METALINK
Broadband

WLANPlus

Evaluation Kit User Guide

MODEL: MtW_RGPlus_5.0_VB_001

Revision 2.3.5

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Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B 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 try to correct the interference by one 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment.

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.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.

This device is going to be operated in 5.15~5.25GHz frequency range, it is restricted in indoor environment only.

IMPORTANT NOTE:
FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Acronyms and Glossary Terms

Acronyms and glossary terms that frequently appear in Metalink documentation include:

Acronyms and Glossary Terms

Term	Description
ACL	Access Control List.
AP	Access Point.
BPF	Band Pass Filter.
BSS	The Basic Service Set (BSS) is the basic building block of a wireless LAN. Coverage of one access point is called a BSS. An access point acts as a master to control the stations within that BSS. Each BSS is identified by an SSID.
CB	Channel Bonding.
CLI	Command Line Interface.
ERP	Extended Rate Policy.
ESSID	Extended Service Set Identifier.
DUT	Device Under Test.
IOCTLS	Input/output controls - typically employed to allow userspace code to communicate with hardware devices.
LDPC	Low-Density Parity-Check code (LDPC code) - An error correcting code. A method of transmitting a message over a noisy transmission channel.
MIMO	Multiple-Input and Multiple-Output - The use of multiple antennas at both the transmitter and receiver to improve communication performance. One of several forms of smart antenna technology.
mPCI	Mini PCI - A bus standard for attaching peripherals to a motherboard. Adapted from the Peripheral Component Interconnect (PCI) bus. Originally designed for laptops and other small-footprint computer systems.
nCB	Non-Channel Bonding.
Multicast	The delivery of information to a group of destinations simultaneously using the most efficient strategy to deliver the messages over each link of the network only once, creating copies only when the links to the destinations split.
NFS	Linux's "Network File System" - A way to share files between machines on a network as if the files were located on the client's local hard drive.
NWID	Network Identification Designator.
OCS	Optimal Channel Selection.
PBC	Push Button Configuration.
RFIC	RF Integrated Circuit.

Term	Description
RSSI	Received Signal Strength Indication - a measurement of the power present in a received radio signal.
SISO	Single Input Single Output.
STA	Infrastructure Station.
UUID	Universally Unique Identifier.
WEP	Wired Equivalent Privacy - The original security protocol for Wi-Fi networks.
WPA	Wi-Fi Protected Access - A security protocol for Wi-Fi networks which provides stronger security than WEP via enhanced encryption and user authentication.
WPS	Wi-Fi Protected Setup - A protocol designed to make it easier to set up and configure security on Wi-Fi networks.

Revision History

Revision 2.3.5 includes updates for release of software v2.3.5

- Added MAC filtering section (page 37)
- Restore Defaults section expanded into two separate sections:
  - Restore Defaults (AP (page 50)
  - Restore Defaults (Station (page 51)
- Added Firmware section (page 52)

Revision 2.3

- Restructured document and made many minor fixes

Revision 2.2

- Adaptation for release of v2.2

Revision 2.1

- Updated for new software release

Revision 1.1

- Dongle 2.0 updates
- CLI screens Update
- Wireless settings update

Revision 1.0

- Initial release of this user guide

1. Introduction to the WLANPlus Evaluation Kit

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1.1 General Overview

WLANPlus™ is an advanced wireless technology for distributing multimedia content throughout the home. WLANPlus incorporates different techniques to obtain the required breakthrough rate and reach while supporting the required QoS. Its breakthrough performance is based on state-of-the-art MIMO technology, offering increased throughput range and an enhanced ability to deal with interference, while providing a rich and reliable user experience.

Main features:

- Higher data transmission rates
- Establishes a wireless connection in multi-path environments
- Extended reach by delivering better SNR compared to legacy Single Input Single Output (SISO) systems
- Higher rates, extended range and improved spectral efficiency
- Supports channels in the 5GHz-band
- Advanced LDPC error-correction schemes, and sophisticated antenna loading between channels
- New aggregation schemes to improve MAC efficiency while supporting the latest security and QoS standards
- Comprehensive MIMO combinations, with up to 2 x 3
- Uses 40MHz or 20MHz Spectrum mode (CB / non-CB)
- AP and STA are WiFi certified:
  - 802.11n
  - 802.11d
- Advanced security including the following configurable modes:
  - None (No security)
  - WEP – Open and shared key authentication
  - WPA personal
  - WPA enterprise (has not been tested)
  - WPA2 personal
  - WPA2 enterprise (has not been tested)
- Configurable basic rate according to mode of operation

  - 802.11a
  - 802.11an
- 15-entry associated station list
- PHY rate: up to 300Mbps; 140Mbps effective rate
- Enhanced Rate-Adaptation algorithm
- Full 802.11 Interoperability
- Dynamic handling of mixed a/n networks
- 802.11n protection modes
- Automatic STA scanning (searches for available APs)
- Broadcast support
- Multicast support (multicast-to-unicast conversion, to enable reliable multicast support)
- Bridge-mode support
- Four-address bridge mode
- Automatic reconnection and dead-station discovery
- AP Forwarding
- Automatic MAC cloning
- Web-based configuration tool
- 802.11d
- 802.11h
- WPS (Wi-Fi Protected setup)
- Status and statistics.
- OCS – Optimal channel selection mechanism.

The WLANPlus Evaluation Kit can be used to evaluate Metalink's MtW8171 and MtW8151, MIMO WLAN transceiver chipset. The WLANPlus Evaluation Kit allows users with no special WLAN expertise to easily connect to testing equipment to evaluate Metalink's WLANPlus MIMO technology. The kit can be connected to Consumer Electronic (CE) products to evaluate the development of embedded WLAN capabilities or as an external add-on offering WLAN capabilities to existing products.

Metalink provides an evaluation kit for:

- WLANPlus Video Bridge (MTW_RGPLUS_5.0_VB_001) – 5GHz cable replacement

1.2 Package Contents

The Evaluation Kit package includes the following items:

- WLANPlus Evaluation Kit
- Power supply

- Ethernet cable
- CD-ROM

2. Physical Description

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2.1 Overview

The WLANPlus Evaluation Kit consists of a plastic shell housing which includes the following components:

- Metalink board:
    - MTW_RGPLUS_5.0_VB_001 Video Bridge (VB)
- Three antennas
- 12V DC power supply connector

2.2 MTW_RGPLUS_5.0_VB_001 Video Bridge

The MTW_RGPLUS_5.0_VB_001 Video Bridge Evaluation Kit contains the Metalink WLANPlus MIMO chipset, which consists of the MtW8171 MAC/Baseband, and the MtW8151 RFIC. The board supports 2 x 3 MIMO configurations.

The PCI interface of the wireless module is connected to a STAR 9101 Network processor. The kit includes a single Ethernet interface for network connection.

The board includes:

- Metalink’s chipset
- STAR 9101 network processor
- 10/100 Mbps Ethernet connector
- 8 Mb Flash
- 32 Mb SDRAM
- LED indicators

