



FCN-3112 Series

10/100/1000TX to 1000SX SNMP Managed Media Converter



Version 1.0

User Manual



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FCC Warning

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. It may cause harmful interference to radio communications if the equipment is not installed and used in accordance with the instructions. 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 try 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.

Caution: Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

CE Mark Warning

This is a Class-A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Ethernet Media Converters

Enterprise Grade Ethernet Media Converters

Hardware Manual

Version 1.0 (August 2018)

This manual supports the following models:

- FCN-3112SC
- FCN-3112SC-S1
- FCN-3112SC-S2
- FCN-3112WA-M
- FCN-3112WA-S1
- FCN-3112WA-S2
- FCN-3112WB-M
- FCN-3112WB-S1
- FCN-3112WB-S2

This document is the current official release manual. Please check our website (www.antaira.com) for any updated manual or contact us by e-mail (support@antaira.com)

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1. Introduction

Antaira enterprise managed media converters come with a pre-installed “user-friendly” web console interface, which allows users to easily configure and manage the units.

1.1 Product Overview

Antaira Technologies FCN-3112 series media converter is a managed, SNMP capable, multi-mode Gigabit Ethernet converter. The FCN-3112 will take 10/100/1000BaseT copper Ethernet and convert it to 1000BaseX fiber. The FCN-3112 features a standard SC fiber connector as well as the STP-RJ45 Ethernet connector. The copper media converter is fully compliant with IEEE 802.3u, 802.3ab, and 802.3z standards. The enterprise media converter features LED diagnostics for power, activity, link, and Full/Half Duplex operations.

1.2 Product Software Features

- Network Management
 - Web UI based management, SNMP
 - IEEE802.1q VLAN tagging, port-based VLAN support
- Port Configuration
 - Status, statistics

1.3 Product Hardware Features

- System Interface and Performance
 - Embedded 1*10/100/1000Tx fast Ethernet RJ45 port, and 1*1000 fixed fiber
 - Store-and-forward switching architecture
 - 1K MAC address table
- Power Input
 - External power supply: DC 5V, 1.5A 50, 60 Hz
- Operating Temperature
 - Standard operating temperature models: 0°C to 50°C
- Case/Installation
 - IP-30 protection metal housing

1.4 Package Contents

- 1– FCN-3112 series: 1010/100/1000TX to 1000SX SNMP managed media converter
- 1– Product CD
- 1– Quick Installation Guide
- 1– AC power adapter

1.5 Safety Precaution

Attention: If the DC voltage is supplied by an external circuit, please use a protection device on the power supply input.

2. Hardware Description

2.1 Physical Dimensions

Figure 2.1, below, shows the physical dimensions of Antaira's FCN-3112 series: 1010/100/1000TX to 1000SX SNMP managed media converter

(W x H x D): 71 x 94 x 26 mm (2.80 x 3.70 x 1.02 inches)

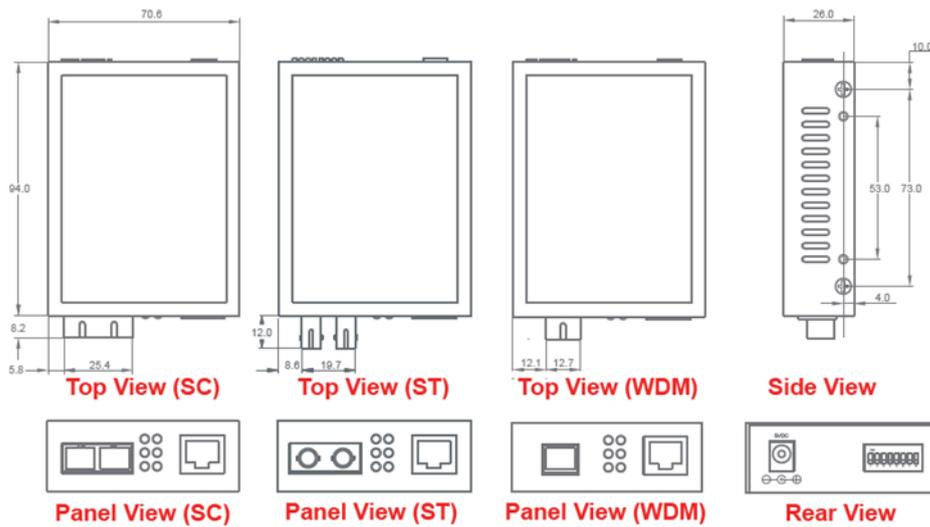
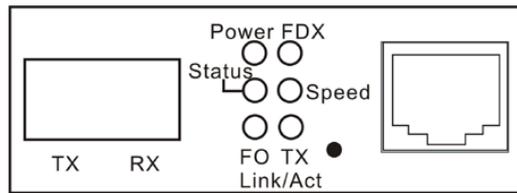


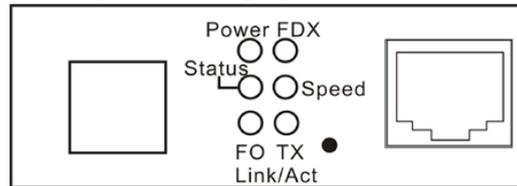
Figure 2.1
FCN-3112 Series Physical Dimensions

2.2 Front Panel

The front panel of the FCN-31112 series enterprise media converter is shown below.



Media Converter Dual-Fiber Front Panel



Media Converter Single-Fiber & SFP Front Panel

2.3 Back Panel View

Below shows the back panel of the FCN-3112 series media converter.



Back Panel View of FCN-3112 Series

2.4 LED Indicators

There are LED light indicators located on the front panel that display the power status and network status. Each LED indicator has a different color and has its own specific meaning, see below in *Table 2.1*.

LED	Color	Description	
Power	Green	On	Power is active.
		Off	Power is inactive.
FDX	Green	On	Copper connection is in full duplex.
		Off	Copper connection is not in full duplex.
Status	Amber/Green	Amber	Lit when TP or FO link is down. Blink when diagnostic testing has failed.
		Green	Lit when TP and FO link is up. Blink when Loopback test is being performed.
Speed	Amber/Green	Amber	Lit when TP works in 1000M.
		Green	Lit when TP works in 100M. Not lit when TP works in 10M or is not linked.
FO (Link/Act)	Amber/Green	Amber	Blink when fiber or copper link is down in Link Alarm Enabled mode.
		Green	Lit when fiber cable connection with the remote device is good. Blink when FO traffic is present.
TX (Link Act)	Amber/Green	Amber	Blink when fiber or copper link is down in Link Alarm enabled mode.
		Green	Lit when TX cable connection with the remote device is good. Blink when TP traffic is present.

Table 2.1 - LED Indicators for FCN-3112 Series

2.5 DIP Switches

There is a bank of DIP switches located on the back panel of the device that helps users to configure the device without the need to access the web management. There is also a reset button on the front panel. Please refer to *Table 2.2* for the functionality of these features.

Pin NO. & Button	Function	Off	On
1	TX Auto-Negotiation	Disable	Enable
2	Manual TX Data Rate 10M/100M	10M	100M
3	Manual TX Data Rate 1000M	10M or 100M	1000M
4	Flow Control	Disable	Enable
5	Fiber Auto-Negotiation	Force	Enable
6	Reserved	Always off!!!	
7	Link Alarm	Disable	Enable
8	TP Configuration	From S/W	From DIP
Diag. Button	Press once for Loopback test. Press and hold for 10 seconds to restore factory default setting.		

