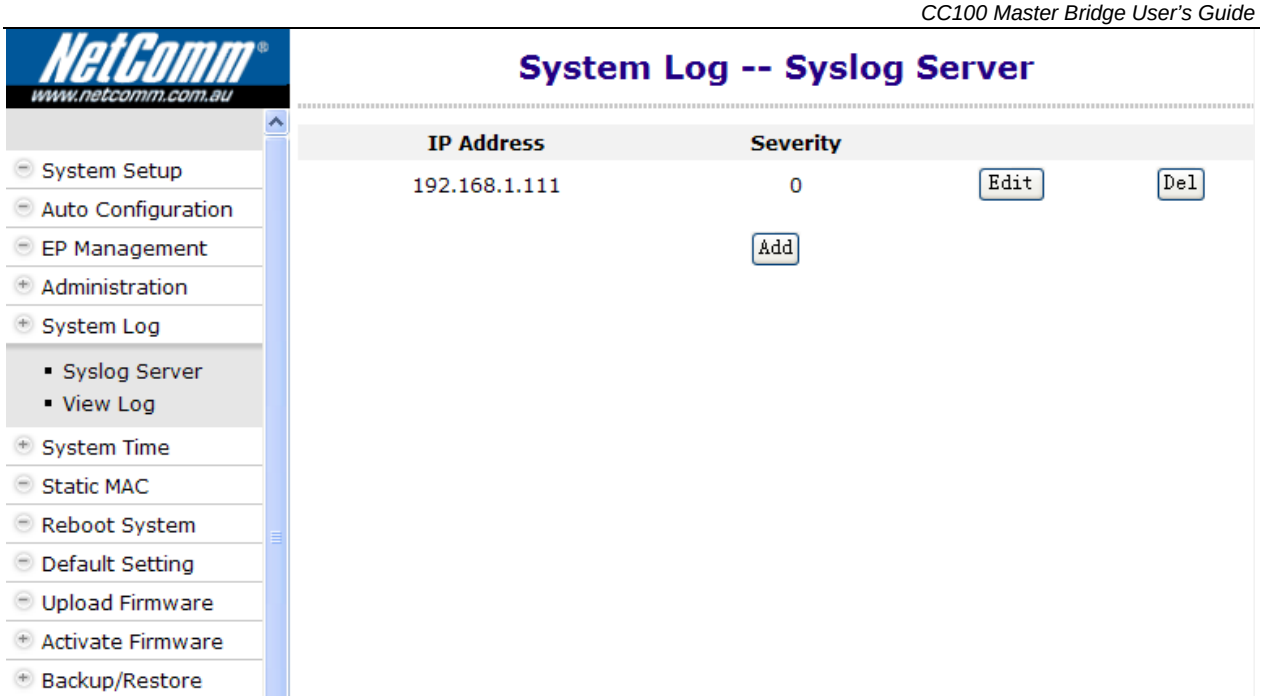
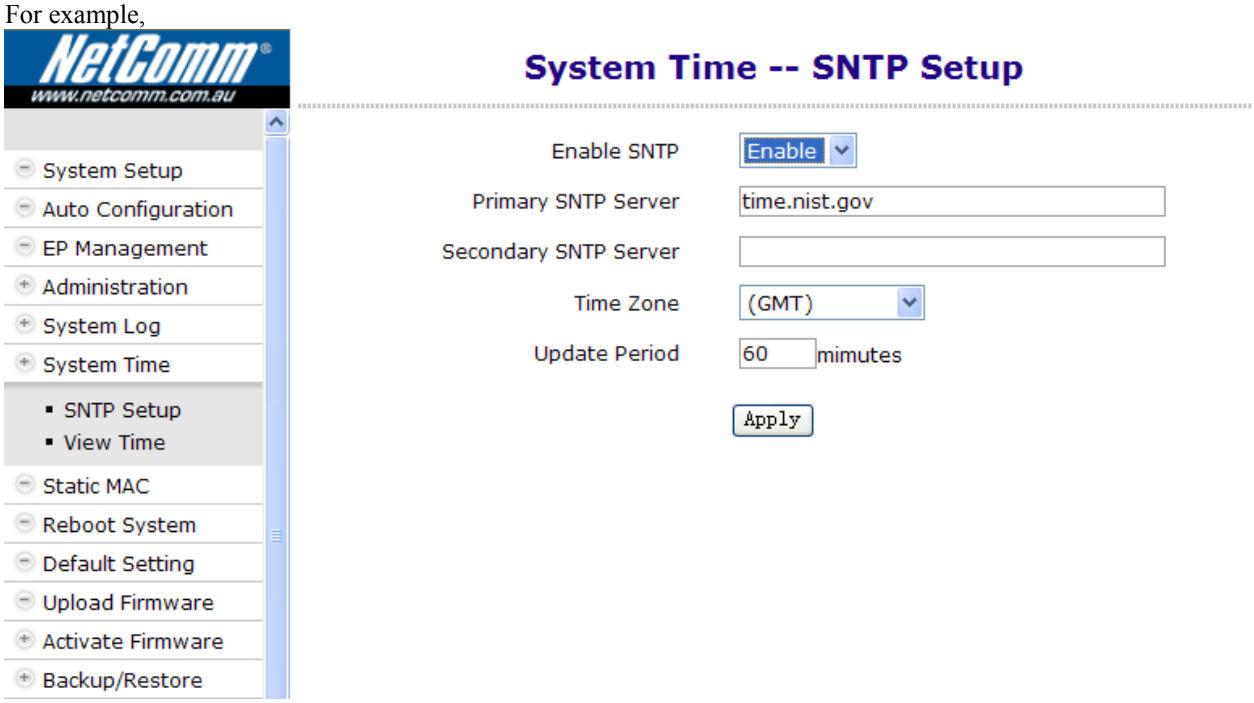


System Time

In order to provide correct timestamp for **Syslog** event, the CC100 supports SNTP protocol and you may assign the suitable SNTP servers to the CC100.

For example,



To access your listed SNTP server by its domain name instead of IP address, the '**DNS Server**' and '**Default Gateway**' in the '**System Setup**' window needs to be set up correctly in order for the CC100 to access the SNTP server by its domain name.

Static MAC

It may be necessary to bind and secure the server/gateway MAC addresses to port LAN1/LAN2 of the CC100 for security. Static MAC is used to prevent MAC-spoofing-attack in the Ethernet network. For example,

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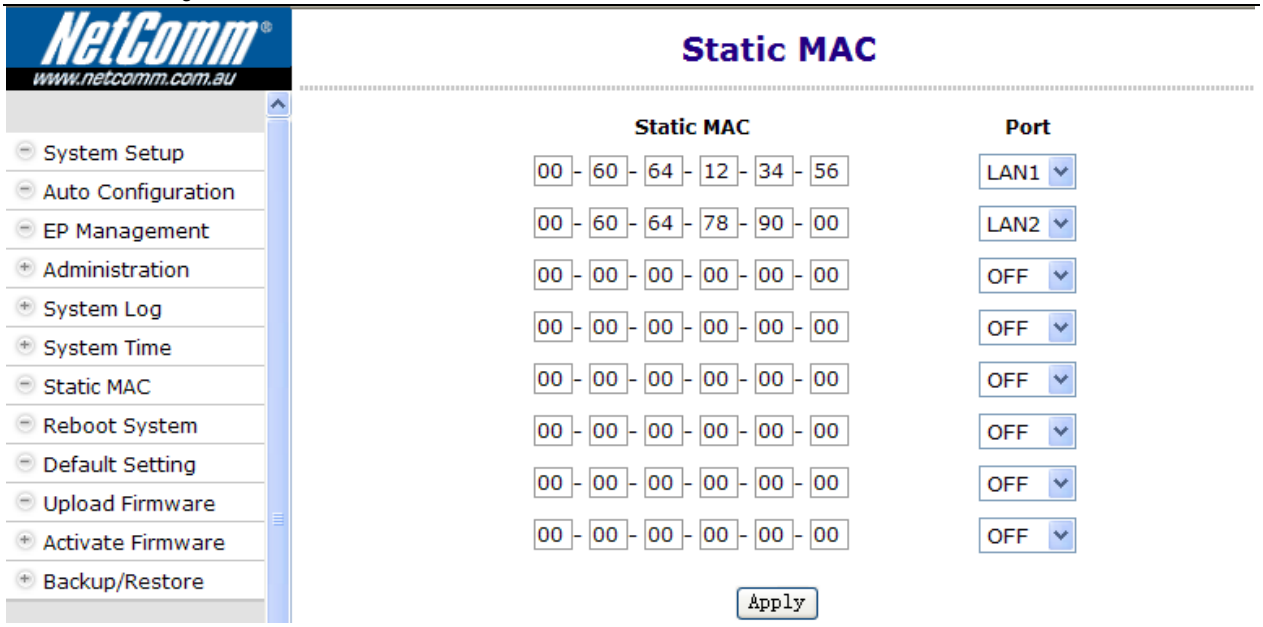

We bind MAC address 00-60-64-12-34-56 to port LAN1 and MAC address 00-60-64-78-90-00 to port LAN2,

Reboot System

Reboot Master CC100 only and leave the EP untainted.

Default Setting

Restore all settings of the CC100 to factory default, including username/password, IP address, privacy mode/key, etc. Press the 'Reset' button locally for about 5 seconds and the CC100 will reboot.

Upload Firmware

Upload '**Bootcode**' / '**System firmware**' / '**Master driver** (3110)' / '**EP driver** (3010 or 3110)' / '**Diagnosis utility**' onto the CC100 '**Upload Area**'. Not functional yet, wait to '**Activate Firmware**' or to '**Upgrade**' driver. Refer to the following "**Example to Upload then Activate System Firmware and HCNA Driver**" for more details.

Activate Firmware

To do the real upgrade for '**Bootcode**' or '**System Firmware**', make the previous uploaded image functional. Refer the following "**Example to Upload then Activate System Firmware and HCNA Driver**" for more details.

Backup/Restore Configuration

Use to backup current configuration into a file with filename extension '**.shc**'. Or to restore the CC100 configuration form the previous saved file.

Example to Upload then Activate System Firmware and HCNA Driver

It is a 2-stage file upgrade procedure, first to upload the selected file onto the CC100 flash ROM '**Upload Area**', then to '**Activate**' it. A coax network system with one CC100 and two connected Smart EPs.

Current System Firmware and HCNA Driver Version

The system firmware version is '**3.34**' before upgrade, check the 'Information' window,

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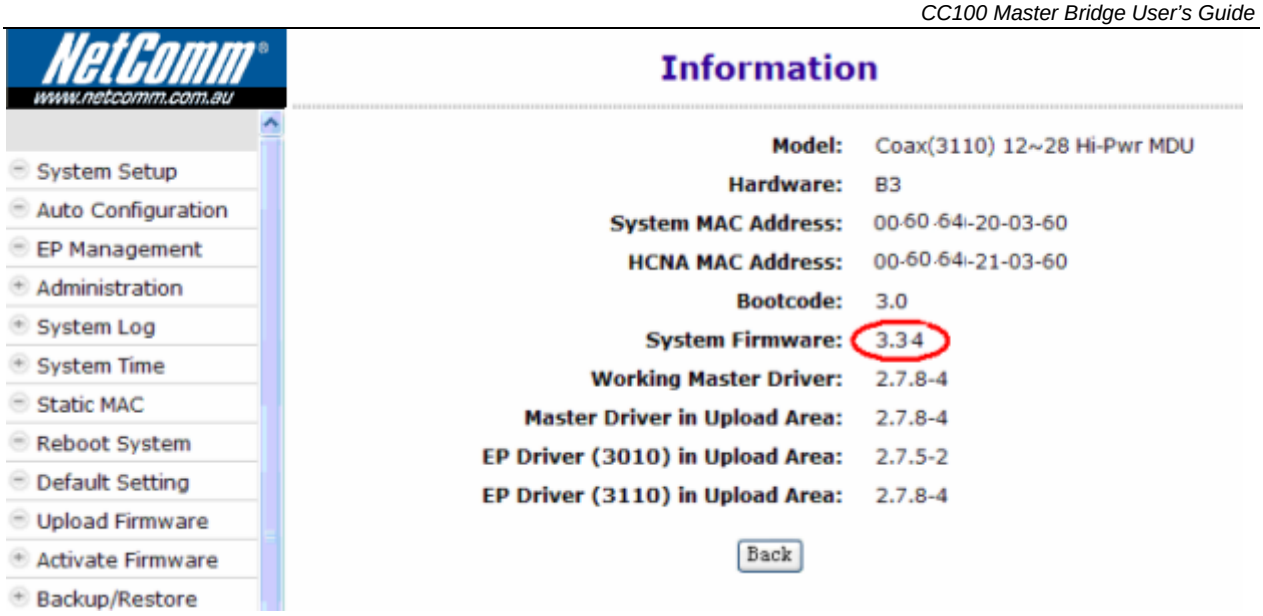
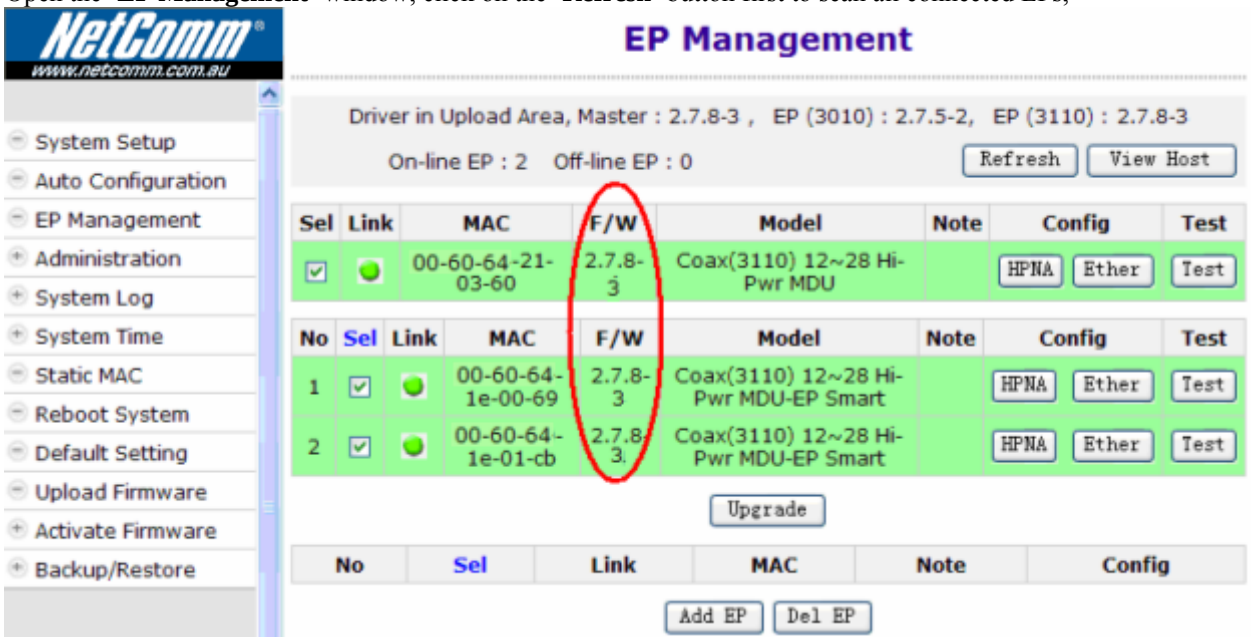