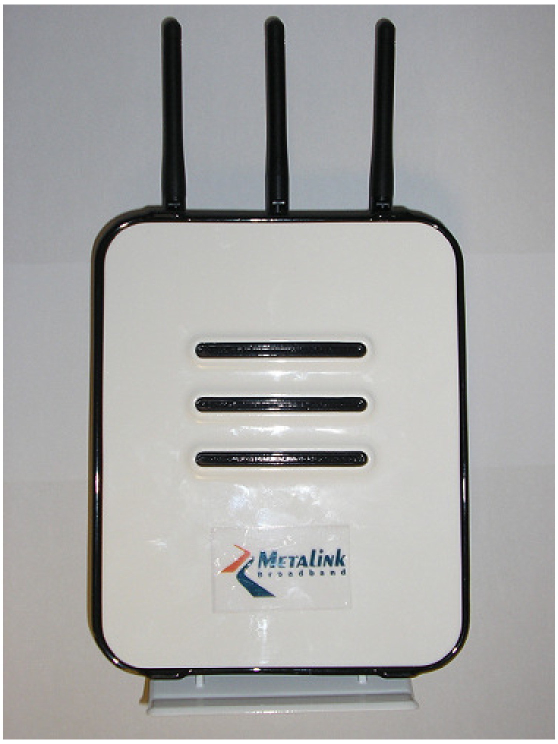

Figure 2-1- MTW_RGPLUS_5.0_VB_001 Video Bridge housing

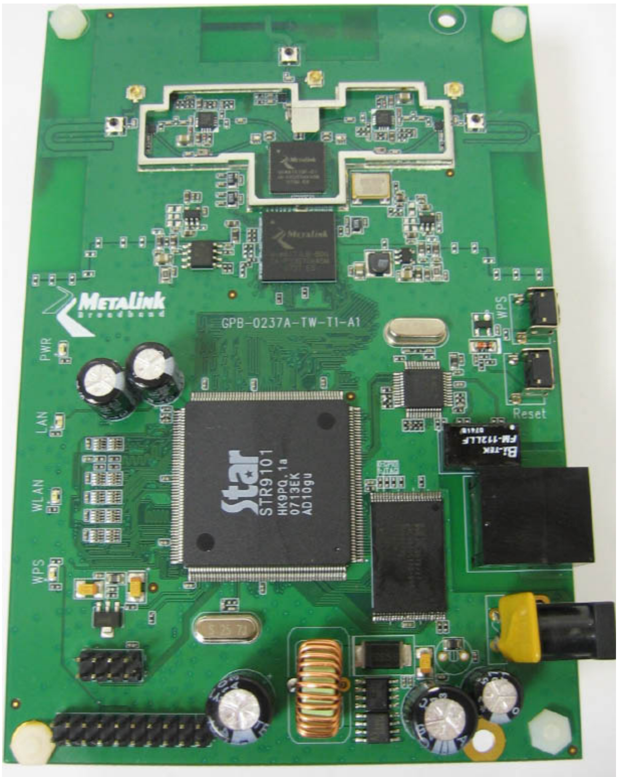

Figure 2-2 - MTW_RGPLUS_5.0_VB_001 Video Bridge board

2.3 LED Indicators

The front panel includes four LED indicators

Name	Function
PWR	On: Host board completed its power-on cycle and init sequence Off: Video Bridge is off or has not finished booting
WLAN	On: Wireless LAN connection established. Blinking – Traffic is transferred Off: No connection
Ethernet	Blinking: Ethernet link is live. For GPB 244/236, there is a separate Ethernet LED for each port Off: Ethernet link not live
WPS	On: WPS push button is pushed Off: WPS push button is not being pushed

2.4 CD-ROM

The CD-ROM includes the following software:

Name	Description	Path
Easy IP Config Tool	A tool which displays an icon in the system tray, and allows seamless switching of predefined IP addresses.	\Misc\Easy IP Config Tool\winips.exe
Ethereal	A network sniffer tool.	\Misc\Ethereal\ethereal-setup-0.10.13.exe
Iperf	A tool to measure TCP and UDP bandwidth performance.	\Misc\Iperf\iperf.exe
MPEG Analysis Tool	A tool to analyze a video file's properties.	\Misc\MPEG Analysis Tool\Elecard StreamEye Tools
NFS Server for Windows	A tool that runs a Linux Network File System server over a Windows machine.	\nfsAxe\SETUP.EXE
TFTP	A File Transfer Protocol server for Windows.	\TFTP\tftpd32.exe
VideoLAN Media Player	A media player which allows playback, as well as streaming, of video files.	\VideoLAN\vlc-0.8.5-win32.exe

Name	Description	Path
Documentation	WLAN*Plus* Evaluation Kit User Guide v2.3.1 Release notes	\Software Documents Ver 2.3\WLANPlus Evaluation Kit UG.doc \Software Documents Ver 2.3\WLANPlus Release Notes SW 2.3.1doc \Software Documents Ver 2.3\SUG API Host Driver Linux.doc

3. Getting Started

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3.1 Overview

This chapter provides an overview of the possible topologies and step-by-step hardware installation instructions.

The Evaluation Kit provides the ability to evaluate Metalink's MtW8171 and MtW8151 MIMO WLAN transceiver chipset. The chipset is packaged inside an Evaluation Kit for a seamless evaluation. The kit is preconfigured to serve as either an Infrastructure Station (STA) or as an Access Point (AP).

A typical installation consists of one AP, which is physically connected to a PC/device serving as a Video Streamer on one end, and one or more STAs, connected to PCs/devices serving as Video Receivers on the other end. The AP Evaluation Kit transmits the video stream to the STAs using wireless communication.

The connection between the Evaluation Kits and the Video Streamer/Receiver(s) uses an Ethernet interface. The connection is supported for both Windows-based and Linux-based Video Receivers and Video Streamers.

It is recommended to use the Evaluation Kits with their factory configurations. These are clearly marked on a label which includes the following information:

- AP <IP Address> - This Evaluation Kit is configured to serve as the Access Point and its preconfigured IP address is marked.
- STA <1/2/3> <IP Adress>- This Evaluation Kit is configured to serve as a Station and its preconfigured IP address is marked.

To change the preconfigured settings, follow the instructions inChanging Configuration Settings on page 25.

3.2 Setting Up the Evaluation Kit (AP/STA)

The installation process consists of:

1. Connecting the AP/STA Evaluation Kit to the Video Streamer/Receiver PC
2. Assigning an IP address to the PC
3. Powering up the Evaluation Kit

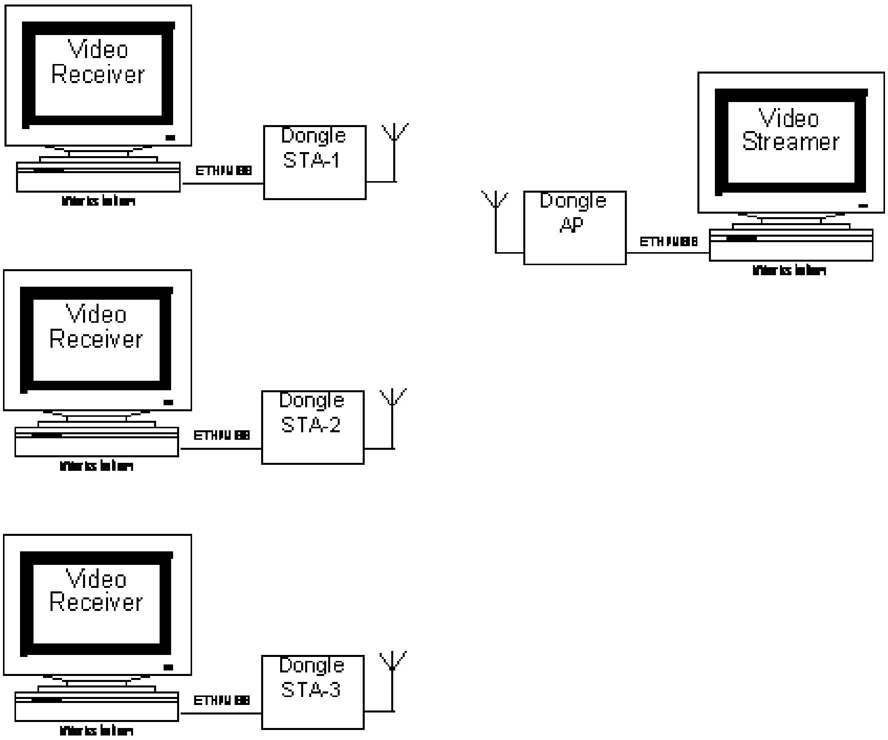


Figure 3-1 – Typical Topology

3.2.1 Connecting the Evaluation Kit to the Video Streamer/Receiver

1. Connect the Ethernet cable to the streamer/receiver PC’s Ethernet port.
2. Connect the other end of the Ethernet cable to the Evaluation Kit's Ethernet port.

3.2.2 Assigning an IP Address

This chapter explains how to configure the IP address of the streamer/receiver PC in order to communicate with the Evaluation Kit when the latter is configured to operate in bridge mode.

The Evaluation Kit can be configured to operate in one of two connection modes, Bridge Mode or Route Mode (not relevant for Evaluation Kits that are Video Bridges). The Evaluation Kit’s default operating mode is Bridge Mode.

The Evaluation Kit’s LAN interface and the PC must be configured to the same subnet.

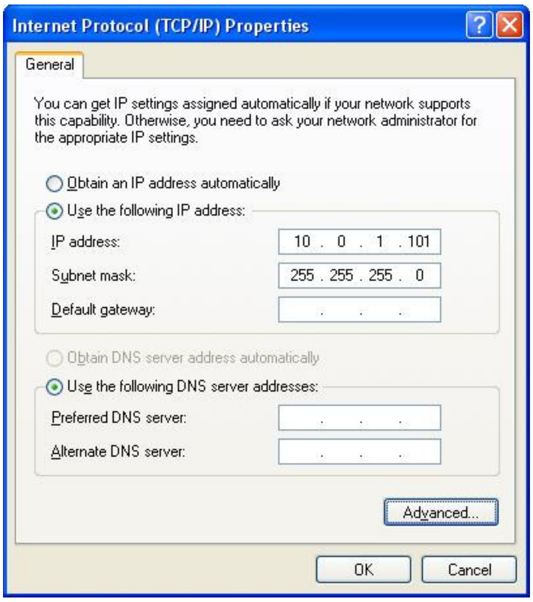
To assign the IP address to the PC:

1. On the PC, from the **Start** menu, select **Settings** > **Control Panel** > **Network Connections**.

   The Network Connections screen displays your existing Network Connections.
2. Locate the Network Connection under **Local Area Connection**.
3. Right click the Local Area Connection and select **Properties**.