Table 2.2

3. Web Management

3.1 About Web-Based Management

Antaira's enterprise Ethernet media converter series is embedded with HTML web console interface that has a flash memory on the CPU board. It is a "user-friendly" design with advanced management features that allow users to manage the device from anywhere on the network through any Internet browser, such as Internet Explorer, Firefox, Chrome, and many others.

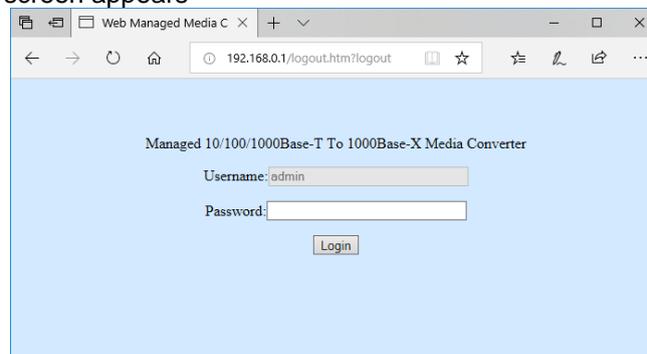
Preparing for Web Console Configuration

Antaira's FCN-3112 series media converters come with a factory default value as follows:

- Default IP Address: 192.168.0.1
- Default User Name: admin
- Default Password: "" {no password}

System Login

1. Launch any Internet browser
2. Type in factory default IP address: <http://192.168.0.1> of the switch. Press "Enter"
3. The login screen appears



4. Key in the default username: **admin** and password "" **{blank}**.
5. Click "Login", then the main (status) page of the Web Console will appear as below in *Figure 3.1*.

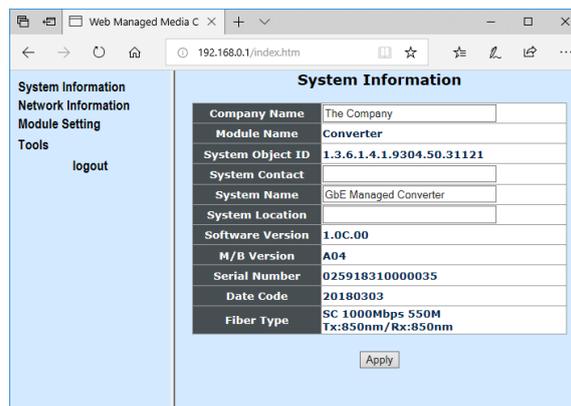


Figure 3.1 - Web Console Main (Status) Page

3.2 System Information

Below, *Figure 3.2*, shows the system setting information.

System Information	
Company Name	The Company
Module Name	Converter
System Object ID	1.3.6.1.4.1.9304.50.31121
System Contact	
System Name	GbE Managed Converter
System Location	
Software Version	1.0C.00
M/B Version	A04
Serial Number	02591831000035
Date Code	20180303
Fiber Type	SC 1000Mbps 550M Tx:850nm/Rx:850nm

Apply

Figure 3.2 – Switch Settings (Status) Page

Terms	Value Description
Company Name	Factory Default: “The Company” *Users can assign any name label to identify this managed node.
Module Name	Factory set to “Converter”
System Object ID	View-only field that shows the predefined System OID.
System Contact	Factory Default: blank. Enter contact information for this media converter.
System Name	Enter a unique name for this media converter. Use a descriptive name to identify the media converter in relation to your network, for example, “Backbone 1”. This name is mainly used for reference only.
System Location	Enter a brief description of the media converter location. The location is for reference only, for example, “13th Floor”.
Software Version	View-only field that shows the product’s firmware version.
M/B Version	View-only field that shows the main board version.
Serial Number	View-only field that shows the serial number of this media converter.
Date Code	View-only field that shows the media converter firmware date code.
Fiber Type	View-only field that shows the fiber type built into the media converter.

3.3 Network Information

Below, Figure 3.3, shows the system setting information.

The screenshot shows a web browser window with the URL 192.168.0.1/index.htm. The interface is divided into a left sidebar and a main content area. The sidebar contains links for System Information, Network Information, Module Setting, Tools, and a logout button. The main content area is titled 'Device Information' and contains three tables:

Device Information	
MAC Address	7c:cb:0d:04:06:5b
IP Address	192.168.0.1
Gateway	192.168.0.254
Subnet Mask	255.255.255.0
Description	Media Converter

Port Status		
Ports	TP	FX
Signal detect(SD)	Detected	No
Link status	On	Down
Speed	1000M	
Duplex mode	Full	
Flow control	Disable	Disable
Auto negotiation	Enable	

SFP Status		
Temperature	--	(C)
Voltage	--	(V)
TX Bias	--	(mA)
TX Power	--	(dBm)
RX Power	--	(dBm)

Figure 3.3 – Switch Settings Description

Device Information

Terms	Description
MAC Address	View-only field that shows the MAC address of this media converter. You cannot change MAC address of this media converter.
IP Address	View-only field that shows the IP address of this media converter. You can change the IP address to the desired one in Network Configuration under the Module Setting Menu.
Gateway	View-only field that shows the Gateway address of this media converter. You can change the Gateway address to the desired one in Network Configuration under the Module Setting Menu.
Subnet Mask	View-only field that shows the Subnet Mask of this media converter. You can change the Subnet Mask to the desired one in Network Configuration under the Module Setting Menu.
Description	View-only field that shows the description you indicate. You can change the description in Network Configuration under the Module Setting Menu.

Port Status

Terms	Description
Signal Detect	View-only field that shows whether the signal TP and FX is detected or not.
Link Status	View-only field that shows the link status of TP and FX. If the link is up, "On" will be shown.
Speed	View-only field that shows the current speed of TP and FX.
Duplex Mode	View-only field that shows whether TP and FX are in full-duplex or half-duplex mode.
Flow Control	View-only field that shows whether TP and FX's flow control function is enabled or not.
Auto Negotiation	View-only field that shows whether TP and FX's auto negotiation function is enabled or not.

SFP Status

Terms	Description
Temperature	View-only field that shows the slide-in SFP module operation temperature.
Voltage	View-only field that shows the slide-in SFP module operation voltage.
TX Power (dbm)	View-only field that shows the slide-in SFP module optical transmission power.
RX Power (dbm)	View-only field that shows the slide-in SFP module optical receiver power.

3.4 Module Setting

Select Module Setting and then the following screen appears.

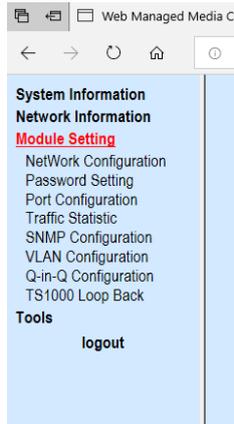
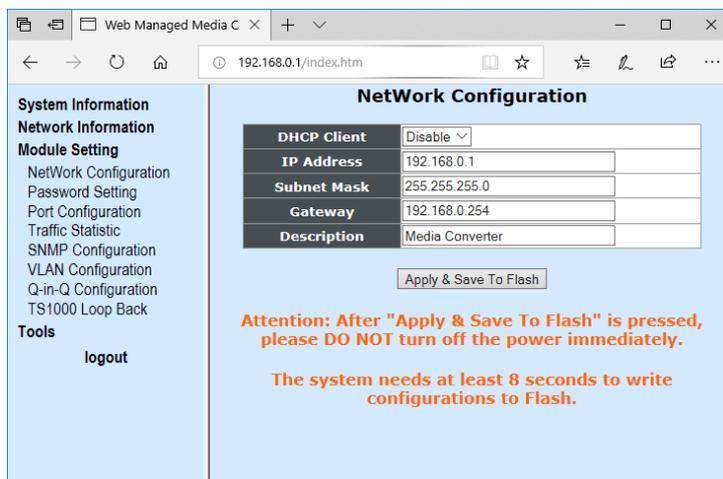


Figure 3.4 – IP Setting Information

Terms	Value Description
Network Configuration	To enable or disable DHCP function and specify the desired IP address, subnet mask, gateway, and description.
Password Setting	Set up a new password for website access.
Port Configuration	Specify ports' speed, duplex mode, ingress rate limit and egress rate limit, and enable or disable flow control function.
Traffic Statistics	Display traffic statistics information of this Media Converter.
SNMP Configuration	To enable or disable SNMP and Trap function.
VLAN Configuration	To enable or disable VLAN mode. If "enabled", the user can further specify ports' VLAN Group and egress link type.
Q-in-Q Configuration	To enable or disable Q-in-Q. If "enabled", the user can further specify tag protocol identifier (TPID) and Q-in-Q direction.
TS 1000 Loop Back	Run a loopback test.