Open the '**EP Management**' window, click on the '**Refresh**' button first to scan all connected EPs,



In the example, the onboard Master (denoted '**Local**') device driver version is '**2.7.5-3**'. The two 3110 EP's device driver version is '**2.7.5-3**',

New System Firmware and HCNA Driver Files

In this example, preparing the following binary files to upgrade the CC100 and the seven connected EPs,

- **CC100_Sysfw_V3.35.bin** → CC100 system firmware version '**3.35**'
- **CC100_Driver_V2.7.8-4.bin** → HCNA device driver version '**2.7.8-4**', include Master(Local) driver version '**2.7.8-4**' , and 3110 Smart EP(as CC101) driver version '**2.7.8-4**'

System Firmware

Upload the New System Firmware

Start from the '**Upload Firmware**' window and click on 'Upload' button,

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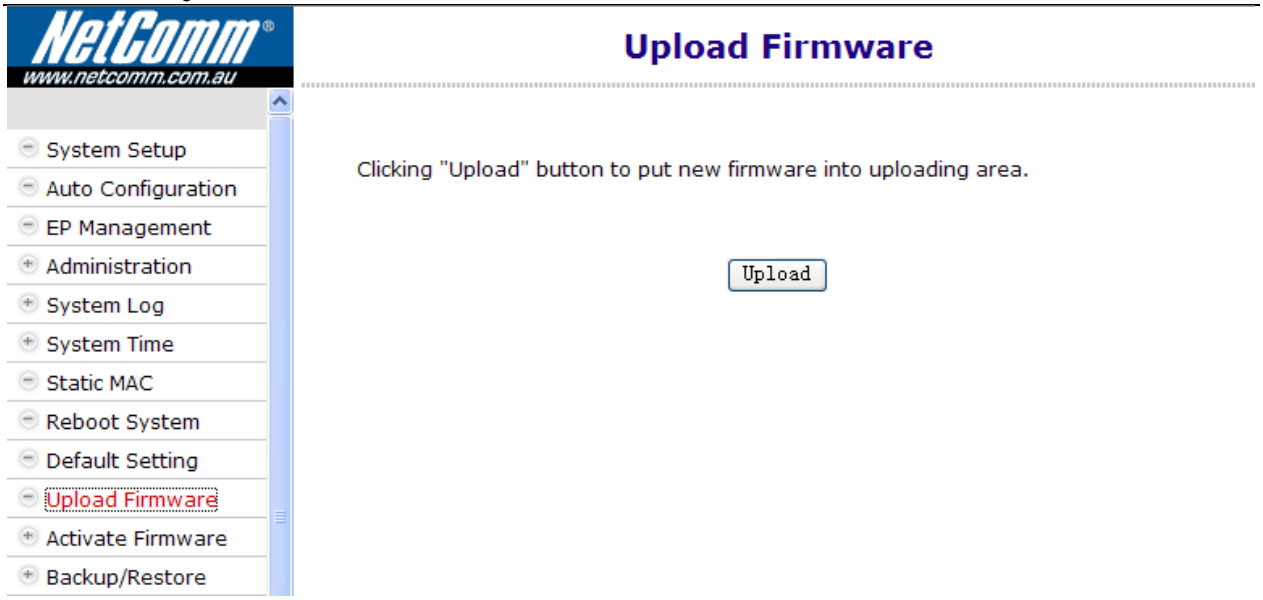
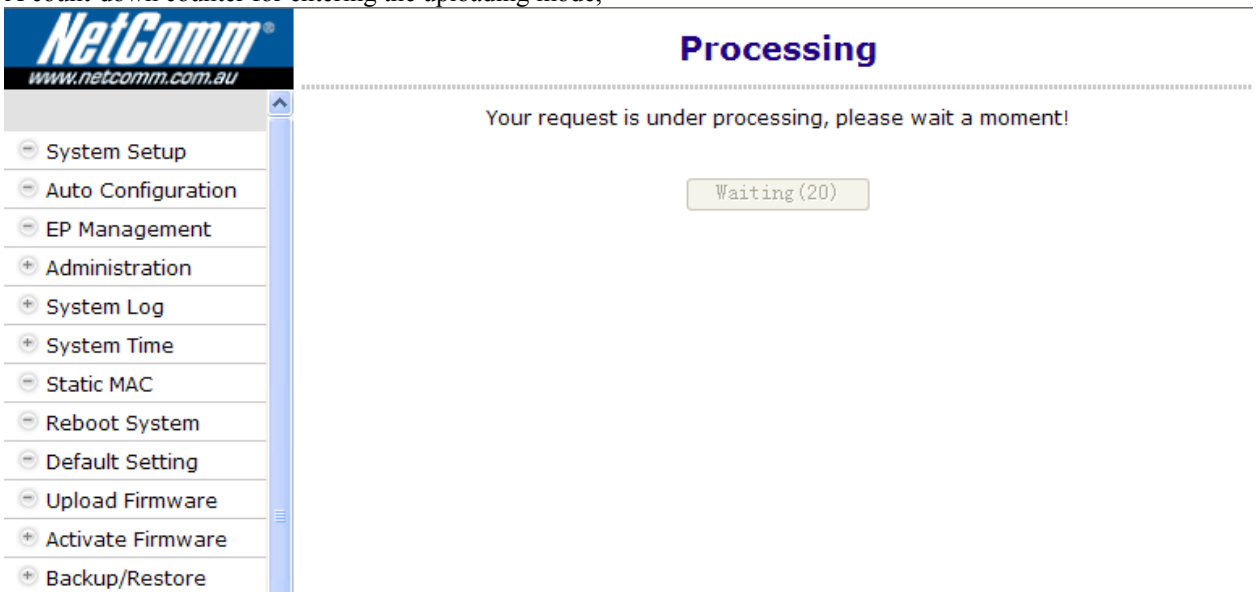


A count-down counter for entering the uploading mode,



Click the '**Continue**' button to proceed,

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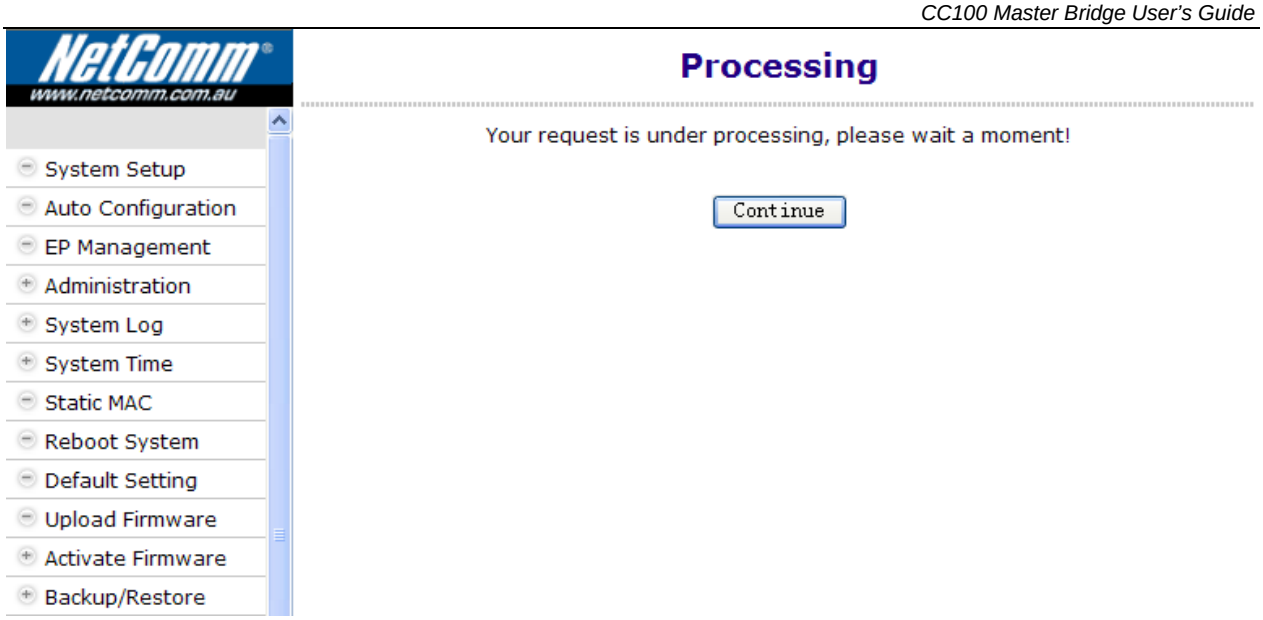
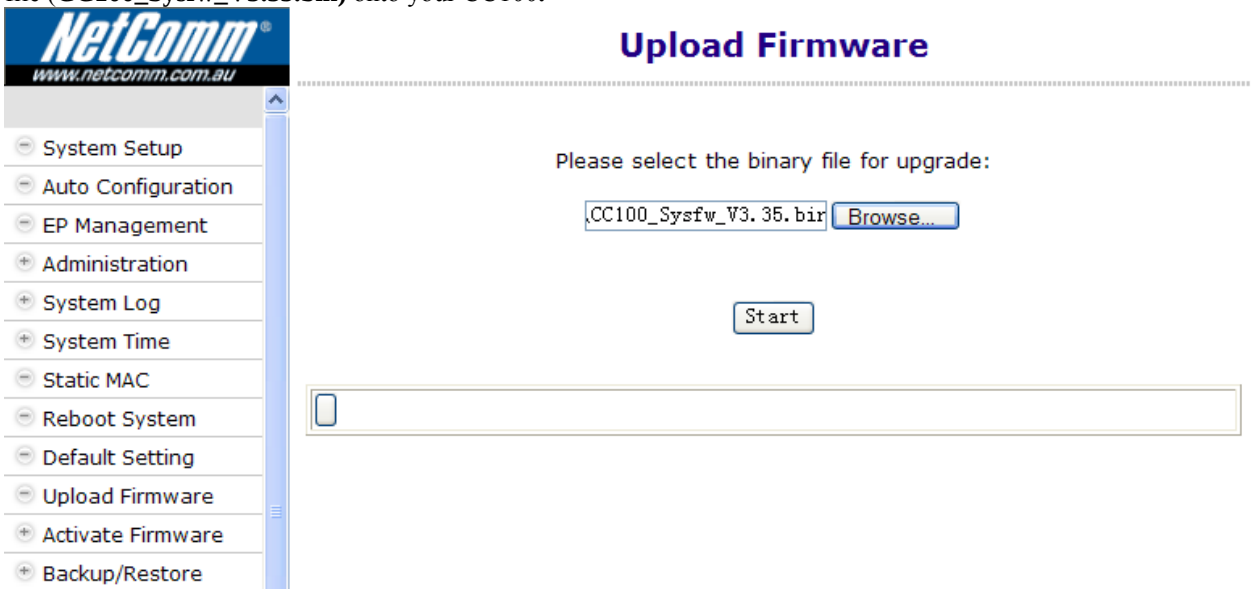