   The Properties window appears.
4. Select the Internet Protocol (TCP/IP), and then select **Properties**.

   The Internet Protocol (TCP/IP) Properties window appears.



You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically
● Use the following IP address:

IP address: 10 . 0 . 1 . 101
Subnet mask: 255 . 255 . 255 . 0
Default gateway: . . .

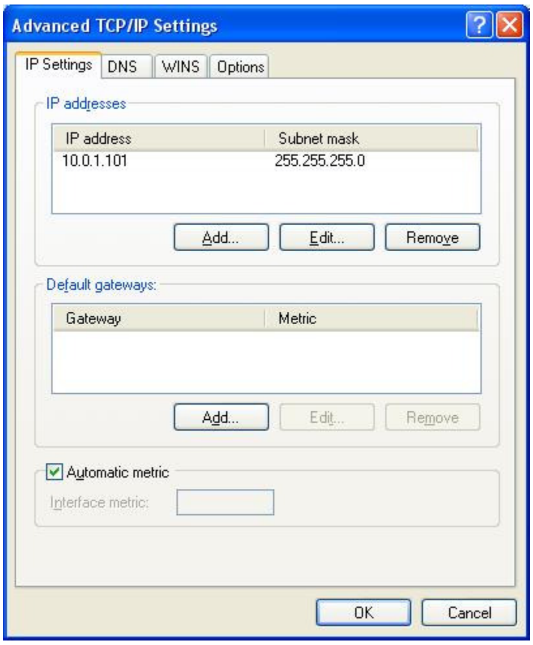
○ Obtain DNS server address automatically
● Use the following DNS server addresses:

Preferred DNS server: . . .
Alternate DNS server: . . .

5. Select **Use the following IP address**, and then enter your IP address.

6. Select **Advanced**.

   The Advanced TCP/IP Settings window appears.



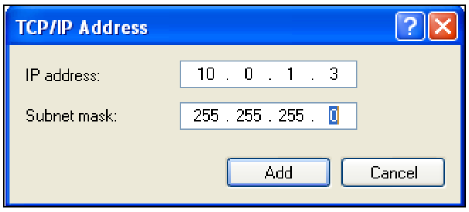
IP address	Subnet mask
10.0.1.101	255.255.255.0

Gateway	Metric

☑ Automatic metric

7. In the **IP Settings** tab, select the IP address, and then select **Add**.

   The TCP/IP Address window appears.



IP address: 10 . 0 . 1 . 3

Subnet mask: 255 . 255 . 255 . 0

8. Enter the IP address (of the PC) that is on the same subnet as the Evaluation Kit.

TIP: For example, if the IP address of the Evaluation Kit (LAN Interface) is "10.0.2.1", the IP address of the corresponding PC should start with "10.0.2" (e.g. 10.0.2.2).

9. In the Subnet Mask field, enter "255.255.255.0".
10. Click **Add**.

    The new Static IP Address is added.
11. Click **OK**.

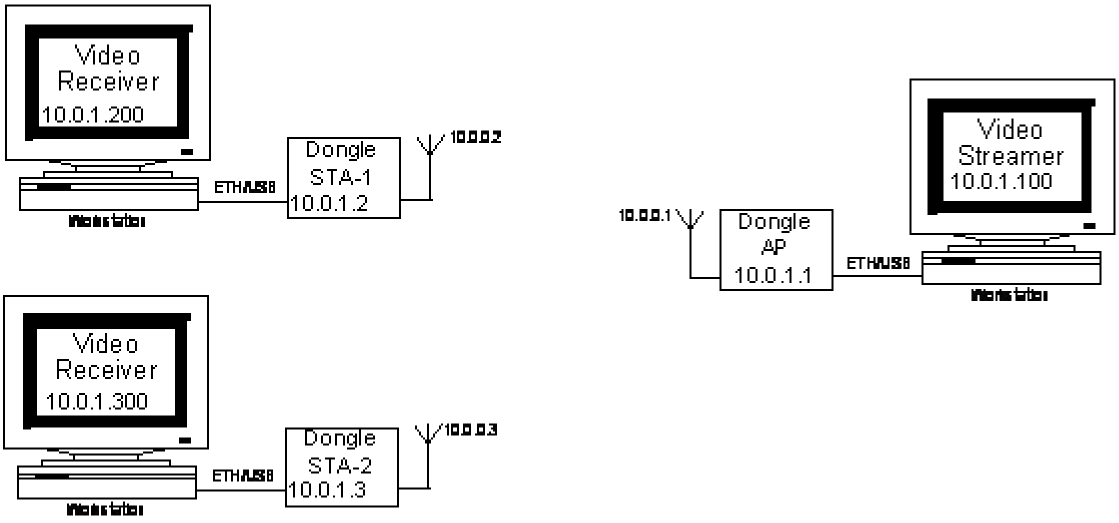


Figure 3-2 - Typical IP Assignment in Bridge mode

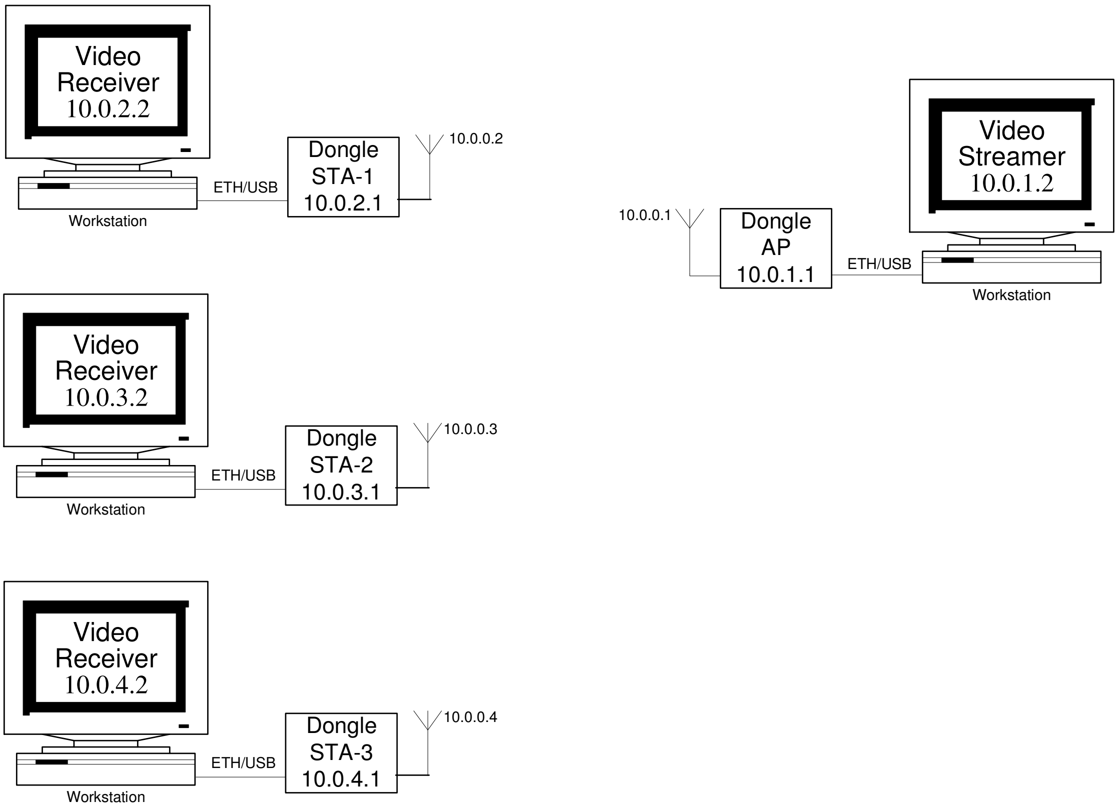


Figure 3-3 – Typical IP Assignment in route mode

3.2.3 Powering Up the Evaluation Kit

To power up the Evaluation Kit:

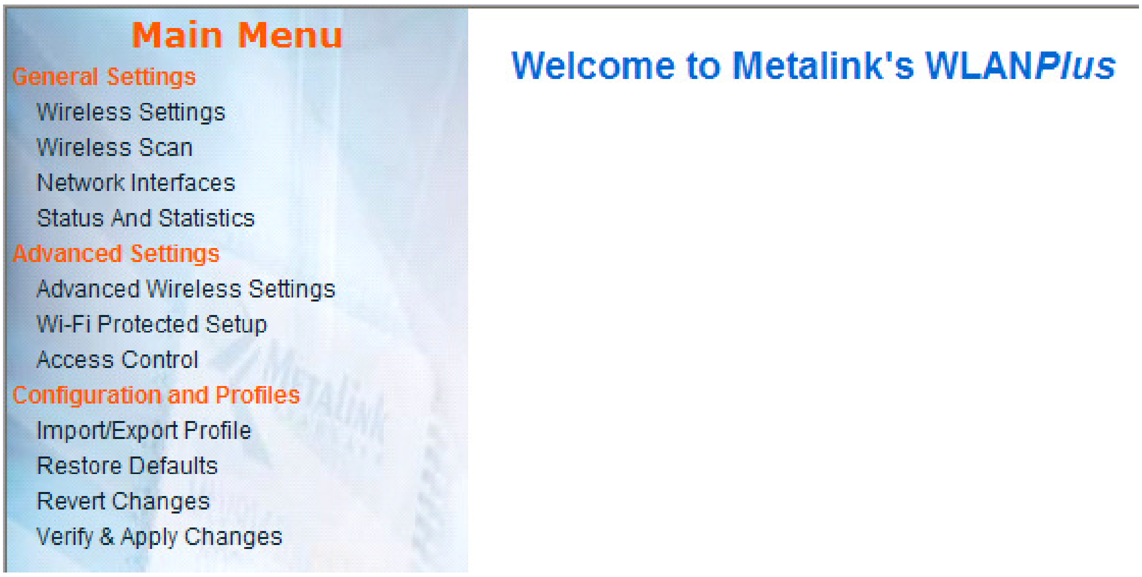
1. Connect the power supply to the power connector.
2. Plug the power supply into an AC power source.
3. Wait 30 seconds.
   The Power Supply LED flashes to indicate that the Evaluation Kit is ready.

3.2.4 Connecting STAs to the AP

The connection between the STA and the AP requires access to MetaLink's WLanPlus web-based management interface. Through the management interface, the STA's scan process for available AP's is initiated and the desired AP is selected and connected to.

To connect an STA to the AP:

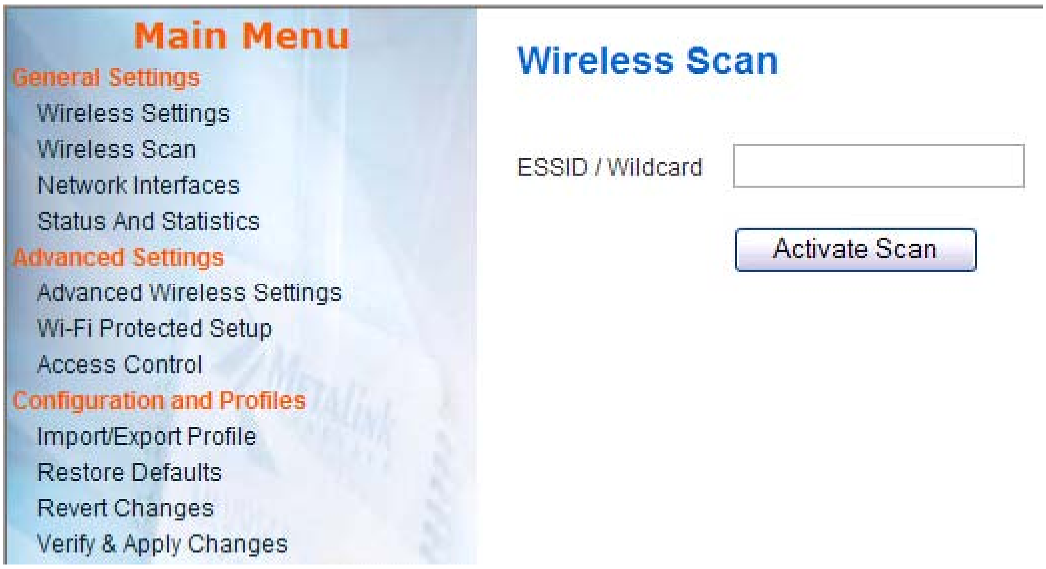
1. On the Receiver which is connected to the STA, open a web browser.
2. Navigate to the STA's IP address. (e.g. http://10.0.1.2)
   The Web Management Welcome page appears.



Welcome to Metalink's WLAN*Plus*

3. In the Main menu, select **Wireless Scan**.

   The Wireless Scan page appears.



4. Click **Scan** to search for APs.

   The results of the scan display the available APs with basic information about the configuration and security settings of each.

5. Click the AP to which you wish to connect.

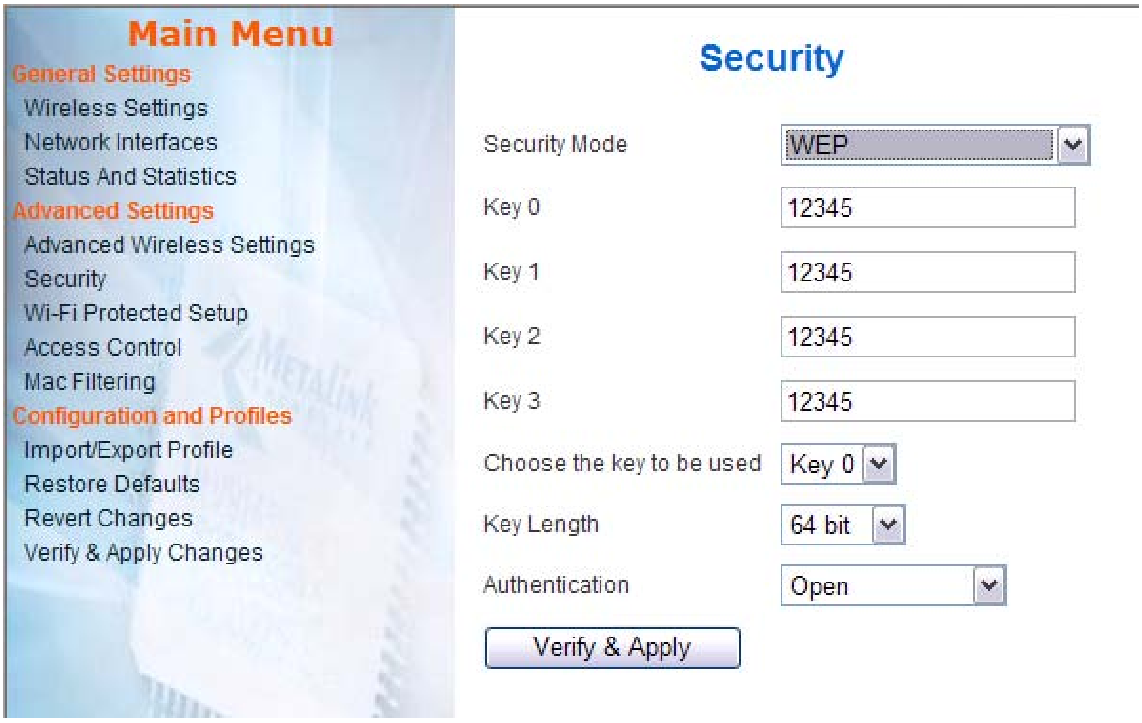
   The Connection window appears.

TIP: The fields in the Connection window depend on the security mode of the AP. If the security of the AP that you have selected is set to **Open**/**Unknown**, the STA requires no other configuration to connect to it. To connect to APs with any other security setting (security enabled), follow the instructions below.

To connect a STA to a WEP- enabled AP:

1. Double click on the WEP-enabled AP.

   The Security page appears.