3.4.1 Network Configuration

Select "Network Configuration" from Module Setting menu, then the following screen appears.



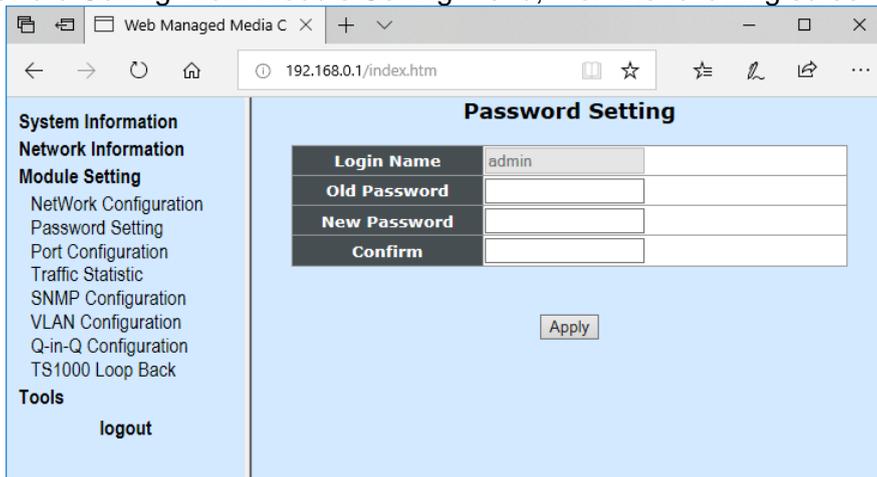
Terms	Value Description
DHCP Client	To enable or disable DHCP function. When "Enabled", the IP address will

	be automatically assigned from DHCP Server. When “Disabled”, you need to specify the media converter’s IP address, subnet mask, and gateway.
IP Address	When DHCP is disabled, you can specify your desired IP address.
Subnet Mask	When DHCP is disabled, you can specify your desired subnet mask.
Gateway	When DHCP is disabled, you can specify your gateway address.
Description	Specify a name or give a brief description to this media converter.

NOTE: When DHCP is enabled and “Apply & Save to Flash” is clicked, the web management connection will be terminated immediately. However, please wait at least 8 seconds to let the converter write configurations to Flash before powering down. If the converter is powered down immediately after “Apply & Save to Flash” is clicked, this might result in Flash crashes.

3.4.2 Password Setting

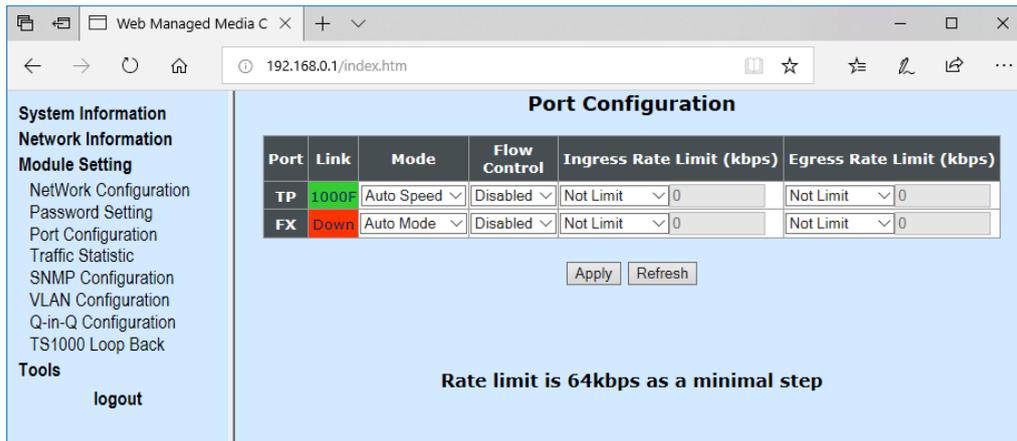
Select “Password Setting” from Module Setting menu, then the following screen appears.



Terms	Value Description
Login Name	View-only filed. This default login name cannot be changed.
Old Password	Type in your old password.
New Password	Type in your new password.
Confirm	Re-type your new password to confirm.

3.4.3 Port Configuration

Select “Port Configuration” from Module Setting menu, then the following screen appears.



Terms	Value Description
Port	There are two kinds of ports in this media converter: TP and FX.
Link	This shows the current link status of TP and FX port. When down, it displays “Down”. When connected, it displays the current speed and mode.
Mode	Select the desired speed and/or duplex mode. For TP port, there are six options available from the pull-down menu, these are “Auto Speed”, “1000 Full”, “100 Full”, “100 Half”, “10 Full”, and “10 Half”. For FX port, “Auto mode” and “Force mode” are available.
Flow Control	To enable or disable flow control function.
Ingress Rate Limit (kbps)	Select the ingress rate limit from the pull-down menu. “Not Limit” indicates “0” kbps. If you want to specify your own rate limit, you can select “User Setting” and then state your desired rate limit in the corresponding space.
Egress Rate Limit (kbps)	Select the egress rate limit from the pull-down menu. “Not Limit” indicates “0” kbps. If you want to specify your own rate limit, you can select “User Setting” and then state your desired rate limit in the corresponding space.

NOTE: When DIP 8 (on the Rear Panel of the media converter) is set to “ON” (which means that Mode and Flow Control will be set according to configurations in DIP Switch), you cannot change TP and FX’s Mode and Flow Control in Web Management. On the other hand, when DIP 8 is set to “OFF” (which means that Mode and Flow Control will be set according to configurations in Web Management), DIP 1~5 setting (set to “ON”) will be ignored.

3.4.4 Traffic Statistic

Select “Traffic Statistics” from Module Setting menu, then the following screen appears.