Click the '**Browse**' button to locate the new system firmware at your PC, then click the '**Start**' button to upload the file (**CC100_Sysfw_V3.35.bin)** onto your CC100**.**



Uploading in progress,

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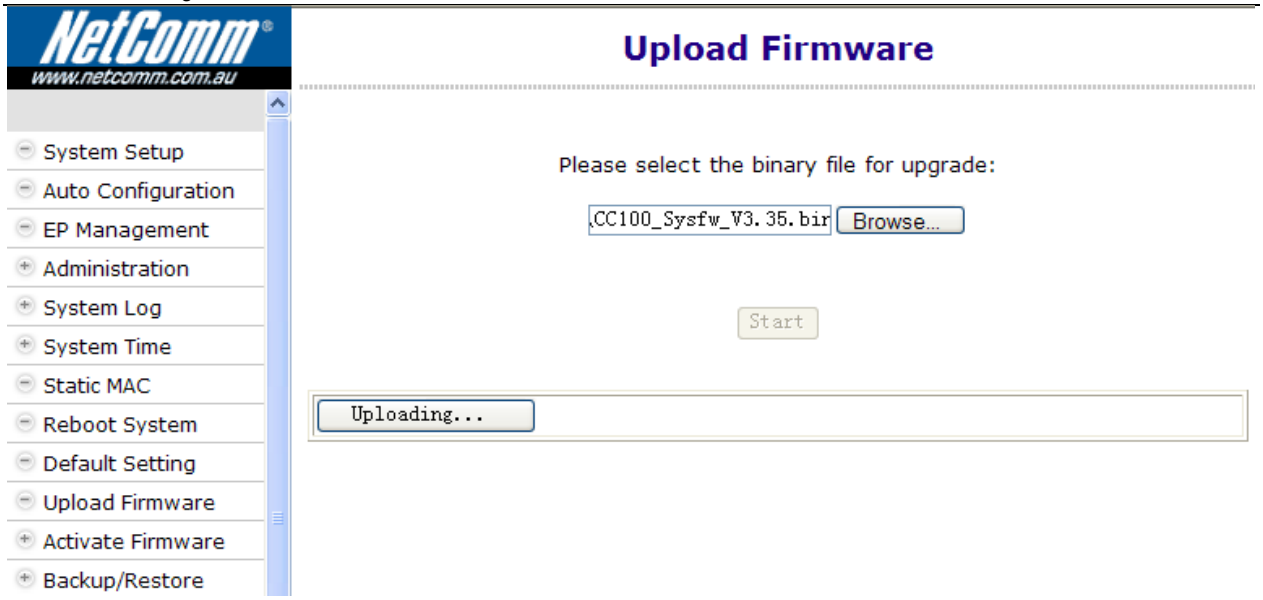

Another count-down counter to verify the integrity of the uploaded file,

Verifying is ok, click the '**Continue**' button.

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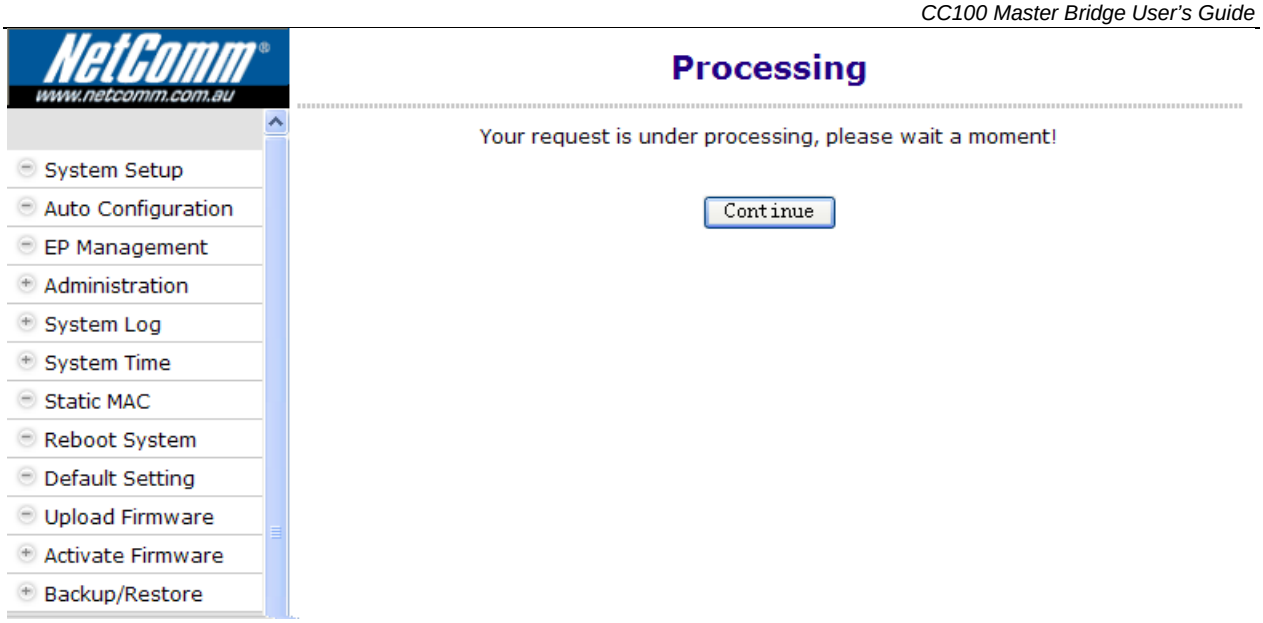
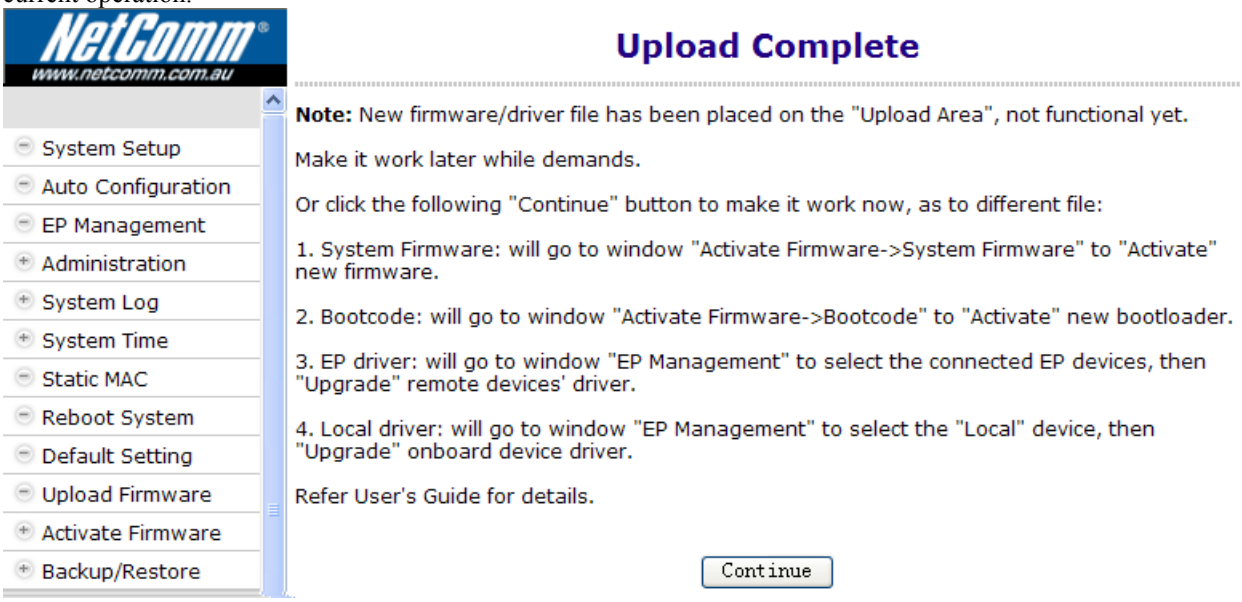


You may activate the new system firmware right away, or wait for the proper scheduled time in order not to disturb current operation.



Check the New System Firmware in 'Upload Area'

After the successful uploading, you may check the uploaded '**System Firmware**' does exist in '**Upload Area**'. By opening the '**System Firmware**' window in the '**Activate Firmware**' function item, here shows the new system firmware version '**3.35**'.

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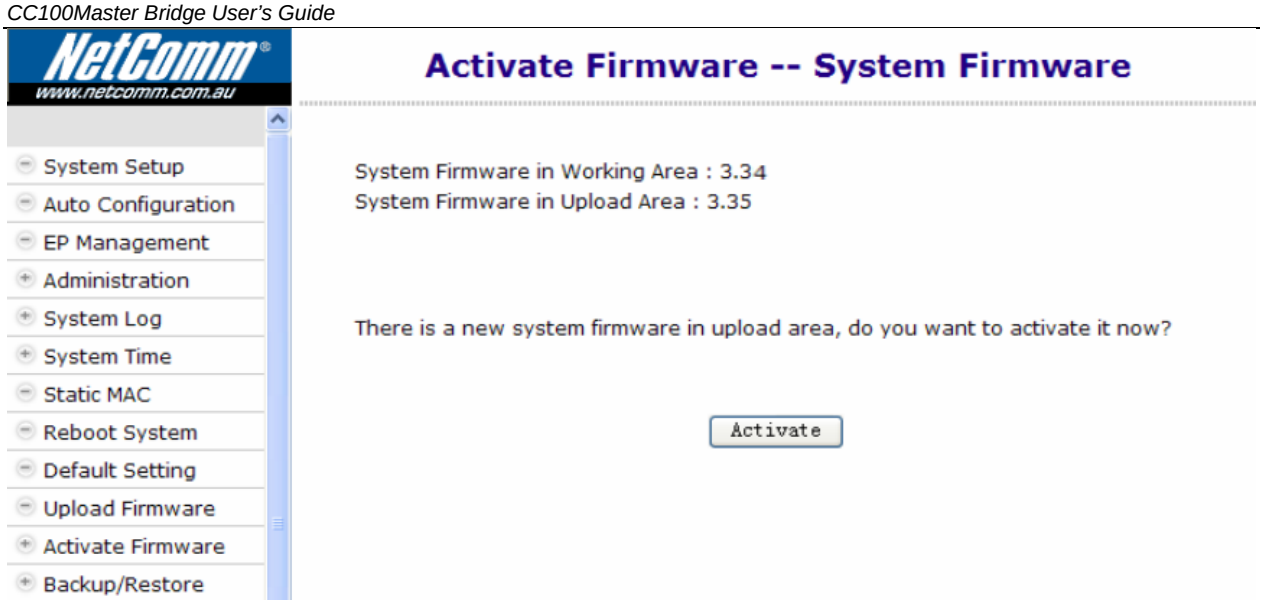
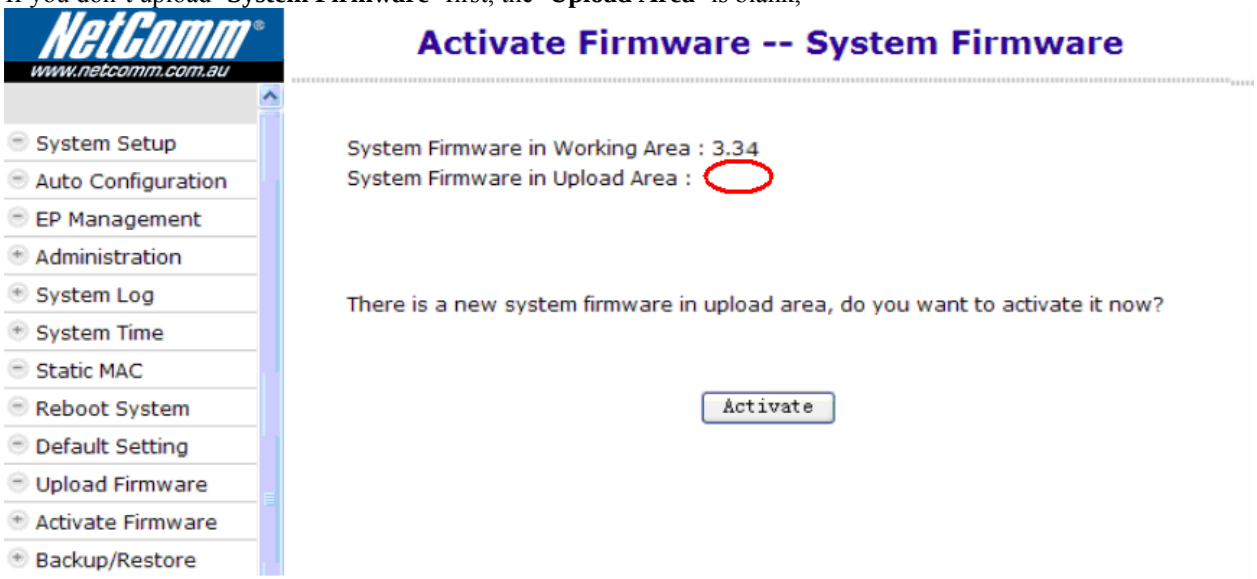