Security

Security Mode: WEP

Key 0: 12345

Key 1: 12345

Key 2: 12345

Key 3: 12345

Choose the key to be used: Key 0

Key Length: 64 bit

Authentication: Open

2. Select the key to use from the **Choose the key to be used** field.

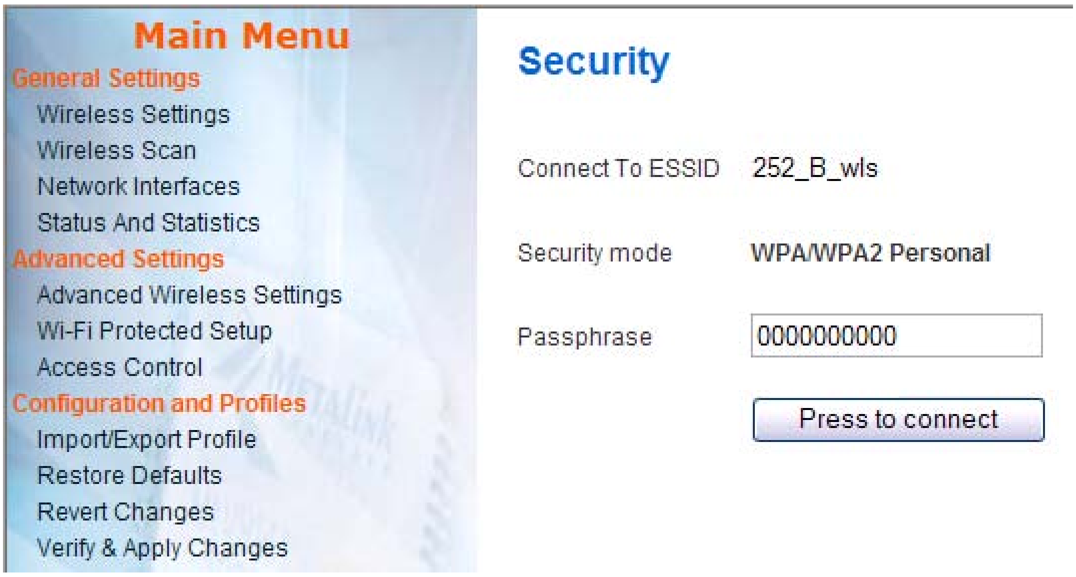
TIP: This corresponds with the AP settings.

3. Enter the value of the key in the relevant key field. For example, if the value in the **Choose the key to be used** field is “2”, enter the key into the **Key 2** field.
4. In the **Authentication** field select the authentication method (WEP in the above example) as selected in the AP.
5. Click **Verify & Apply**.

   The Connect page appears, and displays the current connection status and the BSSID Mac Address.

To connect an STA to a WPA/WPA2-enabled AP:

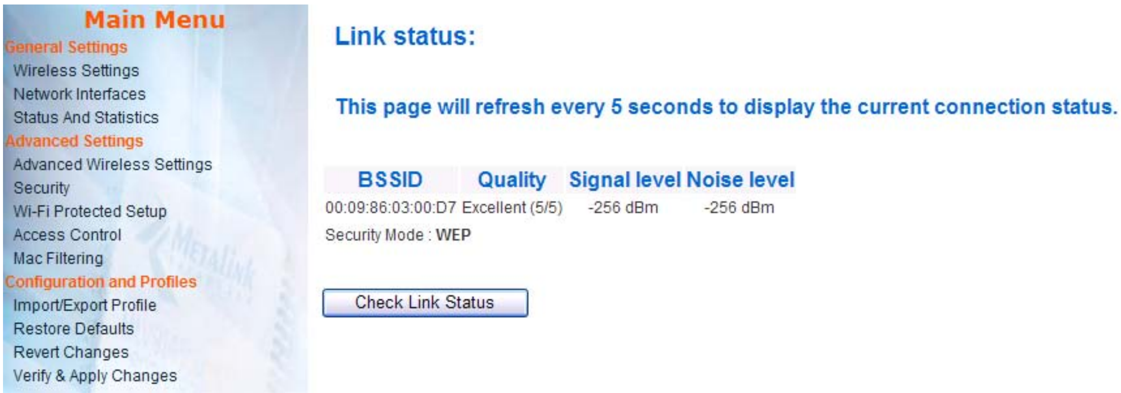
1. Double click on the WPA/WPA2-enabled AP.
   The Security page appears.



Security

Connect To ESSID	252_B_wls
Security mode	WPA/WPA2 Personal
Passphrase	0000000000

2. In the **Passphrase** field enter the key that has been defined in the AP.
3. Click **Press to Connect**.
   The Connect page appears, and displays the current connection status and the BSSID Mac Address.



Link status:

This page will refresh every 5 seconds to display the current connection status.

BSSID	Quality	Signal level	Noise level
00:09:86:03:00:D7	Excellent (5/5)	-256 dBm	-256 dBm

Security Mode : WEP

4. Changing Configuration Settings

The WLANPlus evaluation kit is shipped pre-configured and ready for use. However it is possible to change the default settings using the supplied web-based Configuration Management interface. The Configuration Management interface can be accessed using any standard web-browser.

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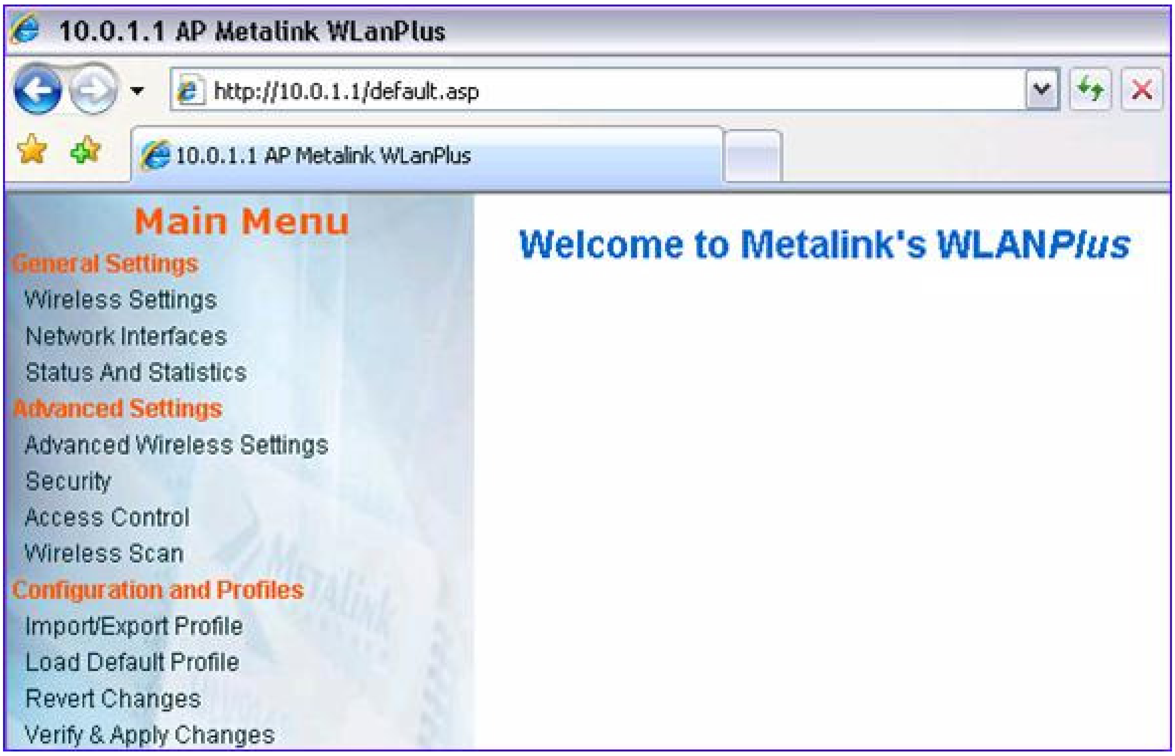
4.1 Accessing the WLANPlus Configuration Menu

To access the WLANPlus configuration pages:

1. Open a web browser and navigate to the following address:
   http://<IP address of the dongle>
   The main configuration page appears.



2. Select from the relevant area of the main menu as necessary:
   - General Settings (on page 26)
   - Advanced Settings (on page 35)
   - Configuration and Profiles (on page 49)

4.2 General Settings

4.2.1 Wireless Settings

The Wireless Configuration Settings include the wireless parameters for the configuration of the wireless communication between an AP Evaluation Kit and the STA Evaluation Kit(s).

WLANPlus complies fully with the **802.11h** and **802.11d** standards. These standards ensure conformance to regulatory restrictions and solutions to problems such as interference with satellites and radar using the same 5 GHz frequency band. The standard provides Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC).

The 802.11d standard allows a station to port between regulatory domains. The STA performs passive scanning upon boot or BSS connection loss and upon receiving a beacon from an AP, is updated with the regulatory domain restrictions of the BSS. These restrictions include the maximum transmit power levels, allowed channels, and class regulation parameters. The 802.11d functionality cannot be disabled.