Traffic Statistic

(The following counter means the port received number)

Port	TP	FX	CPU
Total Bytes	1439164	64	331470
Total Pkts	10702	1	516
Total Error Pkts	0	0	0
Unicast Pkts	812	0	490
Multicast Pkts	5802	0	0
Broadcast Pkts	4088	1	26
64	588	1	254
65-127	8632	0	7
128-255	722	0	20
256-511	78	0	12
512-1023	682	0	17
1024-1518	0	0	206
Undersize Pkts	0	0	0
Oversize Pkts	0	0	0
Fragments	0	0	0
CRC Errors	0	0	0
Jabbers	0	0	0
Drop Events	0	0	0
Pause Frames	0	0	0

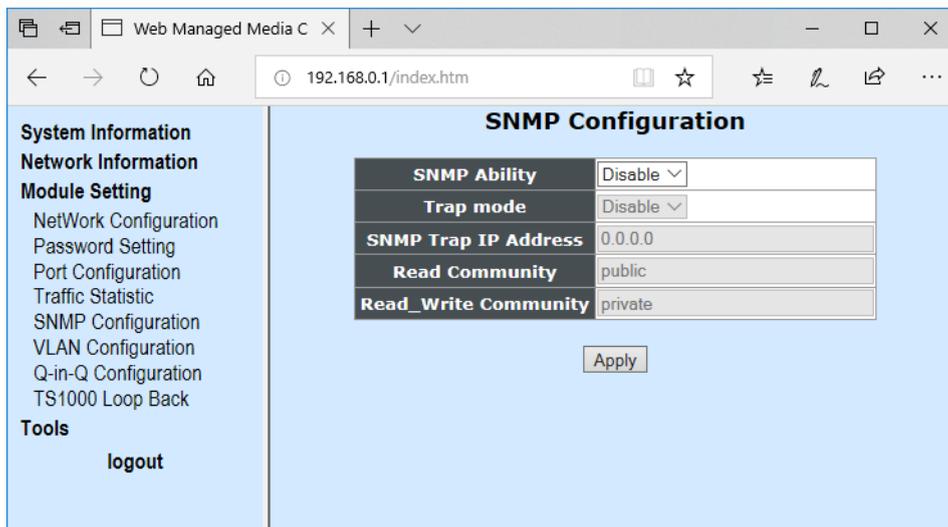
Clear Refresh

Terms	Value Description
Total Bytes	View-only field that shows the number of received frames on each port.
Total Pkts.	View-only field that shows the number of total packets received on each port.
Total Error Pkts.	View-only field that shows the number of total error packets received on each port.
Unicast Pkts.	View-only field that shows the number of unicast packets received.
Multicast Pkts.	View-only field that shows the number of multicast packets received.
Broadcast Pkts	View-only field that shows the number of broadcast packets received.
64	View-only field that shows the number of 64byte packets received on each port.
65-127	View-only field that shows the number of packets between 65 and 127 bytes received on each port.
128-288	View-only field that shows the number of packets between 128 and 288 bytes received on each port.
256-511	View-only field that shows the number of packets between 256 and 511 bytes received on each port.
512-1023	View-only field that shows the number of packets between 512 and 1023 bytes received on each port.
1024-1518	View-only field that shows the number of packets between 1024 and 1518 bytes received on each port.
Undersize Pkts.	View-only field that shows the number of undersized packets (smaller than 64 bytes) received on each port.
Oversize Pkts.	View-only field that shows the number of untagged packets greater than 1518 bytes and tagged packets greater than 1522 bytes received on each port.
Fragments	View-only field that shows the number of packets that are less than 64 bytes

	(excluding framing bits) and have either an FCS error or an alignment error.
CRC Errors	View-only field that shows messages of CRC (cyclic redundancy check) data errors.
Jabbers	View-only field that shows the number of packets that are longer than 1522 bytes and have either an FCS error or an alignment error.
Drop Events	View-only field that shows the number of dropped events received on each port.
Pause Frames	View-only field that shows the number of pause frames received on each port.

3.4.5 SNMP Configuration

Select “SNMP Configuration” from Module Setting menu, then the following screen appears.



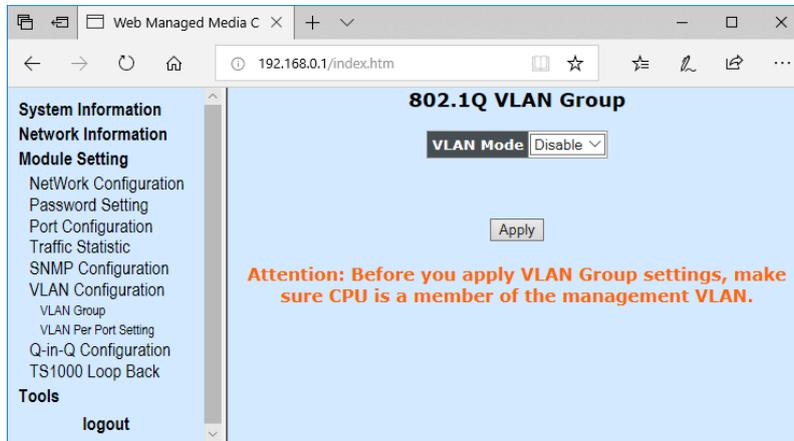
Terms	Value Description
SNMP Ability	To enable or disable SNMP.
Trap Mode	To enable or disable trap mode. When enabled, a trap will be sent when the following events occur: <ul style="list-style-type: none"> • Cold Start: When the media converter operates cold start, a trap notice will be sent. • Power Down: When the media converter is powered down, a trap notice will be sent. • Link Up: When TP or FX link is established, a trap notice will be sent. • Link Down: When TP or FX link is disconnected, a trap notice will be sent.
SNMP Trap IP Address	Specify the IP address to which the trap will be sent.
Read Community	Specify a username for SNMP login, up to 31 characters. This allows users to read only.
Read_Write Community	Specify a username for SNMP login, up to 31 characters. This allows users to read and make some setting changes.

3.4.6 VLAN Configuration

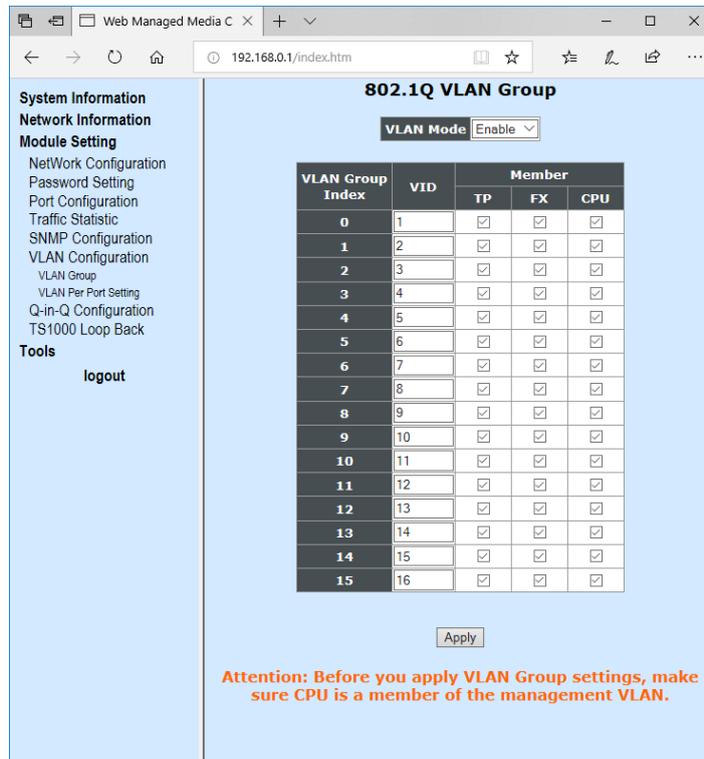
Please see Appendix A for important VLAN definitions.

3.4.6.1 VLAN Group

To enable or disable VLAN Mode. When enabled, you can further indicate a VID to the selected ports. Select “VLAN Group”, then the following screen appears.