If you don't upload '**System Firmware**' first, the '**Upload Area**' is blank,



Activate the New System Firmware

Clicking the '**Activate**' button in the '**System Firmware**' window will do the real upgrade and replace the old '**System Firmware**' (**OS**),

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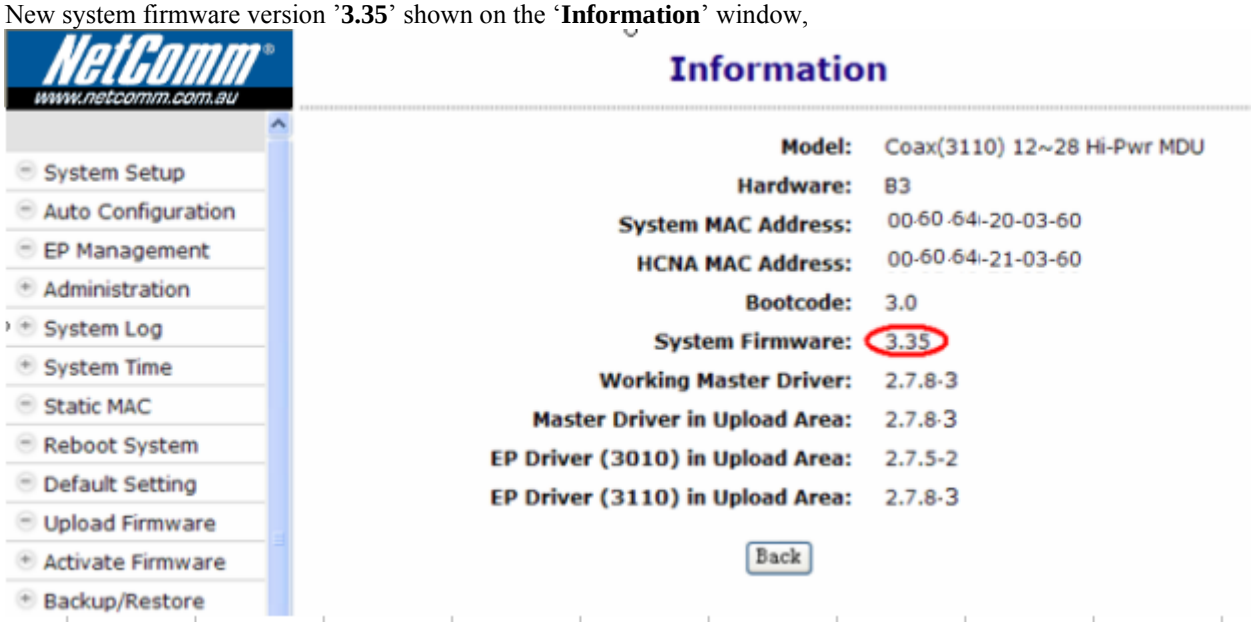
A progress counter for upgrade of the CC100 system firmware, CC100 will reboot after upgrade has completed,

New system firmware version '**3.35**' shown on the '**Information**' window,



HCNA Driver

Upload the New Master/EP HCNA Driver

Follow the similar procedures as to upload new system firmware, start from the '**Upload Firmware**' window…
Click the '**Start**' button to upload the file (**CC100_Driver_V2.7.5-4.bin)** onto your CC100**,**

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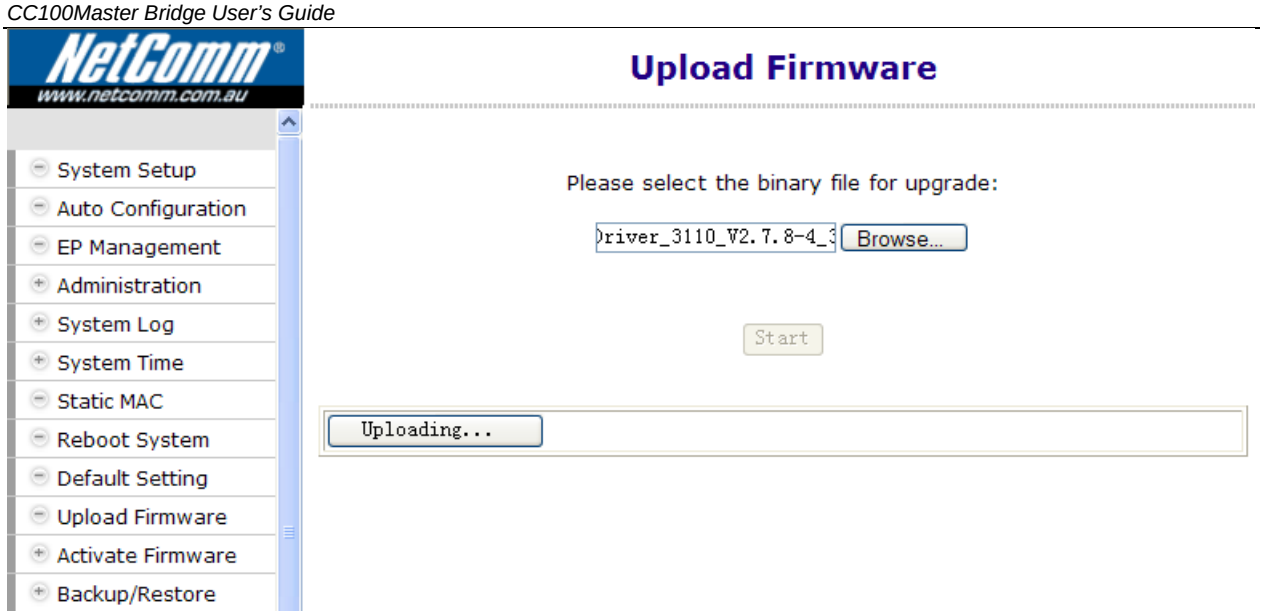
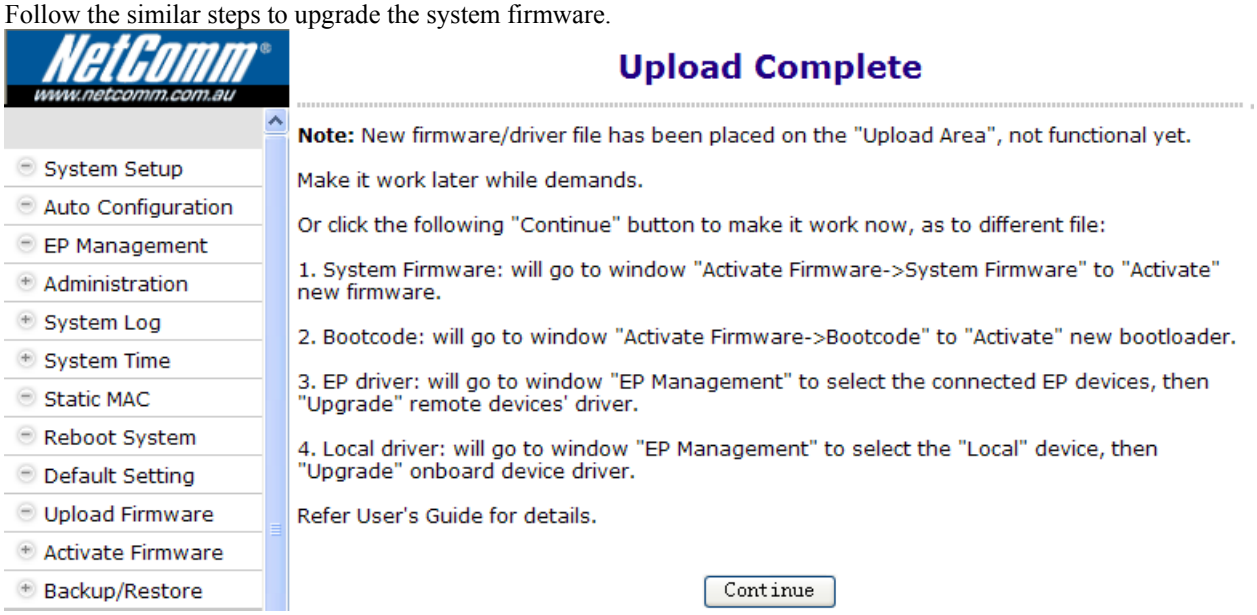
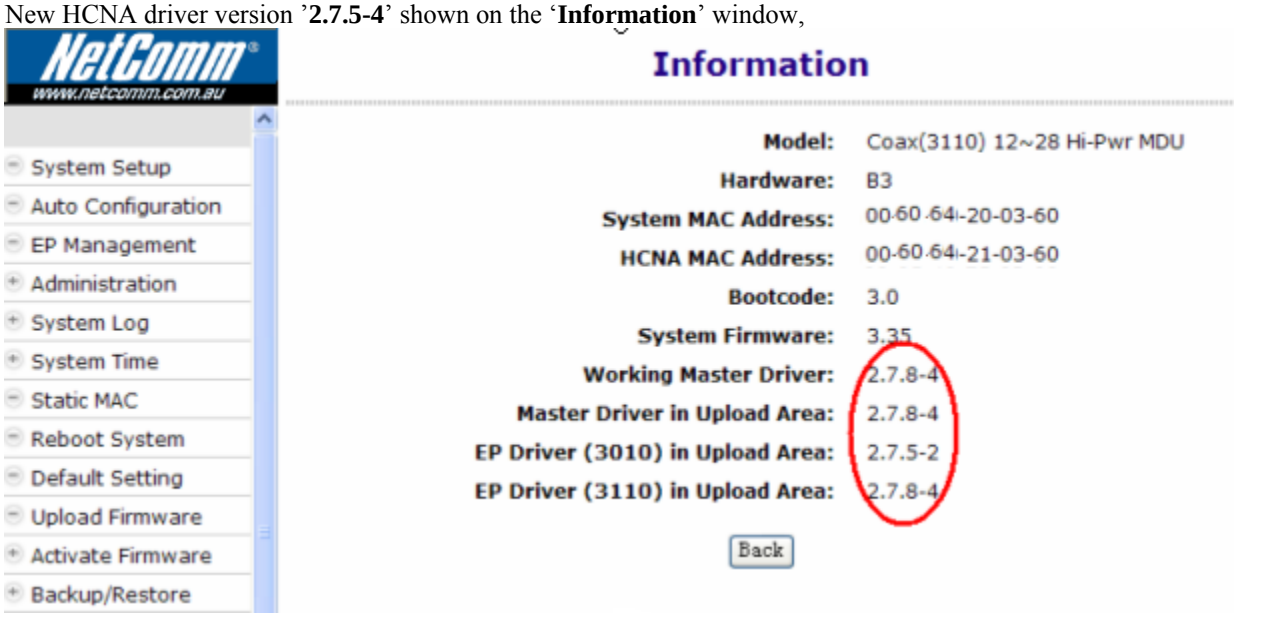


Follow the similar steps to upgrade the system firmware.