The 802.11h standard defines channels in the 5GHz band which are Spectrum Management (SM) required – channels which should continuously be checked for the presence of radars. The SM-required and non-SM-required channels are determined by the regulatory domain. The STAs and AP continuously detect radars during silent periods in transmission and therefore the detection does not affect the effective data throughput. If SM-required channels are specified, the AP will wait for one minute before its beacon is transmitted. Upon detection of a radar by the BSS it will act according to the 802.11h standard. The 802.11h is disabled by default and can be enabled by setting the **Use Radar Detect** parameter in the **Advanced Wireless Settings** page.

The following table describes the wireless settings:

Parameter	Description	Values
Device Type	Specifies whether the device is an AP or STA.	Access Point Infrastructure Station
Frequency Band	Specifies the operating band. **Note** - Not all boards support both bands	5 GHz

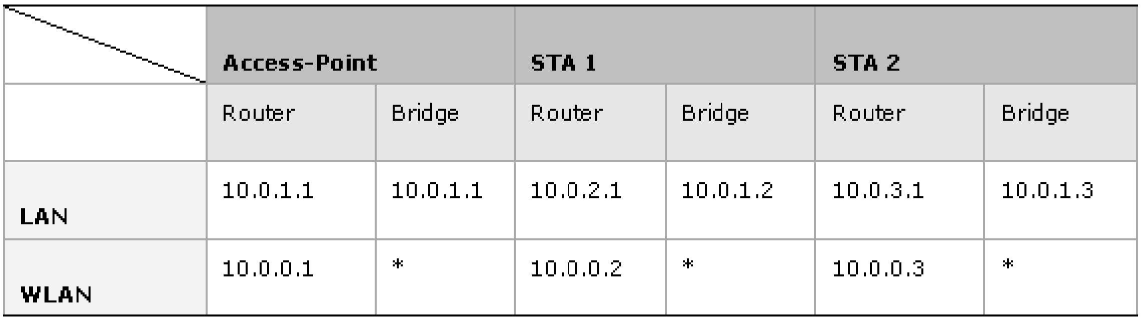
Parameter	Description	Values
Channel (AP only)	Specifies a specific channel for operation. The list of available channels is determined according to the selections made in the band parameters. Specific Channel – in this mode the user can select a specific channel according to the device's regulatory domain.. Auto – in this mode the device uses the Optimal Channel Selection mechanism to select the best channel.	Specific Channel Auto
Channel Bonding Usage (AP only)	Specifies whether channel bonding should be enabled or disabled.	40 MHz – enables channel bonding 20 MHz – disables channel bonding
Secondary Channel Offset (AP only)	Specifies Upper or Lower sideband. This setting is only relevant if the Spectrum BW usage selected is 40MHz.	Upper Lower
ESSID (AP only)	Configures the ESSID that the AP advertises within its network.	Entry is limited up to 32 characters

4.2.2 Network Interfaces

Each Evaluation Kit (STA and AP) includes LAN and WLAN interfaces. These interfaces are configured separately. On Evaluation Kits with multiple LAN interfaces, the LAN interfaces are bridged by default and have the same IP address.

Metalink's Video Bridge Evaluation Kit operates only in Bridge mode (it is not possible to configure it to operate in Route mode).

The following table summarizes the default network interface settings for the various devices.



	Access-Point		STA 1		STA 2	
	Router	Bridge	Router	Bridge	Router	Bridge
LAN	10.0.1.1	10.0.1.1	10.0.2.1	10.0.1.2	10.0.3.1	10.0.1.3
WLAN	10.0.0.1	*	10.0.0.2	*	10.0.0.3	*

The following table describes the parameters that can be configured.

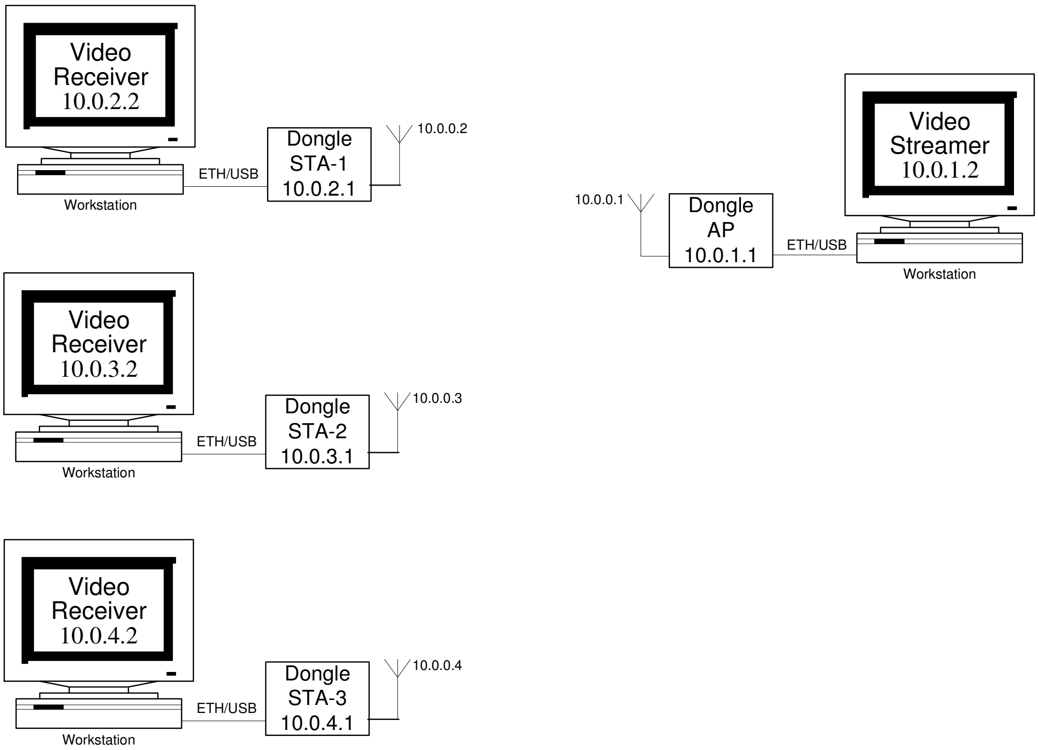
Parameter	Description	Values
IP	Specifies the Ethernet LAN IP address for both Ethernet ports – LAN (0) and LAN (1).	IP Address
Subnet	Specifies the Subnet-Mask of the network, of the specified IP address.	Subnet
Ethernet MAC Address (port 0 – LAN)	Specifies the MAC addresses for the port 0-LAN port.	MAC Address
Ethernet MAC Address (port 1 – WAN)	Specifies the MAC addresses for the port 1-WAN port.	

Parameter	Description	Values
Network Mode	Specifies whether the network will operate in Bridge or Route modes. There are several bridge modes possible.	**For AP:** **Bridge (Default)** – operation in Bridge mode. **Four Address support** - This Bridge mode allow usage of 4 MAC address in the Wireless packet. **Route** – operation in Route mode. **For STA:** **L2-NAT (default) –** When operating in L2-NAT mode, packets are sent from the AP to the station in 3 MAC addresses in the header. The station contains a table with the IP's and MAC address of all the computers connected to it and change the MAC address of the Packets when it is transferred to the Computer behind the station. **Bridging MAC Cloning** – operation in Bridge mode, where the STA uses the host's IP address. With MAC Cloning, an AP will not be able to access the target STA through its WLAN address, but will be able to access the target host connected to that STA's LAN port. This mode supports operation with security. **Four Address Support** – operation in Bridge mode, where the AP can access the target STA through its WLAN address. This mode allows the use of security and for several host PCs to be connected behind the STA. Four Address Support is Metalink's proprietary implementation of the Wireless Distribution System (WDS) capability and will not be supported by other vendors. **Route** – operation in Route mode.

Parameter	Description	Values
Wireless LAN Mac Address	Displays the MAC address of the wireless interface (cannot be changed).	e.g. 00:09:86:BA:F0:81
Wireless LAN IP (Route Mode only)	Specifies the IP address of the wireless LAN. This IP address is mandatory when setting the network in Route mode. Relevant only in Evaluation Kits that are not Video Bridge	
Cloned MAC Address (Bridge mode for STA only)	Displays the Clone MAC address of the Host (connected to the Evaluation Kit)	e.g. 00:09:86:BA:F0:81 Setting the cloned MAC Address to 00:00:00:00:00:00 will trigger an automatic adjustment to the STAs MAC address according to the MAC address of the connected device/PC. The automatic adjustment will be done after a system reboot.
Wireless LAN Subnet	Specifies the Subnet address of the Wireless LAN. This Subnet address is mandatory when setting the network in Route mode. Enter the following Subnet address: 255.255.255.0	

4.2.3 Configuring Route Mode

The default configuration of WLANPlus is Bridge mode, however you may choose to setup the wireless network to operate in Route mode (on Evaluation Kits that are not Video Bridge). The following diagram illustrates a typical wireless network setup in Route mode.