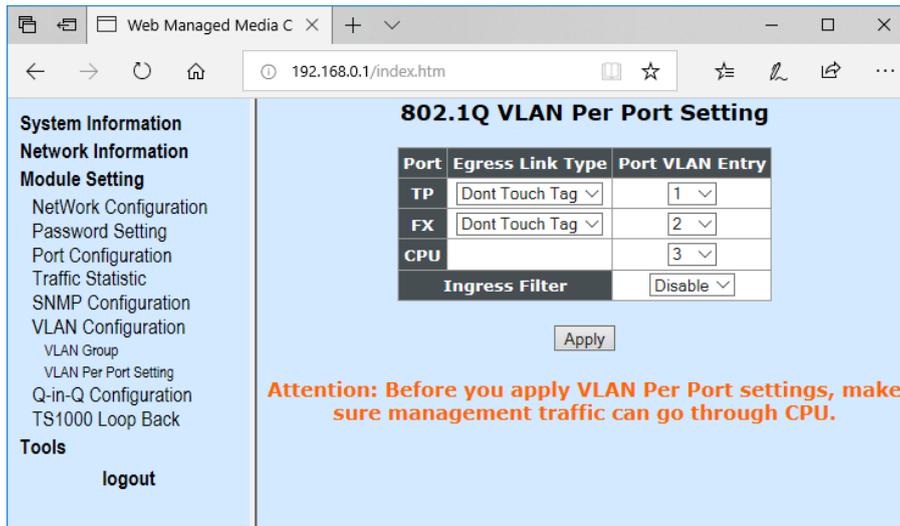
VLAN Mode: To enable or disable VLAN Mode. When “enable” is selected, the following screen will appear to allow you to further indicate a VID to the selected ports.



Terms	Value Description
VLAN Group	There are 16 VLAN Groups available from 0 to 15.
VID	Specify a VID (1~4094) to each VLAN Group.
Member	Check the TP, FX, or CPU box in each VLAN Group to enable them to carry the same VID and belong to the same VLAN Group.

3.4.6.2 VLAN per Port Setting

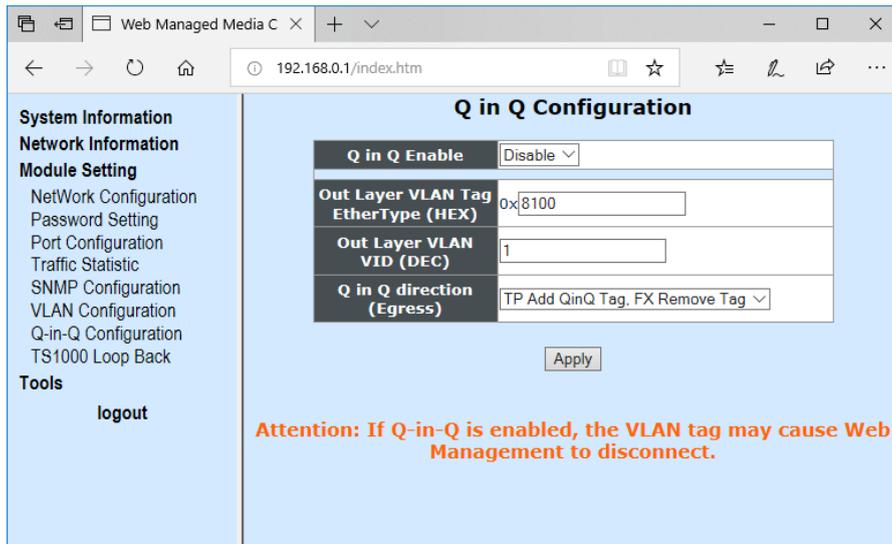
To set up each port's egress link type and VID select "VLAN Per Port Setting". The following screen appears.



Terms	Value Description
Port	This column indicates the ports available. These are TP, FX, and CPU.
Egress Link Type	Select the needed egress link type from the pull-down menu. Please note that when Q-in-Q is enabled, settings in Egress Link Type will be disabled.
Replace Tag	This will change the VID of packets to the specified one.
Remove Tag	This will remove packets' VID.
Add Tag	This will add the specified VID to packets.
Don't Touch Tag	This will keep packets intact.
Port VLAN Entry	Select each port's corresponding VLAN Group from the pull-down menu. When you specify "Add Tag" as Egress Link Type, the tag selected here will be added to the packet.
Ingress Filter	To enable or disable ingress filter.

3.4.7 Q-in-Q Configuration

Select “Q-in-Q Configuration” from Module Setting menu, then the following screen appears.



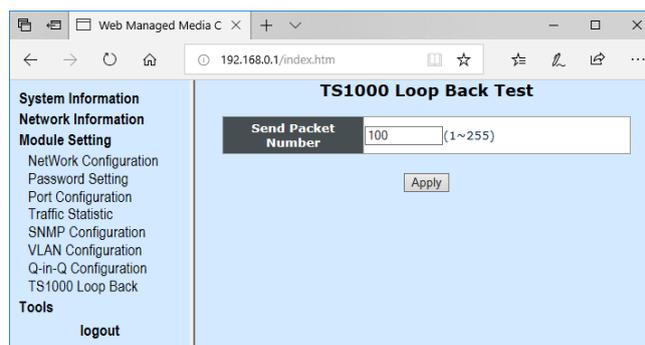
Terms	Value Description
Q in Q Enable	To enable or disable Q-in-Q function. When Q-in-Q is enabled, settings in Egress Link Type will be disabled.
Out Layer VLAN Tag EtherType (HEX)	Specify the tag protocol identifier (TPID) value of VLAN tags.
Out Layer VLAN VID (DEC)	Specify the VID (1~4094).
Q in Q Direction	Select Q-in-Q direction from the pull-down menu.
•TP Add Q in Q Tag, FX Remove Tag	TP port inserts a Q-in-Q tag and FX port removes a Q-in-Q tag.
•FX Add Q in Q Tag, TP Remove Tag	FX port inserts a Q-in-Q tag and FX port removes a Q-in-Q tag.

NOTE: When traffic is untagged and Q-in-Q is enabled with proper settings, the traffic will be forwarded out with only one tag (Out Layer VLAN VID).

See Appendix B for examples.

3.4.8 TS1000 Loop Back

Select “Loopback Test” from Module Setting menu, then the following screen appears.

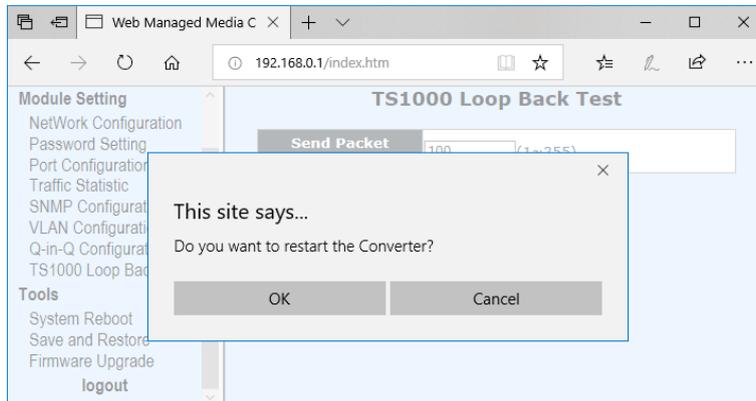


Terms	Value Description
Send Packet Number	Specify the number of packets for loopback test. By default, the number of packets sent is 100.

3.5 Tools

3.5.1 System Reboot

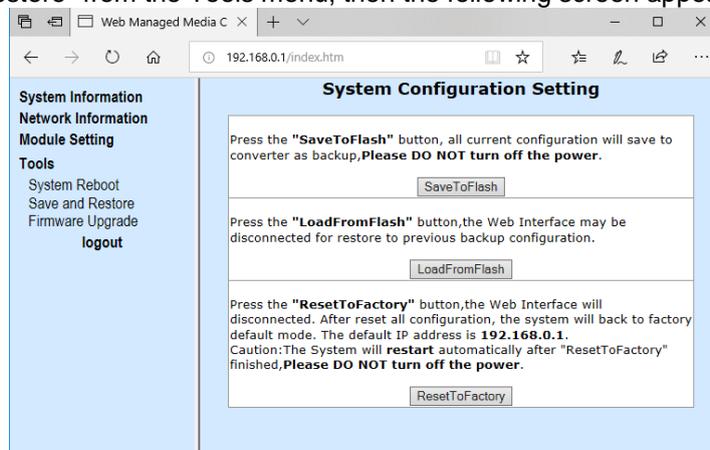
Select “System Reboot” from Tools menu, then the following screen appears.