New HCNA driver version '**2.7.5-4**' shown on the '**Information**' window,



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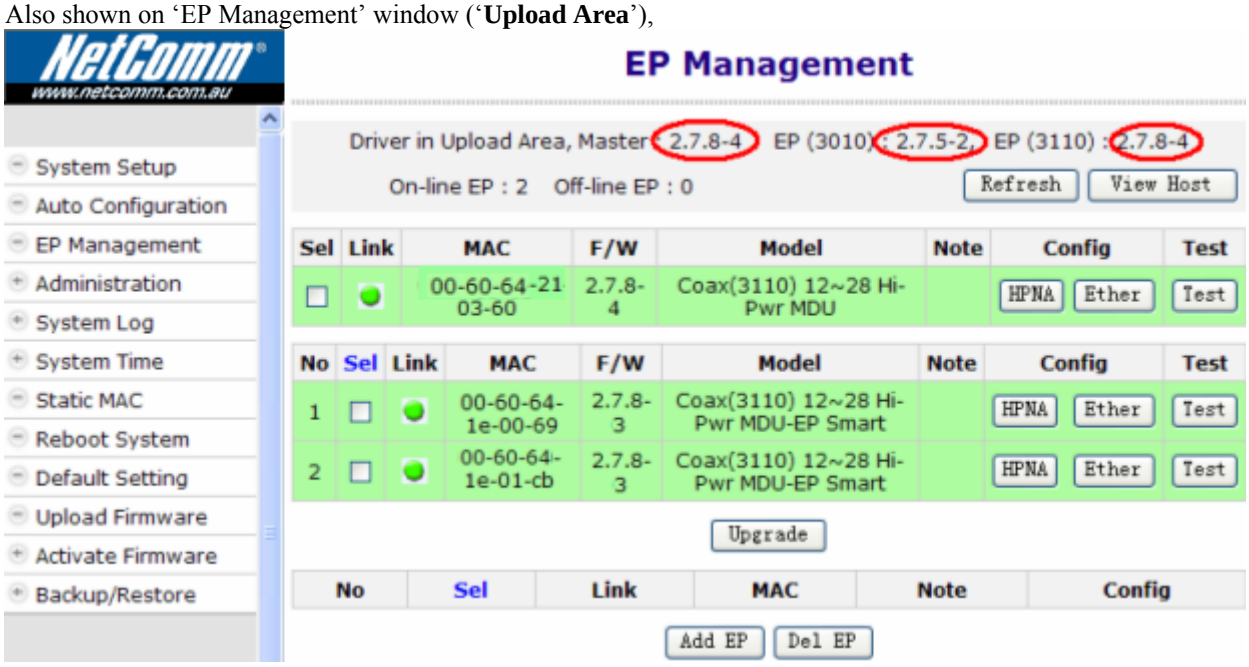
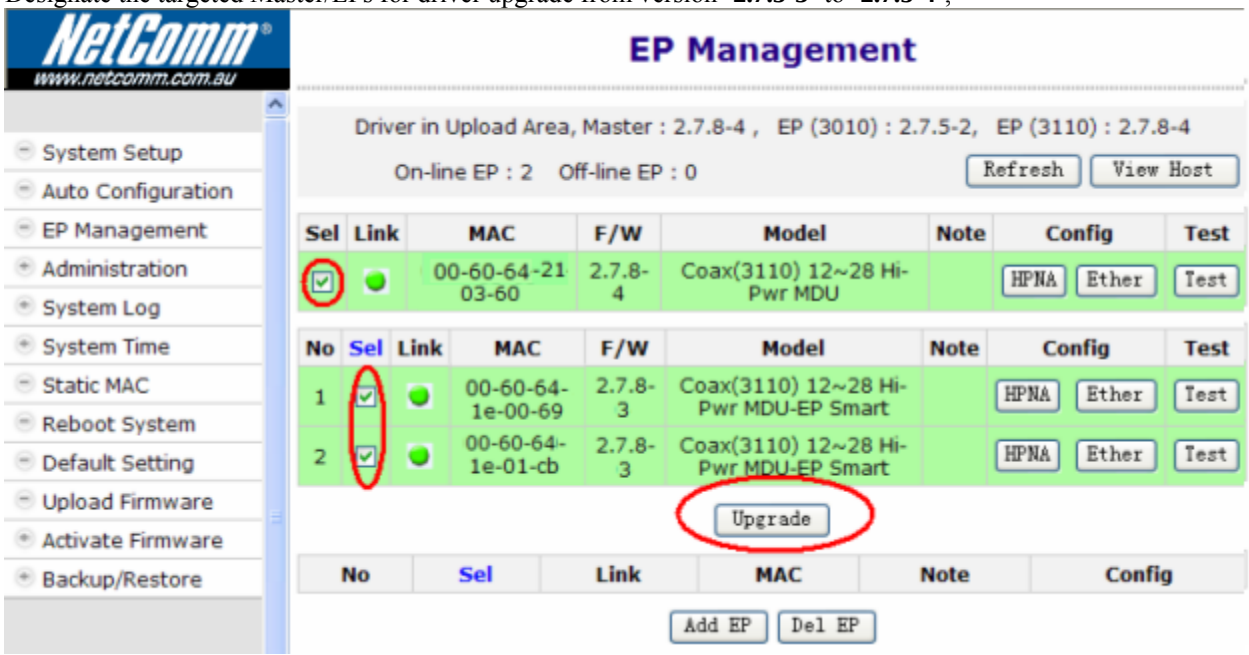
Also shown on 'EP Management' window ('**Upload Area**'),



Upgrade the New HCNA Driver

Designate the targeted Master/EPs for driver upgrade from version '**2.7.5-3**' to '**2.7.5-4**',



Click the '**Upgrade**' button to proceed,

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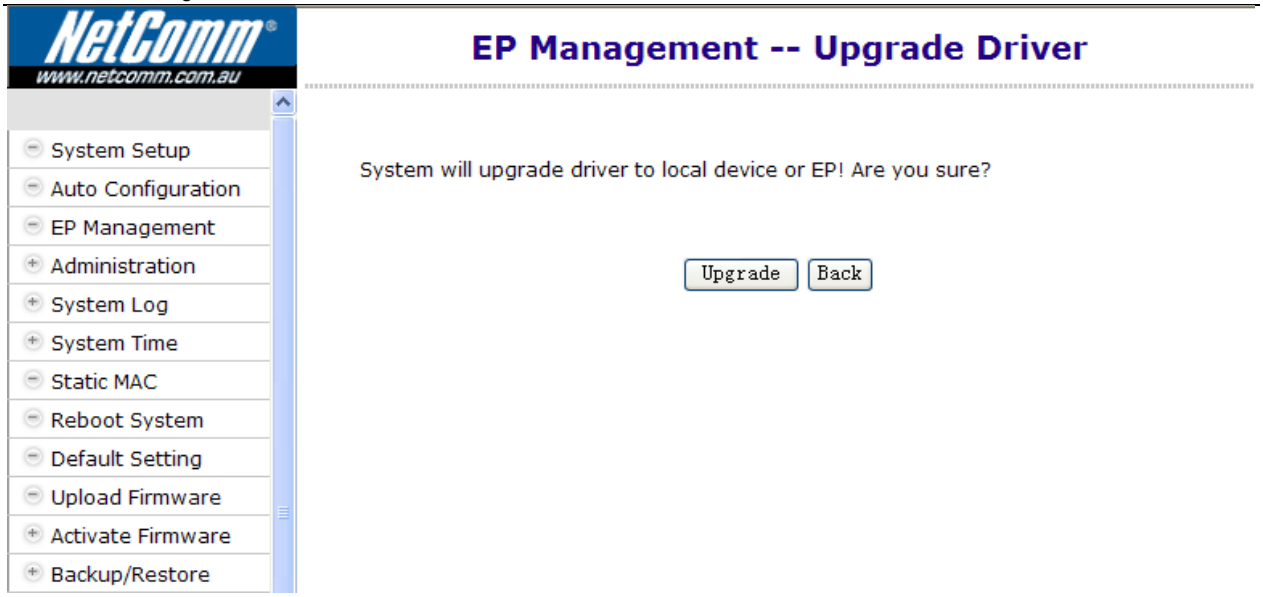
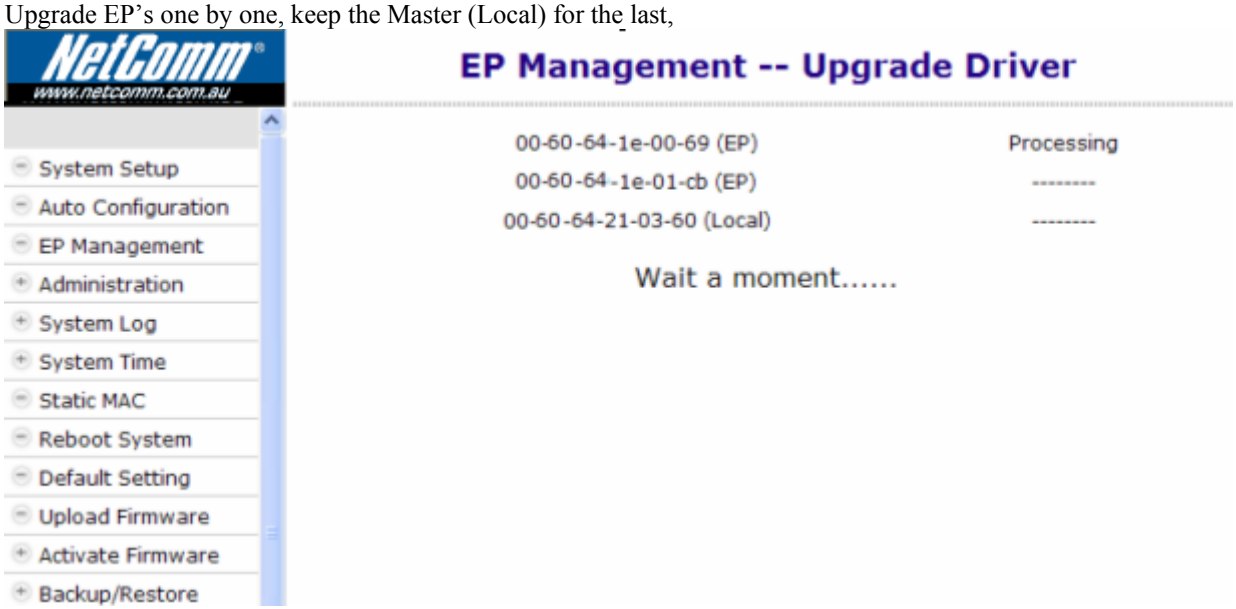


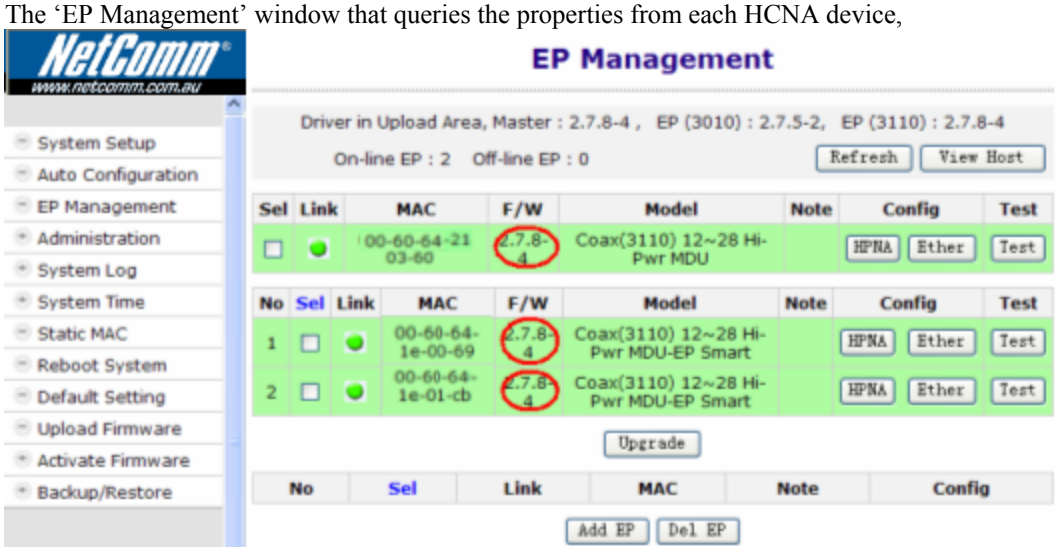
Then '**Upgrade**' button again to confirm,

Upgrade EP's one by one, keep the Master (Local) for the last,



Master/EP runs the New HCNA Driver

The 'EP Management' window that queries the properties from each HCNA device,



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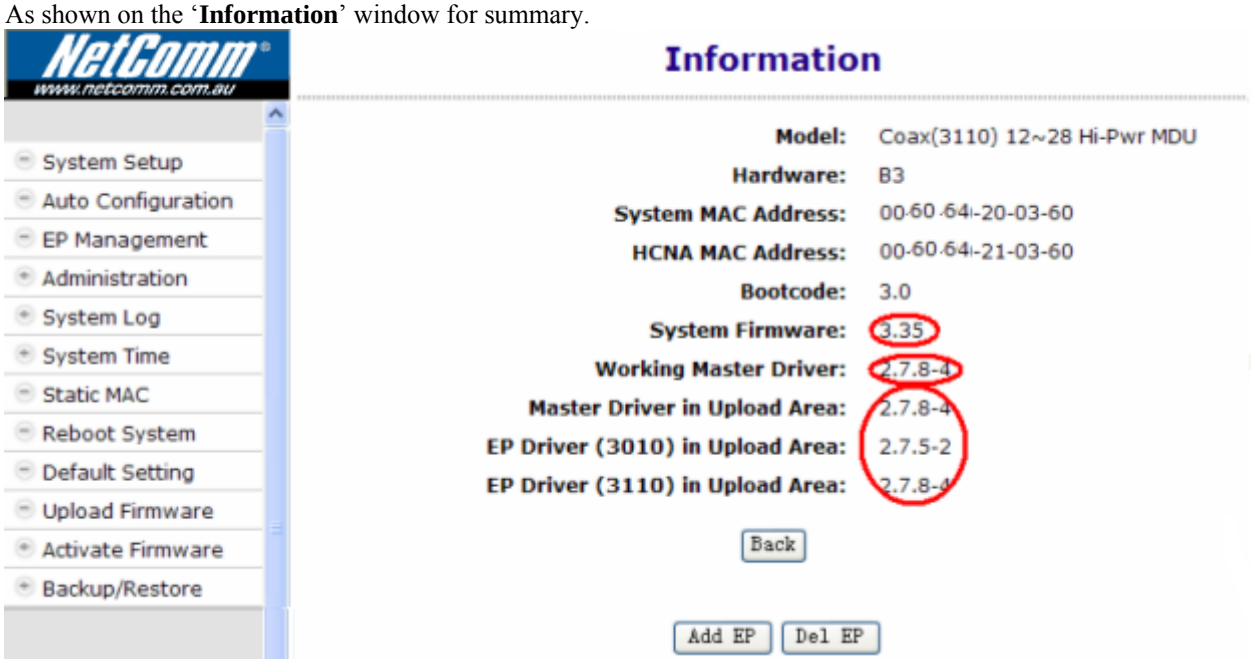
Indicate the new driver version '**2.7.5-4**' is working.