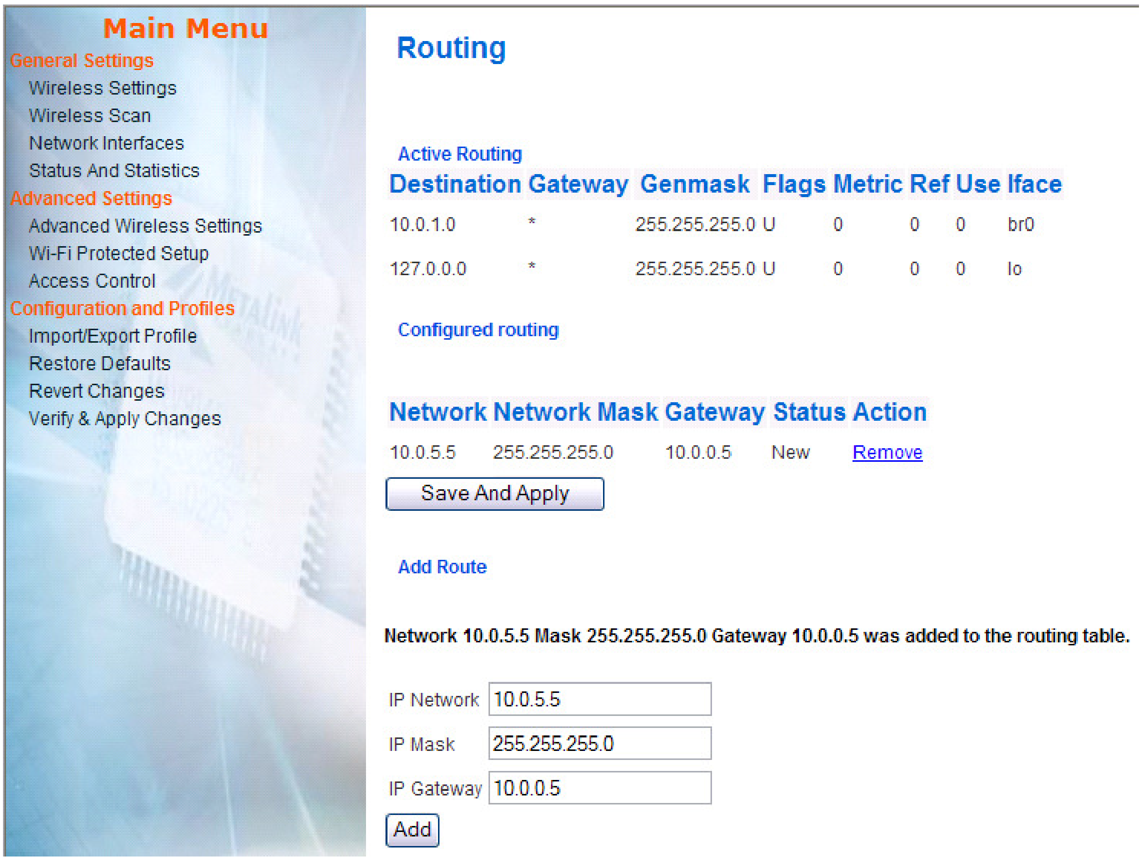


To configure Route mode:

1. In the **Network Interfaces** screen, in the **IP** field, enter the Ethernet LAN IP address.
2. In the **Subnet** field enter `255.255.255.0`.
3. In the **Ethernet MAC Address (port 0 – LAN)** and **(port 1 – WAN)**, enter the MAC address of the Ethernet ports (port 0-LAN and port 1-WAN).
4. In the **Enable Bridge Mode** field, set to **No**.
5. In the **Wireless LAN** field, enter the IP address of the wireless LAN (e.g. in the above topology when configuring STA-1 the Wireless LAN IP address is: `10.0.0.2`).
6. In the **Wireless LAN Subnet** field, enter the Subnet-Mask of the wireless interface (e.g. `255.255.255.0`).

7. Click **Configure Routing**.

   The Routing page appears.



Routing

Active Routing

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.1.0	*	255.255.255.0	U	0	0	0	br0
127.0.0.0	*	255.255.255.0	U	0	0	0	lo

Configured routing

Network	Network Mask	Gateway	Status	Action
10.0.5.5	255.255.255.0	10.0.0.5	New	Remove

Save And Apply

Add Route

Network 10.0.5.5 Mask 255.255.255.0 Gateway 10.0.0.5 was added to the routing table.

IP Network	10.0.5.5
IP Mask	255.255.255.0
IP Gateway	10.0.0.5

Add

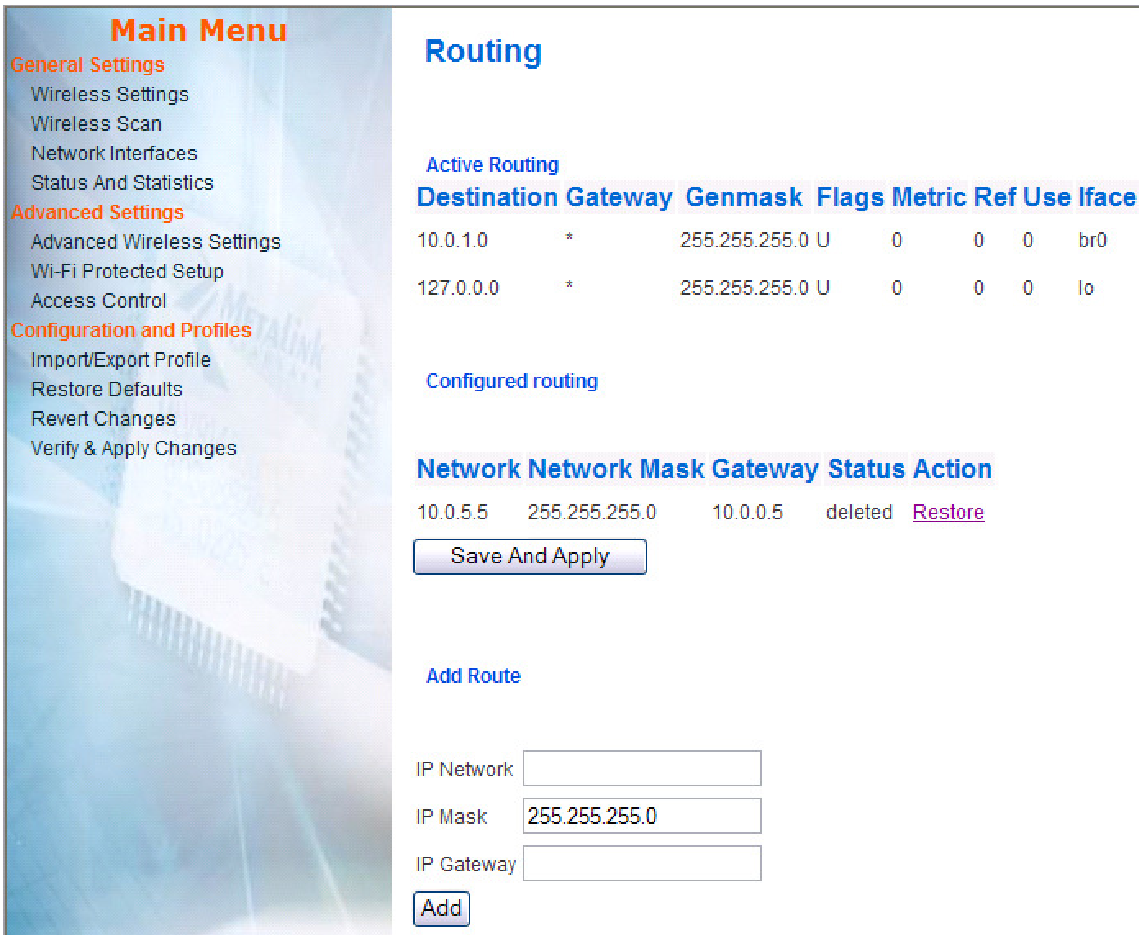
8. At the bottom of the page, enter the IP address of the destination into the **IP Network** field. (e.g. in the above topology when configuring STA-1 the destination is the IP address of the AP: `10.0.1.1` or `10.0.1.0`)
9. In the IP Mask field, enter `255.255.255.0`.
10. In the IP Gateway field, enter the IP address of the destination's IP Gateway. (e.g. in the above topology when configuring STA-1 the destination is the IP address of the gateway, which is the wireless LAN address of the destination: `10.0.0.1`).
11. Click **Add**.