Select “OK” to restart the converter or “Cancel” to continue without restarting.

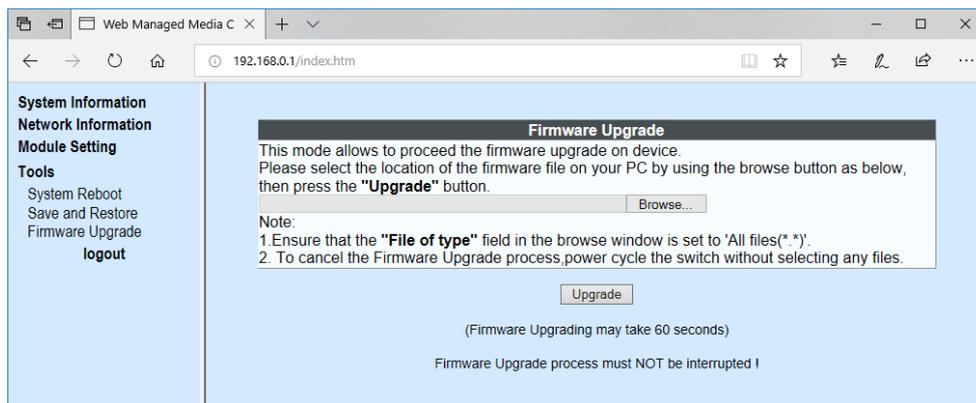
3.5.2 Save and Restore

Select “Save and Restore” from the Tools menu, then the following screen appears.



3.5.3 Firmware Upgrade

Select “Firmware Upgrade”, then the following screen page appears.



4. Maintenance and Service

- If the device requires servicing of any kind, the user is required to disconnect and remove it from its mounting. The initial installation should be done in a way that makes this as convenient as possible.
- Voltage/power lines should be properly insulated as well as other cables. Be careful when handling them so as to not trip over.
- Do not under any circumstance insert foreign objects of any kind into the heat dissipation holes located in the different faces of the device. This may not only harm the internal layout, but might cause harm to user as well.
- Do not under any circumstance open the device for any reason. Please contact your dealer for any repair needed or follow the instructions within the manual.
- Clean the device with dry soft cloth.

5. Technical Specifications

The following technical specifications are for Antaira's FCN-3112 series enterprise Ethernet media converter

Technical Specifications

Approvals	FCC Class A, CE
Dimensions	71 x 97 x 26 mm (2.80 x 3.82 x 1.02 inches)
Ethernet	10/100/1000BaseT: 1 x RJ45 Port
Fiber	1000BaseX: 1 x SC Port
Humidity	5% ~ 90% non-condensing
IEEE	IEEE 802.3 10BaseT IEEE 802.3u 100BaseTX IEEE 802.3ab 1000BaseT IEEE 802.3z 1000BaseX IEEE 802.3x Flow Control
LED	Power, FDX, Status, Speed, FO Link/ACT, TX Link/ACT
Mac Address Table	1 K
Memory Buffer	256Kb
Operating Temperature	0° ~ 50°C
Power	DC 5V, 1.5A 50, 60 Hz
Power Consumption	3.4 W
Storage Temperature	-20° ~ 60°C
Warranty	5 Years
Weight	0.6 Kg

6. Appendix A

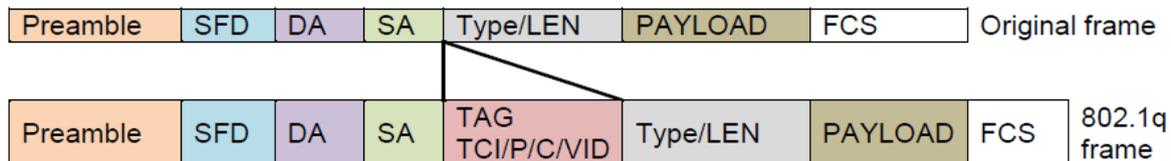
A Virtual Local Area Network (VLAN) is a network topology configured according to a logical scheme rather than the physical layout. VLAN can be used to combine any collections of LAN segments into a group that appears as a single LAN. VLAN also logically segments the network into different broadcast domains. All broadcast, multicast, and unknown packets entering the converter on a particular VLAN will only be forwarded to the stations or ports that are members of that VLAN.

VLAN can enhance performance by conserving bandwidth and improve security by limiting traffic to specific domains. A VLAN is a collection of end nodes grouped by logics instead of physical locations. End nodes that frequently communicate with each other are assigned to the same VLAN, no matter where they are physically located on the network. Another benefit of VLAN is that you can change the network topology without physically moving stations or changing cable connections. Stations can be 'moved' to another VLAN and thus communicate with its members and share its resources, simply by changing the port VLAN settings from one VLAN to another. This allows VLAN to accommodate network moves, changes and additions with the greatest flexibility.

802.1Q VLAN Concept

Port-based VLAN is simple to implement and use, but it cannot be deployed across a network containing several switches. The 802.1Q protocol was developed in order to provide the solution. By tagging VLAN membership information to Ethernet frames, the IEEE 802.1Q can help network administrators break large networks into smaller segments so that broadcast and multicast traffic will not occupy too much available bandwidth as well as provide a higher-level security between segments of internal networks.

Introduction to 802.1Q frame format:



PRE	Preamble	62 bits	Used to synchronize traffic
SFD	Start Frame Delimiter	2 bits	Marks the beginning of the header
DA	Destination Address	6 bytes	The MAC address of the destination
SA	Source Address	6 bytes	The MAC address of the source
TCI	Tag Control Info	2 bytes	Set to 8100 for 802.1p and Q tags
P	Priority	3 bits	Indicates 802.1p priority level 0-7
C	Canonical Indicator	1 bit	Indicates if the MAC addresses are in Canonical format - Ethernet set to "0"
VID	VLAN Identifier	12 bits	Indicates the VLAN (0-4095)
T/L	Type/Length Field	2 bytes	Ethernet II "type" or 802.3 "length"
	Payload < or = 1500 bytes	User data	
FCS	Frame Check Sequence	4 bytes	Cyclical Redundancy Check

Important VLAN Concepts for Configuration

There are two key concepts to understand.

1. The Default Port VLAN ID (**PVID**) specifies the VID that will be assigned to the untagged traffic entering that port.
2. The VLAN ID (**VID**) specifies the set of VLANs that a given port is allowed to receive and send.

Both variables can be assigned to a port, but there are significant differences between them. Administrators can only assign one PVID to each port (since the 802.1Q protocol assigns any single packet to just one VLAN). The PVID defines the default VLAN ID tag that will be added to un-tagged

frames entering that port (ingress traffic). On the other hand, a port can be defined as a member of multiple VLAN (multiple VID). These VID's constitute an access list for the port. The access list can be used to filter tagged ingress traffic (the converter will drop a tagged packet if that tagged packet does not have a VID that belong to the set of VID's assigned to that port). The converter also consults the access list to filter packets it sends to that port (egress traffic). Packets will not be forwarded unless the VID associated with that packet belongs to the set of VID's assigned to that port.