System Firmware and HCNA Driver Version after Upgrade

As shown on the '**Information**' window for summary.



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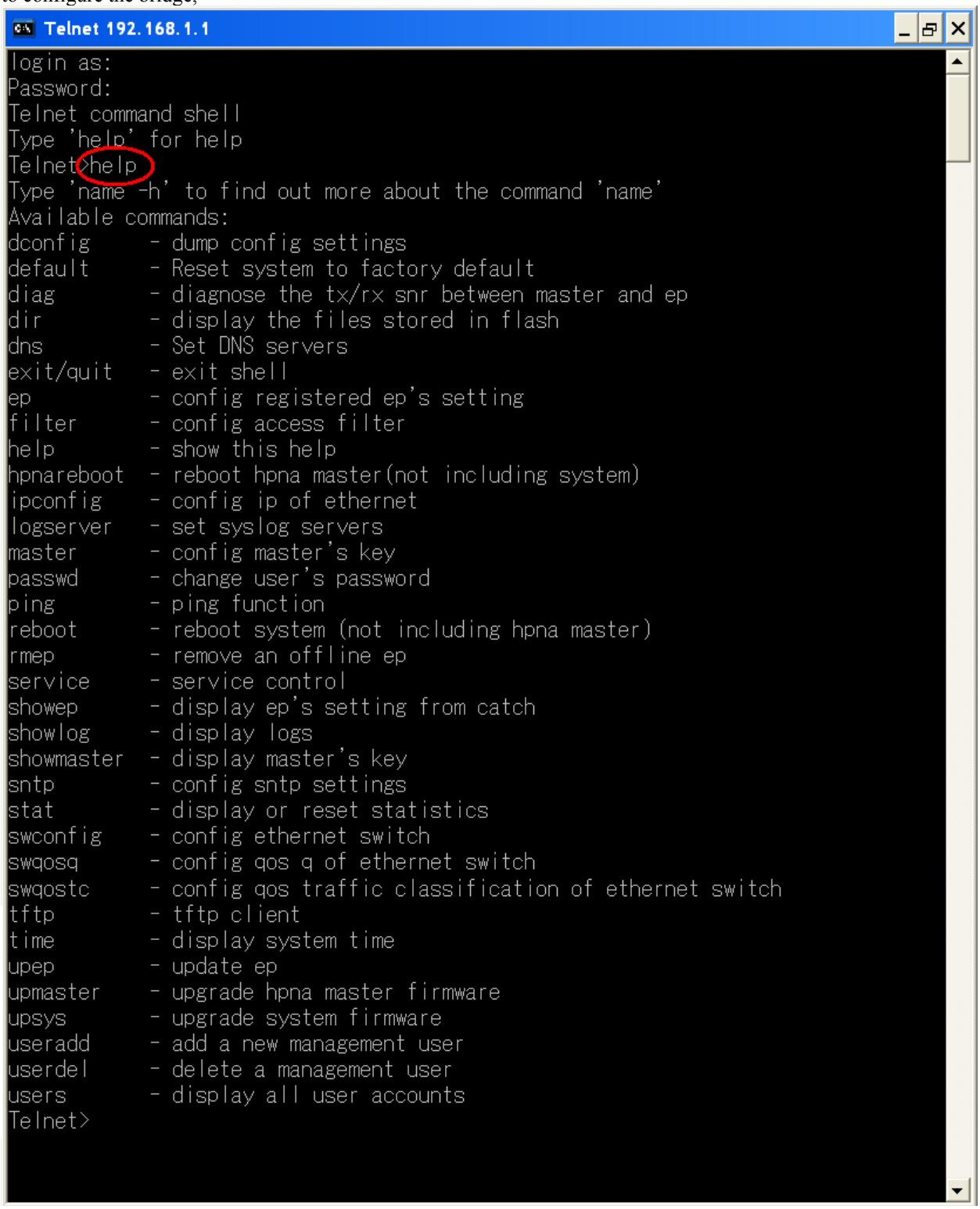
Use Telnet

Any popular Telnet client could use it to configure the bridge remotely. For example, run Windows built-in Telnet to configure the bridge,



Inputting any command with '**-h**' argument will show you the usage, as '**dconfig –h**' will explain the function and usage of command '**dconfig**'.

For security consideration, please disable the '**Telnet Server**' if the bridge is not to be configured via Telnet.

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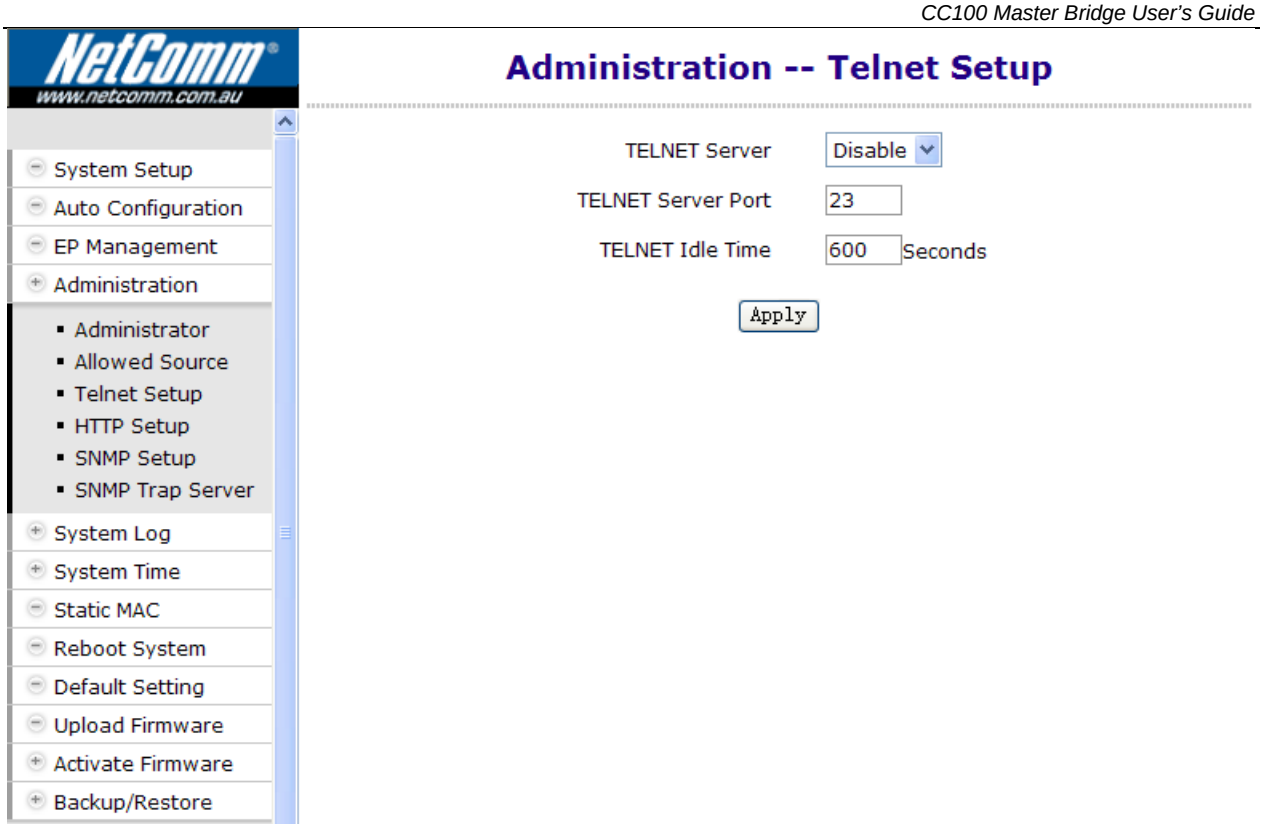

Note that Telnet connection will be terminated automatically if the telnet client doesn't input any command for 5 minutes; i.e. the console idle timer is 10 minutes (600 Sec).

Command Sets for Telnet Console

The following table lists all commands for Telnet console. The third column '**Description**' explains what happens when you run the '**Commands**' in the first column and also explains the versatile options of the second column '**Arguments**'.

Some common formats for arguments are:

<mac> MAC address, format in 'nn-nn-nn-nn-nn-nn where nn=00~FF'. As '00-60-64-13-03-36'.
<ip> IPv4 address, format in 'nnn.nnn.nnn.nnn where n=0~9'. As '192.168.1.1'. Also applicable for **<mask>**, **<default gateway>**
<interface> Network interface name, '**eth0**' for LAN1/LAN2 interface, '**hpna0**' for HCNA interface.
<fid> Flash ROM file id represented different firmware/driver, 'n where n=0~12',
'n=0': System bootcode (bootloader)
'n=1': System firmware (OS)
'n=2': Master HCNA driver (3110)
'n=3': 3010 EP HCNA driver
'n=5': 3110 EP HCNA driver
'n=10': 3010 EP diagnosis utility
'n=11': 3110 EP diagnosis utility

Only lowercase letter can be accepted. Typing commands followed by pressing 'ENTER' will execute the command. Run any command with '**-h**' argument will show you the usage

Commands	Arguments [ ] is optional	Description

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dconfig		Dump all configurations/settings.
default		Reset all settings to factory default, except Password.
diag	-t <mac> -r <mac>	On-line EP connection diagnosis. -t: downstream SNR diagnosis(from Master to EP) -r: upstream SNR diagnosis(from EP to Master) <mac>: EP MAC <mac> to be diagnosed
dir		Show detail file information resides in flash ROM. Include 'Working Area' and 'Upload Area', refer Figure 4. The listed filenames are, 'bootcode': boot loader 'sysfw4m': system firmware 'G1C28H21M': Master HCNA driver 'G0C28H20Ep': 3010 EP HCNA driver 'G1C28H21Ep': 3110 EP HCNA driver 'diagsw': 3010 diagnosis utility file 'diagsw1': 3110 diagnosis utility file Accompanying with file id, file version, file date, and file size.
dns	[-s <pri/sec> <ip>]	Display or set up DNS server setting. -s pri <ip>: set up Primary DNS server's IP -s sec <ip>: set up Secondary DNS server's IP
exit		Close the Telnet console.
quit		Close the Telnet console.
ep	[-c <hostcnt>] [-n <note>] [-u <uprate index>] <mac>	Set up the EP Properties Profile related setting values. <hostcnt>: EP Host Limit setting value (0~255), default 255 <note>: EP Note setting value <uprate index>: EP Upstream Rate setting value (0~1563, *64Kbps), default 0 for unlimited <mac>: designated EP MAC to configure
ephpnareboot (Smart EP)	-m <mac>	Reset remote Smart EP device
epstat (Smart EP)	-m <mac> [-r]	Display remote Smart EP port statistics for port LAN1/LAN2/HCNA. -r: reset all port statistics counter to 0
epswc (Smart EP)	-m <mac> [-t] [-u] [-r] [-d] [-p <lan1/lan2/hpna> [-l <up/down>] [-s <auto /10h /10f /100h /100f>] [-f <on/off>]]	Display or set up remote Smart EP built-in switch Ethernet properties -t: display EP switch settings -u: display EP switch/port status -r: reset EP switch -d: reset EP switch's eeprom settings to factory default -p: configure EP port LAN1/LAN2/HCNA -l: link, <up/down>: force current port to link up or down, i.e. enable/disable current port -s: current port Ethernet mode setting, <auto>: auto-negotiation mode <10h/10f/100h/100f>: 10/100Mbps, half/full-duplex mode -f: current port Ethernet flow-control setting, <on/off>: turn on /off flow control
epswigmp **epswqosq** **epswqosrate** **epswqostc** **epswtagvlan** **(Smart EP)**	-m <mac>	Refer swigmp, swqosq, swqosrate, swqostc, swtagvlan for the same functionality, but operate on remote Smart EP with designated MAC address <mac>
filter	[-s <set> [-c <act/deact>] [-a <ip> -m <mask>] [-t <allow/deny>] [-w <allow/deny>]	Display or set up the filter rule set, refer the section "Allow Source" for IP <ip> and Subnet Mask setup <mask>. <set>: filter set index, total 16 set (0~15) <act/deact>: activate or de-activate the rule set <allow/deny>: allow or deny the protocol

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	[-n <allow/deny>] [-p <allow/deny>]]	-t: telnet -w: http/web -n: snmp -p: reply to ICMP ping

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help		Display all commands with brief description
hpnareboot		Reset Master HCNA device'
ipconfig	[-a <ip> -m <mask> -g <default gateway>]	Display or set up system IP network, include IP address <ip>, subnet mask <mask>, and default gateway <default gateway>.
logserver	[-s <set> [-c <act/deact>] [-a <ip> -v <severity>]]	Display or set up Unix-like **Syslog** servers(max 5 set) <set>: server index, at most 5 servers (0~4) <act/deact>: activate or de-activate the server with IP address <ip> <severity>: select the severity level, refer section "System Log", default level 6 (info)
master	-k <on/off/key(0x…)>	Set up Master HCNA device Privacy Mode setting values. Use command 'upmaster' to take effect on Master device. (replace the working values with the setting ones) Use command 'upep' to upgrade EP with the new 'Privacy Mode/Key'. <on/off>: set 'Privacy Mode' to ON or OFF, default OFF <key(0xnnnn)>, n is 0~F: 4-digit 'Privacy Key' in hexadecimal, default 0x0
passwd	[name] -o <oldpasswd> -n <newpasswd>	Change user's password, user can update its own password. Only superuser has the privilege to rewrite other's password, [name]: user's account name, default to current login name if not supplied <oldpasswd>: old password, superuser can bypass this parameter <newpasswd>: new password
ping	[-n <count>] [-w <timeout>] [-l <pktlen>] address	ICMP ping function, <count>: number of ping requests(max 65535) <timeout>: expiry timer in each reply(1~60 sec) <pktlen>: sent packet length(64~1500) address: target IP address
reboot		Reboot system
rmep	<mac>	Remove designated EP Properties Profile. <mac>: EP MAC <mac> to be removed
service	[-s <telnet/http> [-c <on/off>] [-p <port)>] [-t <idle>]]	Display or set up Telnet and Http service. <telnet/http>: configure Telnet or Http <on/off>: enable or disable this service <port>: TCP port number (0~65535) <idle>: expiry timer to logoff automatically (0~32767 sec) default 300 seconds
showep	[-f] [-n <note>] [-m <mac>]	Display EP connection status and properties, and check if it matches the stored Properties Profile in CC100. -f: force to re-scan all connected EPs -n: display EP with matched <note> -m: display EP with MAC address <mac>
showlog		Display the (Syslog) logged messages.
showmaster		Display Master HCNA information, include driver version, properties(Privacy Mode, Privacy Key)
snmp	[-c <act/deact>] [-p <port>] [-n <name>] [-t <contact>] [-l <location>] [-r <rcomm>] [-w <wcomm>]	Display or set up basic SNMP system configuration. <act/deact>: activate(enable) or de-activate(disable) SNMP agent <port>: SNMP UDP port number (0~65535), default 161 <name>: SNMP system name <contact>: SNMP system contact information <location>: SNMP system location information <rcomm>: SNMP system read-only community name, default 'public'

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		<wcomm>: SNMP system read-write community name, default 'private'

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snmptrapserver	[-s <set> [-c <act/deact>] [-p <port>] [-a <ip>] [-m <community>]]	Display or set up SNMP trap server(s) configuration. <set>: trap server index, at most 5 servers (0~4) <act/deact>: activate or de-activate trap server IP <ip> <port>: SNMP trap UDP port number (0~65535), default 162 <ip>: trap server IP address <community>: trap server community name, default 'public'
snmptrapsetup	[-l <on/off>] [-u <on/off>] [-s <on/off>] [-d <on/off>]	Enable or disable specified trap type, <on/off>: turn on or turn off this trap type, default is on -l: logon/logoff trap -u: upload/upgrade firmware/driver trap -s: EP on-line status changed trap -d: EP diagnosis trap
sntp	[-c <act/deact>] [-r <refresh time>] [-z <time zone>] [-s <set> -a address]	Display or set up SNTP configuration for System Time. <act/deact>: activate or de-activate SNTP service for system time <refresh time>: query SNTP server period, default 60 minutes <time zone>: '+hh:mm' or '-hh:mm' to GMT time, hh for hours and mm for minutes, default '+00:00' <set>: 2 registered SNTP server set(0~1) address: SNTP server host name or IP address in current set
stat	[-r]	Display port statistics for port LAN1/LAN2/HCNA. -r: reset all port statistics counter to 0
swconfig	[-p <lan1/lan2> [-s <auto /10h /10f /100h /100f>]]	Display or set up Ethernet port LAN1/LAN2 properties <lan1/lan2>: configure LAN1 or LAN2 port <auto>: auto-negotiation mode <10h/10f/100h/100f>: 10/100Mbps, half/full-duplex mode
swigmp	[-c <on/off>] [-t <QueryInterval (4~510, even number)>]]	Display or set up IGMP v2 snooping configuration <on/off>: enable or disable built-in IGMP v2 snooping function, default is off <Query Interval>: expiry timer to age learned Multicast MAC if no IGMP query frame received from the router, default is 248 seconds (range from 4 to 510 in even)
swqos	[-q <queue> [-w <weight>] [-d <discard mode>]]	Display or set up the QoS configuration, include priority queue, service weight and discard ratio while congestion, refer Priority for more. <queue>: select queue index (0~3) to configure, as q0(lowest priority)/q1/q2/q3(highest priority) <weight>: assign the queue with service weight(1~15), default 1 for q0, 2 for q1, 3 for q2 and 4 for q3 <discard mode>: choose the discard mode(0~3) for queue utilization, default 0 for 0%. 1 for 25%, 2 for 50% and 3 for 75%. refer Priority for more.
swqosrate	[-p <lan1/lan2> [-d <tx/rx>] [-c <on/off>] [-r <N (1~1563 rate=N*64kbps)>]]	Display or set up the LAN1/LAN2 maximum rate. refer Bandwidth Control for more. <lan1/lan2>: configure LAN1 or LAN2 port <tx/rx>: direction, incoming(rx) or outgoing(tx) <on/off>: enable or disable control on this direction <N>: the setup max rate (multiply value by 64kbps). Range from 0 to 1563, bandwidth control is invalid if N >= 1563
swqostc	[-s <set> [-c <act/deact>] [-p <port> -q <queue>]]	Display or set up the QoS configuration for TCP/UDP traffic classification, to assign higher priority for total 8 different TCP/UDP protocols <set>: rule set index, at most 8 set (0~7) <act/deact>: activate or de-activate this set <port>: TCP/UDP port number (0~65535), <queue>: select queue index (0~3) for this rule set, as q0(lowest priority)/q1/q2/q3(highest priority)
swsmac	[-m <mac>]	Display or set up the static MAC entry, total 8 entries of MAC

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	[-c <lan1/lan2/off/del>]	addresses can be setup, refer Static MAC <mac>: max 8 entries <lan1/lan2>: bind the current MAC entry to LAN1 or LAN2 port, i.e. enable this MAC entry as static MAC <off>:disable this MAC entry, neither bind to LAN1 nor LAN2 <del>: remove the current MAC entry, invalid this MAC entry to default 00-00-00-00-00-00
swtagvlan	[-c <on/off>] [-p <lan1/lan2/hpna> [-r <priority(0~7)>] [-v <vid(0~4095)>] [-i <all/tag>] [-o <untag/ tag/ bypass >]]	Display or set up the LAN1/LAN2/HCNA Tag VLAN. refer Tag VLAN Setup for more. <lan1/lan2/hpna>: configure LAN1 or LAN2 or HCNA port <priority>: 802.1p value, 0~7 <vid>: 802.1Q VID, 0~4096 <all/tag>: ingress rule -- accept all incoming packets or accept incoming tagged packets only, reject other incoming packets. <untag/tag/bypass>: egress rule: un-tag or tag or bypass the outgoing packet -c: enable Tag VLAN mode or not -p: the port in Tag VLAN mode -r: 802.1p in Tag VLAN mode -v: VID of 802.1Q in Tag VLAN mode -I: ingress rule for the port in Tag VLAN mode -o: egress rule for the port in Tag VLAN mod
tftp	-s <ip> -c <get/put> -f <file>	Run TFTP client to get file (upload file onto CC100) or to put file (retrieve file from CC100) from TFTP server IP <ip>. <get/put>: run TFTP command 'get' or 'put' <file>: filename
time		Display current System Time.
upep	[-a] [-m <mac>] [-n <note>]	Upgrade EP HCNA driver (stored in Upload Area), this operation also synchronize EP with EP Properties Profile stored in CC100, -a: upgrade all on-line EP at once -m: upgrade the EP with matched MAC <mac> -n: upgrade (matched MAC <mac>) EP 'Note' property <note>
upmaster		Upgrade Master HCNA driver (stored in Upload Area), this operation also synchronize Master HCNA device with its setting values in Properties Profile.
upsys		Upgrade the uploaded system firmware (stored in Upload Area), then reboot.
useradd	name -p <password> -r <ro/rw>	Create new management user account. name: user name -p: login password -r: 'ro' for user has read-only privilege, 'rw' for user has read-write privilege
userdel	name	Delete the management user account by name. name: user name
users		Display all user accounts.

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Use SNMP

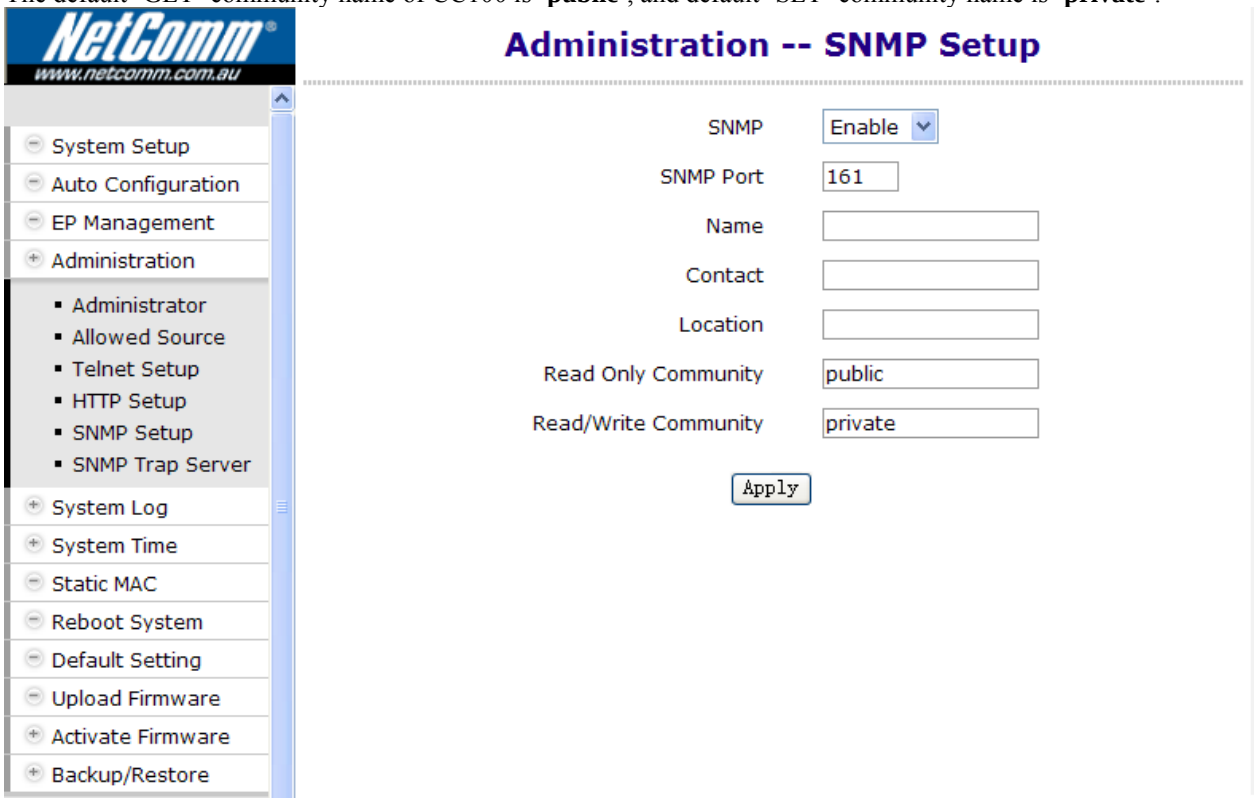
The **SNMP Agent** resides in CC100 and will handle requests from a remote **SNMP Manager**. The CC100 SNMP agent supports standard SNMP community-based operations (SNMP V1/V2c) as 'SET', 'GET' and 'TRAP'.

You need to specify the correct **Read-Only Community Name** into bridge before any SNMP 'GET' operation can be performed. Also set up the **Read/Write Community Name** for SNMP 'SET' operation. 'SET' operation can modify the setting within the CC100. While 'Get' is read-only operation used to report the requested SNMP data to SNMP manager.