The differences between Ingress and Egress configurations can provide network segmentation. Moreover, they allow resources to be shared across more than one VLAN.

Important VLAN Definitions

Ingress

The point at which a frame is received on a port and the decisions must be made. The converter examines the VID (if present) in the received frames header and decides whether or not and where to forward the frame. If the received frame is untagged, the converter will tag the frame with the PVID for the port on which it was received. It will then use traditional Ethernet bridging algorithms to determine the port to which the packet should be forwarded.

Next, it checks to see if each destination port is on the same VLAN as the PVID and thus can transmit the frame. If the destination port is a member of the VLAN used by the ingress port, the frame will be forwarded. If the received frame is tagged with VLAN information, the converter checks its address table to see whether the destination port is a member of the same VLAN. Assuming both ports are members of the tagged VLAN, the frame will be forwarded.

Ingress Filtering

The process of checking an incoming frame and comparing its VID with the ingress port VLAN membership is known as Ingress Filtering.

On the media converter, it can be either enabled or disabled.

1. When an untagged frame is received, the ingress port PVID will be applied to the frame.
2. When a tagged frame is received, the VID in the frame tag is used.

When Ingress Filtering is "enabled", the media converter will first determine.

1. If the ingress port itself is a member of the frame VLAN, it will receive the frame.
2. If the ingress port is not a member of the frame VLAN, the frame will be dropped.
3. If it is a member of that VLAN, the media converter then checks its address table to see whether the destination port is a member of the same VLAN. Assuming both ports are members of that VLAN, the frame will be forwarded.

Administrators should make sure that each port's PVID is set up; otherwise, incoming frames may be dropped if Ingress Filtering is enabled. On the other hand, when Ingress Filtering is disabled, the media converter will not compare the incoming frame VID with the ingress port VLAN membership. It will only check its address table to see whether the destination VLAN exists.

1. If the VLAN is unknown, it will be broadcasted.
2. If the VLAN and the destination MAC address are known, the frame will be forwarded.
3. If the VLAN is known and the destination MAC address is unknown, the frame will be flooded to all ports in the VLAN.

Tagging

Every port on an 802.1Q compliant converter can be configured as tagging or un-tagging. Ports with tagging Enabled will put the VID number, priority and other VLAN information into the header of all packets that flow into and out of it. If a packet has been tagged previously, the port will not alter the

packet and keep the VLAN information intact. The VLAN information in the tag can then be used by other 802.1Q compliant devices on the network to make packet forwarding decisions.

Un-tagging

Ports with un-tagging Enabled will strip the 802.1Q tag from all packets that flow into and out of those ports. If the packet does not have an 802.1Q VLAN tag, the port will not alter the packet. Thus, all packets received by and forwarded by an un-tagging port will have no 802.1Q VLAN information. Un-tagging is used to send packets from an 802.1Q-compliant network device to a non-compliant network device. Simply put, un-tagging means that once you set up the port as “U” (untagged), all egress packets (in the same VLAN group) from the port will have no tags.

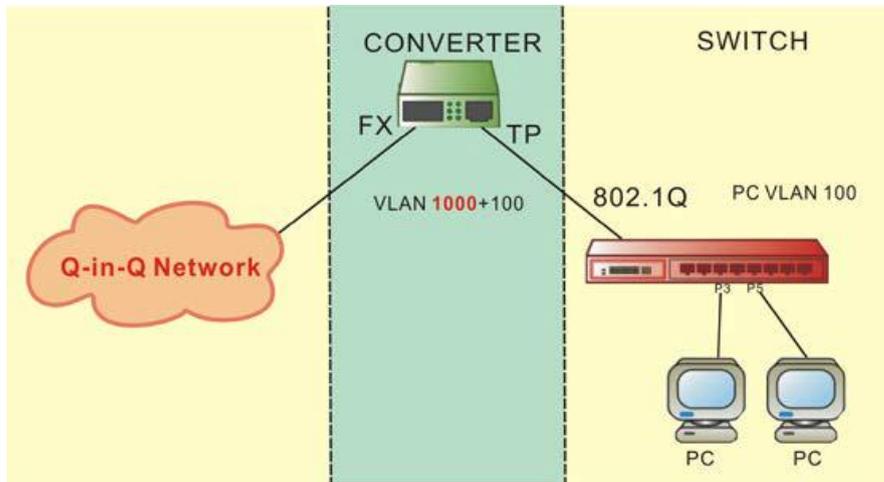
7. Appendix B

Q-in-Q examples:

In this section, two example figures are provided to explain the VLAN and Q-in-Q configurations.

Application Example 1:

As illustrated below, TP port is connected to the customer device that has incoming traffic with VLAN 100. If you want traffic forwarded out FX port to be added with a double tag 1000, then follow the steps below to accomplish the process.



VLAN Group

System Information

Network Information

Module Setting

- NetWork Configuration
- Password Setting
- Port Configuration
- Traffic Statistic
- SNMP Configuration
- VLAN Configuration
 - VLAN Group
 - VLAN Per Port Setting
 - Q-in-Q Configuration
 - TS1000 Loop Back
 - 802.3ah Function

Tools

logout

802.1Q VLAN Group

VLAN Mode Enable

VLAN Group	VID	Member		
		TP	FX	CPU
0	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	1000	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
8	9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
9	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
10	11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
11	12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
12	13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
13	14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
14	15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
15	16	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Apply

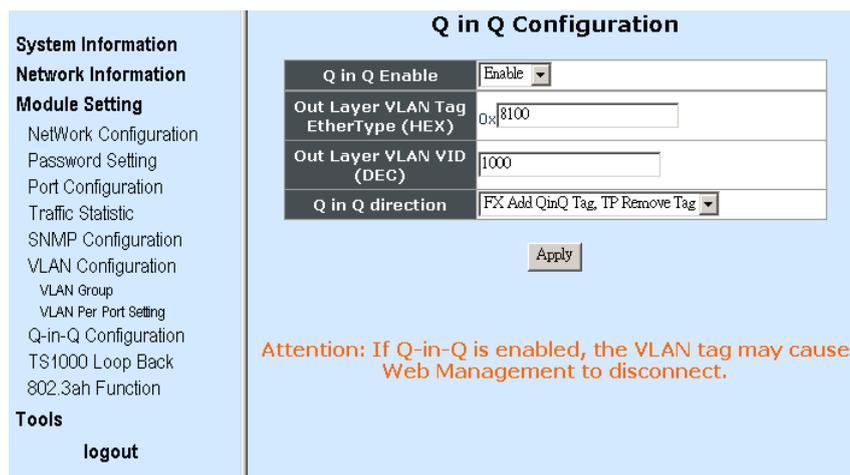
1. By default, VLAN mode is disabled. Make sure you enable VLAN mode before carrying on the following steps.

2. Specify VID 100 and 1000 in VLAN Group 1 and 2 respectively. Select TP, FX, and CPU as member ports in VLAN Group 1 and 2 (when CPU is selected as a member, the VLAN becomes management VLAN.).
3. Click “Apply” to make settings effective.

VLAN Per Port Setting

1. Check whether Q-in-Q is enabled. When enabled, settings in Egress Link Type will be disabled. In this example, Q-in-Q is enabled; thus, this decision ignores Egress Link Type settings.
2. Check whether you have set up 802.1Q VLAN Group Table. When incoming traffic is with a tag, the forwarding process will be executed according to settings in 802.1Q VLAN Group Table. In this example, 802.1Q VLAN Group Table has already set up.