You may need the accompanying proprietary **MIB file** for some popular SNMP/MIB manager software to manage the bridge system. The CC100 bridge system may also be integrated into your original SNMP management system by this MIB file.

Each SNMP manager will assign the name of the community it belongs to in its 'GET', 'SET' and 'TRAP' operations. The community name could be unique to allow set of SNMP managers to access one SNMP agent, any operation with mismatched community name will be rejected by agent. For security consideration, you should either change the factory default community name or disable SNMP function in CC100.

The default 'GET' community name of CC100 is '**public**', and default 'SET' community name is '**private**'.



For the following example, the two '**TRAP Server'** with IP address '**192.168.1.100**' and '**192.168.1.101**' will capture all traps emitted from the CC100 SNMP agent,

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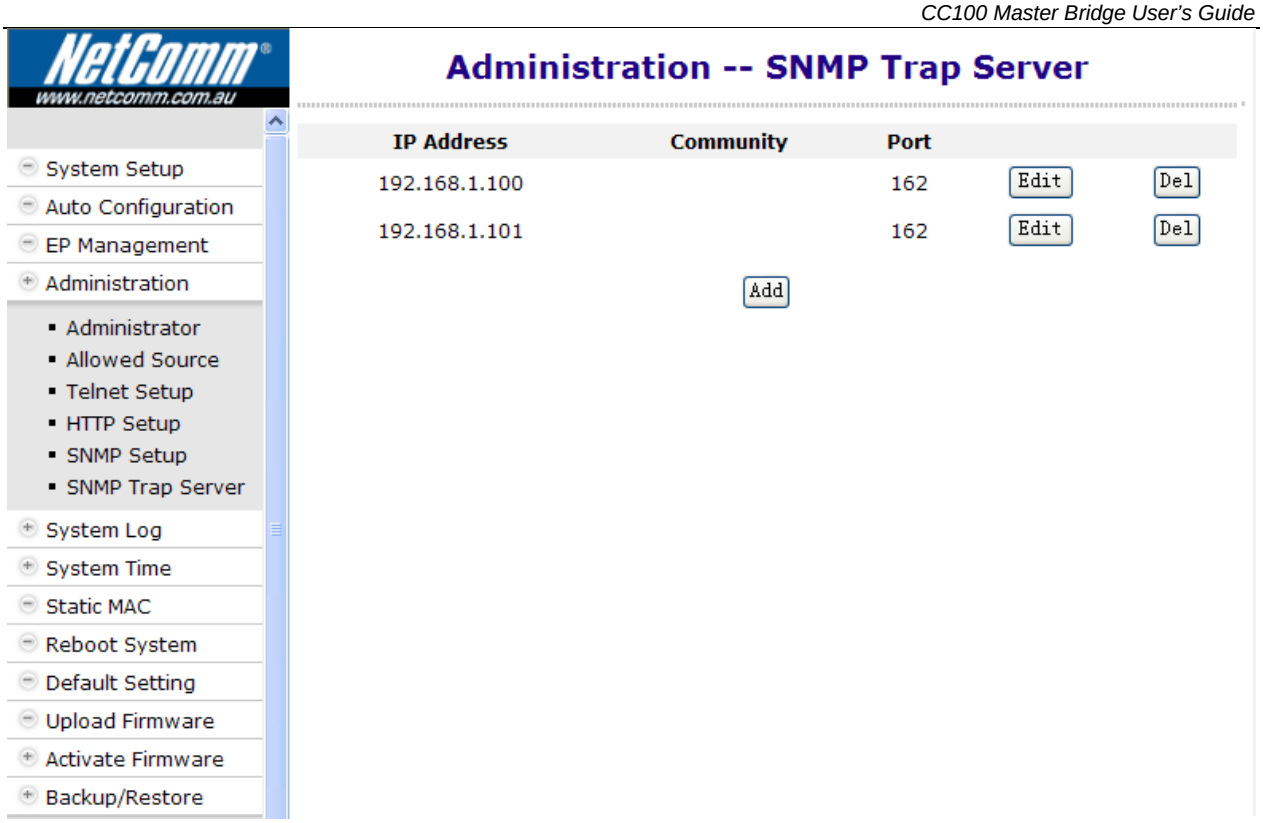

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4

ADVANCED FEATURES

This chapter describes the advanced features offered by your bridge.

QoS

Quality of Service is enforced by assigning each incoming packet with a predefined priority value. Packets with higher priority should be processed as soon as possible (fast in, fast out). In shortage of buffers, some low priority packets should be discarded to smooth the high priority traffic flow. Higher priority traffic will have higher data rate and lower possibility of being discarded.

The numbering priority value ranges from 0 to 7, and 7 represents the highest priority level. The CC100 supports priority schemes such as 802.1p, IP TOS and TCP/UDP protocol.

Priority in Upstream and Downstream

There are 4 priority queues for packets. Packets with priority value 0 or 1 go to the same queue, denoted as **Queue0**. **Queue1** has priority value 2 and 3, **Queue2** has priority value 4 and 5, and **Queue3** has priority value 6 and 7. In Total 4 levels of service are provided. **Queue3** needs to have higher "**Service Weight**', i.e. packets reside in **Queue3** will be sent out faster. Packets in **Queue0** should have larger '**Drop Ratio**' in congestion situation since it is classified as less important.

Refer to the following table for the detail mechanism to discard packets early according to their priority to prevent resources blocked by the low priority. For example, if '**Drop Ratio**' of **Queue0** is set to 75%, then CC100 will discard 50% of incoming packets toward **Queue0** if **Queue0** is one **fourth full** (Queue Utilization 25%). And will discard 75% of incoming packets toward **Queue0** if **Queue0** is **half full** (Queue Utilization 50%).

Drop Ratio / Queue Utilization	0%	25%	50%	75%
25%	0%	0%	25%	50%
50%	0%	25%	50%	75%

802.1p

Tagged packet has the 3-bit (value 0~7) 802.1p field for priority mapping. The default priority mapping scheme is usually suitable and should work for most applications--for example, to map 802.1p value 7 to priority 7, to map value 0 to priority 0, and so on. It will take effect in both downstream and upstream.

IP TOS

The bit7 to bit5 of TOS byte in IP packets is treated as TOS precedence value (0~7). By default, the CC100 uses the precedence value to map the priority queue. Please refer RFC-1349.

TCP/UDP Port Number

Different TCP or UDP port numbers usually states for different protocol. You may raise the priority for important applications with specified TCP or UDP port numbers. In the CC100, you can assign higher priority for total 8 different TCP/UDP protocols.

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A

SPECIFICATIONS

NETWORK INTERFACE

- HomePNA3.1 over Coax(HCNA) Compliant
- IEEE 802.3u 100Mbps Fast Ethernet
- IEEE 802.3 10Mbps Ethernet
- IEEE 802.3x Flow Control
- 10/100Mbps Auto-Negotiation Support
- MDI/MDX Auto-Detection Support

NETWORK MANAGEMENT

- Remote Management by HTTP / TELNET / SNMP Protocols
- Firmware and HCNA Driver are Upgradeable via HTTP or TFTP
- Enable/Disable Endpoint Service
- Subscriber Host (PC) Number Control in Endpoint
- Diagnosis of HCNA Interface
- Bandwidth Control
- 802.1Q Tag VLAN Support
- IGMP v2 Snooping Control
- Ethernet Statistics and Status

QUALITY OF SERVICE

- Priority Based on 802.1p, IP TOS and TCP/UDP Port
- Based on HomePNA Parameterized QoS

TRANMISSION POWER AND SPECTRUM

- 8 +/- 1dBm
- 12~28MHz

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TRANMISSION SPEED AND RANGE

- Up to 144Mbps
- Min Attenuation to Endpoint: 12dB
- Max Attenuation to Endpoint: 50dB (-176dBm/Hz Noise Floor)

CONNECTORS

- Ethernet LAN Port: 2 Ports, RJ45 Jack
- HCNA Port: 1 F-Type Port to HCNA Coax Network
- TV/Antenna Port: 1 F-Type Port to TV Set or from CATV/Antenna

LED INDICATOR

- Power
- Ethernet LAN Link/Activity per Port
- HCNA Link/Activity
- HCNA SyncMode
- HCNA Endpoint Diagnosis

TERMINAL DEVICES(ENDPOINT)

- Cooperate with HCNA Ethernet Bridge Endpoint (as CC101)
- Support up to 31 Endpoints

POWER REQUIREMENT

- 5V DC Input
- Power Consumption: < 6 Watts

ENVIRONMENTAL CONDITION

- Operation: 0 ℃~ 55 ℃ (32 ℉~ 131 ℉)
- Storage: -10℃ ~ 70 ℃ (14 ℉~ 158 ℉)
- Humidity: 10% ~ 95% Non-condensing

PHYSICALS

- Dimensions: 160(W) x 116(D) x 30(H) mm
- Weight: 260g

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Customer Information

ACA (Australian Communications Authority) requires you to be aware of the following information and warnings:

(1) This unit shall be connected to the Telecommunication Network through a line cord which meets the requirements of the ACA TS008 Standard.

(2) This equipment has been tested and found to comply with the Standards for C-Tick and or A-Tick as set by the ACA . These standards are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio noise and, if not installed and used in accordance with the instructions detailed within this manual, may cause interference to radio communications. However, there is no guarantee that interference will not occur with the installation of this product in your home or office. If this equipment does cause some degree of interference to radio or television reception, which can be determined by turning the equipment off and on, we encourage the user to try to correct the interference by one or more of the following measures:

- Change the direction or relocate the receiving antenna.
- Increase the separation between this equipment and the receiver.
- Connect the equipment to an alternate power outlet on a different power circuit from that to which the receiver/TV is connected.
- Consult an experienced radio/TV technician for help.

(3) The power supply that is provided with this unit is only intended for use with this product. Do not use this power supply with any other product or do not use any other power supply that is not approved for use with this product by NetComm. Failure to do so may cause damage to this product, fire or result in personal injury.

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GNU General Public License

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Product Warranty

The warranty is granted on the following conditions:

1. This warranty extends to the original purchaser (you) and is not transferable;
2. This warranty shall not apply to software programs, batteries, power supplies, cables or other accessories supplied in or with the product;
3. The customer complies with all of the terms of any relevant agreement with NetComm and any other reasonable requirements of NetComm including producing such evidence of purchase as NetComm may require;
4. The cost of transporting product to and from NetComm's nominated premises is your responsibility; and,
5. NetComm does not have any liability or responsibility under this warranty where any cost, loss, injury or damage of any kind, whether direct, indirect, consequential, incidental or otherwise arises out of events beyond NetComm's reasonable control. This includes but is not limited to: acts of God, war, riot, embargoes, acts of civil or military authorities, fire, floods, electricity outages, lightning, power surges, or shortages of materials or labour.
6. The customer is responsible for the security of their computer and network at all times. Security features may be disabled within the factory default settings. NetComm recommends that you enable these features to enhance your security.

The warranty is automatically voided if:

1. You, or someone else, use the product, or attempts to use it, other than as specified by NetComm;
2. The fault or defect in your product is the result of a voltage surge subjected to the product either by the way of power supply or communication line, whether caused by thunderstorm activity or any other cause(s);
3. The fault is the result of accidental damage or damage in transit, including but not limited to liquid spillage;
4. Your product has been used for any purposes other than that for which it is sold, or in any way other than in strict accordance with the user manual supplied;
5. Your product has been repaired or modified or attempted to be repaired or modified, other than by a qualified person at a service centre authorised by NetComm; and,
6. The serial number has been defaced or altered in any way or if the serial number plate has been removed.

Limitations of Warranty

The Trade Practices Act 1974 and corresponding State and Territory Fair Trading Acts or legalisation of another Government ("the relevant acts") in certain circumstances imply mandatory conditions and warranties which cannot be excluded. This warranty is in addition to and not in replacement for such conditions and warranties.

To the extent permitted by the Relevant Acts, in relation to your product and any other materials provided with the product ("the Goods") the liability of NetComm under the Relevant Acts is limited at the option of NetComm to:

- Replacement of the Goods; or
- Repair of the Goods; or
- Payment of the cost of replacing the Goods; or
- Payment of the cost of having the Goods repaired.

All NetComm ACN 002 490 486 products have a standard 12 months warranty from date of purchase. However some products have an extended warranty option (refer to packaging). To be eligible for the extended warranty you must supply the requested warranty information to NetComm within 30 days of the original purchase by registering on-line via the NetComm web site at

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Product Warranty

NetComm products have a standard 12 months warranty from date of purchase. However some products have an extended warranty option, via registering your product online at the NetComm website **www.netcomm.com.au**.

Technical Support

If you have any technical difficulties with your product, please refer to the support section of our website.

www.netcomm.com.au/support

Note: NetComm Technical Support for this product only covers the basic installation and features outlined in the Quick Start Guide. For further information regarding the advanced features of this product, please refer to the configuring sections in the User Guide or contact a Network Specialist.

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