Q-in-Q Configuration



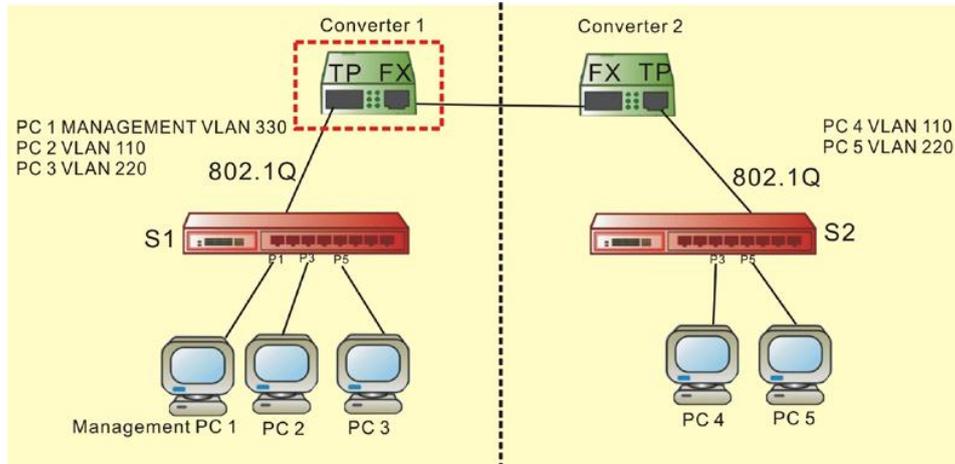
Q in Q Configuration	
Q in Q Enable	Enable
Out Layer VLAN Tag EtherType (HEX)	0x8100
Out Layer VLAN VID (DEC)	1000
Q in Q direction	FX Add QinQ Tag, TP Remove Tag

Attention: If Q-in-Q is enabled, the VLAN tag may cause Web Management to disconnect.

1. By default, Q-in-Q is disabled. Make sure Q-in-Q is enabled before applying the settings.
2. Enter the TPID to identify the frame as the IEEE 802.1Q-tagged frame. The value is usually set to 8100. However, you can also enter the TPID (such as 88A8, 9100) that is suitable for your networking environment.
3. Enter the outer VLAN ID. In this example, the outer VLAN ID is 1000.
4. Decide to add a double tag to or remove a double tag from egress traffic. In this example, “FX Add QinQ Tag, TP remove Tag” is selected to accomplish the process of the provided scenario (Egress traffic from FX port has already had a tag with VID 100. The other tag with VID 1000 will also be added).

Application Example 2:

In this backbone scenario, suppose two stand-alone converters are used to extend the distance up to 80KM (depending on the models used). On the left-hand side, PC1 is the management PC that can manage the “Converter 1” remotely via the TP port. PC2 and PC4 are in the same VLAN 110 and should be able to communicate with each other. PC3 and PC5 are also in the same VLAN 220 and should be able to communicate with each other. To allow management and data traffic to flow to and from the converter in this scenario, the following steps to configure “Converter 1” are suggested.



802.1Q VLAN Group

System Information

Network Information

Module Setting

- NetWork Configuration
- Password Setting
- Port Configuration
- Traffic Statistic
- SNMP Configuration
- VLAN Configuration

802.1Q VLAN Group

VLAN Mode Enable

VLAN Group	VID	Member		
		TP	FX	CPU
0	110	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1	220	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	330	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

1. By default, VLAN mode is disabled. Make sure you enable VLAN mode before carrying on the following steps.
2. Specify VID 110, 220, 330 in VLAN Group 0, 1, 2 respectively. Select TP and FX in VLAN Group 0 and 1 and select TP and CPU in VLAN Group 2 (when CPU is selected as a member, the VLAN becomes management VLAN.).
3. Click “Apply” to make settings effective.

802.1Q VLAN Per Port Setting

System Information

Network Information

Module Setting

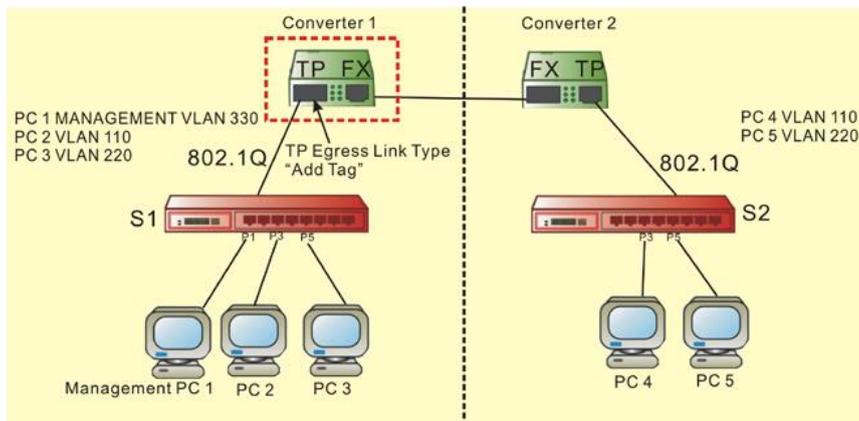
- NetWork Configuration
- Password Setting
- Port Configuration
- Traffic Statistic
- SNMP Configuration
- VLAN Configuration
 - VLAN Group
 - VLAN Per Port Setting
 - Q-in-Q Configuration
 - TS1000 Loop Back
- Tools**
- logout

802.1Q VLAN Per Port Setting

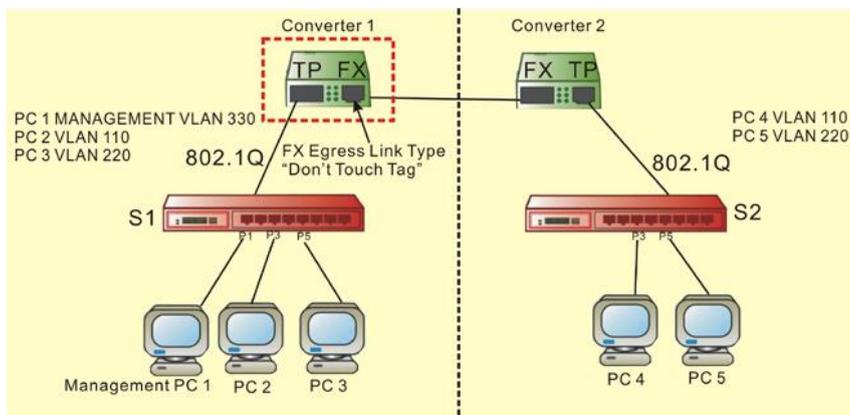
Port	Egress Link Type	Port VLAN Entry
TP	Add Tag	2
FX	Don't Touch Tag	1
CPU		2
Ingress Filter		Disable

Attention: Before you apply VLAN Per Port settings, make sure management traffic can go through CPU.

- Set TP port's Egress Link Type to "Add Tag" and select VLAN Group 2 (330). When Management PC1 sends out a frame, the converter will remove VLAN tag 330 within a frame. To ensure the link will not be disconnected due to the lack of the appropriate tag, TP port's Egress traffic should be added a tag 330.



- Set FX port's Egress Link Type to "Don't Touch Tag". When PC2 wants to send a frame to PC4, the converter will forward it out of the FX port directly based on settings in "802.1Q VLAN Group".



- Select "VLAN Group 2" as CPU's Port VLAN Entry setting.

Antaira Customer Service and Support

(Antaira US Headquarter) + 844-268-2472

(Antaira Europe Office) + 48-22-862-88-81

(Antaira Asia Office) + 886-2-2218-9733

Please report any problems to Antaira:

www.antaira.com / support@antaira.com

www.antaira.eu / info@antaira.eu

www.antaira.com.tw / info@antaira.com.tw

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