    The new route is added to the **Configured Routing** section at the top of the page and its status appears as **New**. At this stage the route is not activated.
12. To activate the route, click **Save and Apply**.

    The route appears in the **Active Routing** section at the top of the page and its status is shown as **Active**.

TIP: When configuring the AP to operate in Route mode repeat steps 8-11 for each STA that will be connected to the AP and then follow step 12 to activate them.

To remove route:



Routing

Active Routing

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
10.0.1.0	*	255.255.255.0	U	0	0	0	br0
127.0.0.0	*	255.255.255.0	U	0	0	0	lo

Configured routing

Network	Network Mask	Gateway	Status	Action
10.0.5.5	255.255.255.0	10.0.0.5	deleted	Restore

Add Route

IP Network	
IP Mask	255.255.255.0
IP Gateway	

1. Click **Remove.**

   Status of the "route" changes from **Active** to **Deleted**.

2. Click **Save and Apply** for remove.

TIP: You do not need to reboot the Evaluation Kit for the routing configuration to take effect.

4.2.4 Status and Statistics

Parameter	Description
Display Version Information	The following information appears when you click **Version Info**: Information about the Evaluation Kit's current firmware version, the Linux OS version, and a combined version number. The combined version number represents a certain combination of firmware and Linux versions. A list of modules which are installed on the Evaluation Kit, their version numbers and their status in terms of the CRC check (OK/CRC check failed). If a certain CRC check fails, a warning message appears at the bottom with the cause of failure.
Show Link Status	The following information appears when you click **Link Status**: **For AP**: The number of STAs that are connected to it. The BSSID to which it is connected, represented by the MAC Address of the AP. If there are no STAs connected, the **No STA Connected** message appears. **For STA:** The SSID to which the STA is connected. The BSSID to which the STA is connected (represented by the MAC address of the AP to which it is connected).
Show Statistics	The following information appears when you click **Statistics**: ifconfig Statistics: displays the results that are obtained by using the "ifconfig" command in the Evaluation Kit's Linux console (similar to the "ipconfig" command in Windows). All the network interfaces of the Evaluation Kit are presented including their IP addresses, subnet masks and overall TX and RX statistics. TC Output (packets lost in OS): displays the packet traffic through the various interfaces of the device. The WLAN interface (wlan0) is further divided into four separated priorities, corresponding to the different QoS queues. The "dropped" counter indicates the number of packets that were rejected by the OS. MAC Statistics: Displays packet traffic running through the MAC. Additional Statistics: Displays miscellaneous statistics such as Aggregated packets, 802.11 management and control frames and various RX and TX traffic per priority queue.
MAC Events and Exceptions	The following information appears when you click **MAC Events and Exception**: Displays the events in the wireless interface, and/or the configured exceptions outputted by the Evaluation Kit.

4.3 Advanced Settings

4.3.1 Advanced Wireless Settings

Parameter	Description	Values
Use Radar Detect	Enables/disables the 802.11h for radar detection. The 802.11h Channel-switching capabilities are always enabled.	**No** **Yes**
Use LDPC	Low-Density Parity-check Code. It enables/disables error correction for reducing the probability of data loss in noisy channels. The Rate Adaptation algorithm automatically disables LDPC coding when working at high PHY rates (higher than 162).	**Yes** - Uses LDPC advanced error-correction scheme **No** - Uses the Vietrbi FEC algorithm
ERP Protection Type	This feature allows protection of OFDM packets despite the presence of 802.11b stations within the BSS. By sending RTS/CTS or CTS2Self packets in 802.11b rates, the device informs the BSS that OFDM packets are going to be transferred and protects the packets in the BSS. The RTS/CTS and CTS2Self creates overhead which may result in lower throughputs. The RTS/CTS option provides better coverage compared to CTS-to-Self, but results in lower throughputs. This is caused by the fact that the RTS/CTS option includes acknowledgement from the receiving device, while the CTS2Self option does not.	RTS/CTS **None** – may cause collision between OFDM and CCK packets. CTS2Self
Use Overlapping BSS protection (AP only)	This option enforces BSS protection when the AP detects beacons from overlapping 802.11b APs or overlapping APs with the ERP bit turned-on. In this case when the AP will detect a beacon from an overlapping BSS it will extend the protection coverage to its BSS.	**Yes** **No**

Parameter	Description	Values
11n Protection Type	This feature allows protection from non-HT Stations within the BSS. In case the AP detects an association of a non-HT legacy STA, it will signal all the HT STAs to use RTS/CTS or CTS-to-Self mechanisms before each data transmission. This feature also supports all 802.11n standard protections, including MIMO. The RTS/CTS option provides better coverage compared to CTS-to-Self, but results in lower throughputs. This is caused by the fact that the RTS/CTS option includes acknowledgement from the receiving device, while the CTS2Self option does not.	RTS/CTS **None** - may cause collision between HT and legacy packets CTS2Self
Enable AP forwarding (AP only)	Enables the ability of the AP to relay packets from STA to STA within the BSS	**Yes** **No**
Use reliable multicast (AP only)	This feature enables the transmission of multicast traffic through separate unicast streams to enable acknowledgments by each recipient. This mechanism ensures that the unreliable multicast data will arrive at its destination.	**Yes** **No**
Hidden SSID	This feature provides very basic security (mostly for home usage) without the need to configure additional security settings. When chosen, the AP does not advertise the SSID of it's BSS in the transmitted beacons. In this way, the BSS will not be seen in the scan results of wireless stations and hence only stations with prior knowledge of the SSID will be able to establish a connection. According to the 802.11h standard, this ability will not be available in specific channels of 5.2GHz (with Spectrum Management) because of the prohibition of active scanning.	**Yes** **No**
Percentage of maximal transmit power	Sets the percentage of maximal transmit power relative to the regulatory domain restrictions. For example, if the regulatory domain restriction allows transmission of up to 20db, setting the percentage at 50% will allow maximal transmit power of 10db.	**12%** **25%** **50%** **100%**

4.3.2 MAC filtering

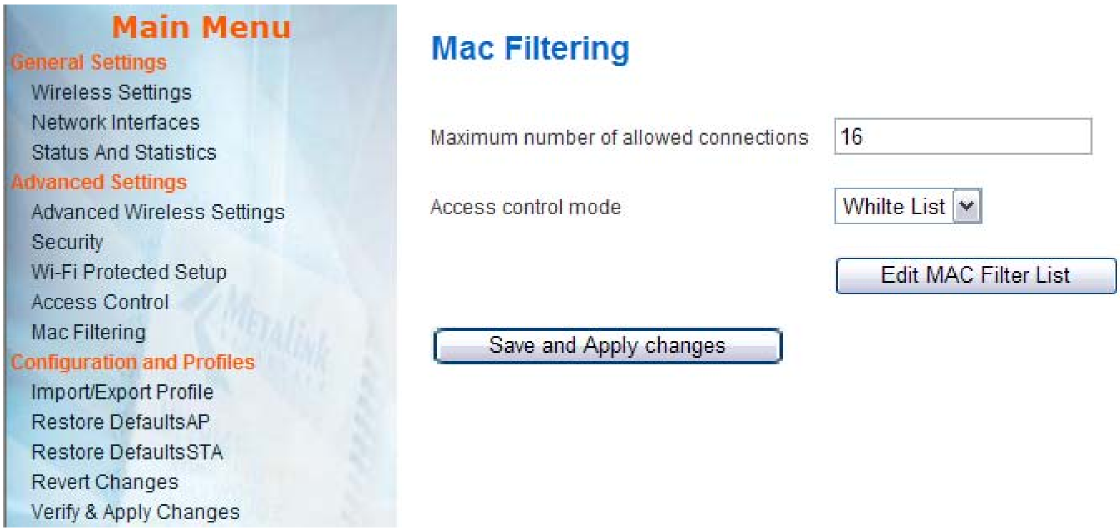
IMPORTANT: The MAC filtering options are only relevant for AP mode.

This feature controls the authentication process of STAs to the AP. Each STA is checked against the Access Control List. The maximum number of STAs that can associate with an AP is 16.

Selecting MAC Filtering Type

1. From the Main Menu, click **Mac Filtering**.

   The Mac Filtering page appears.



Mac Filtering

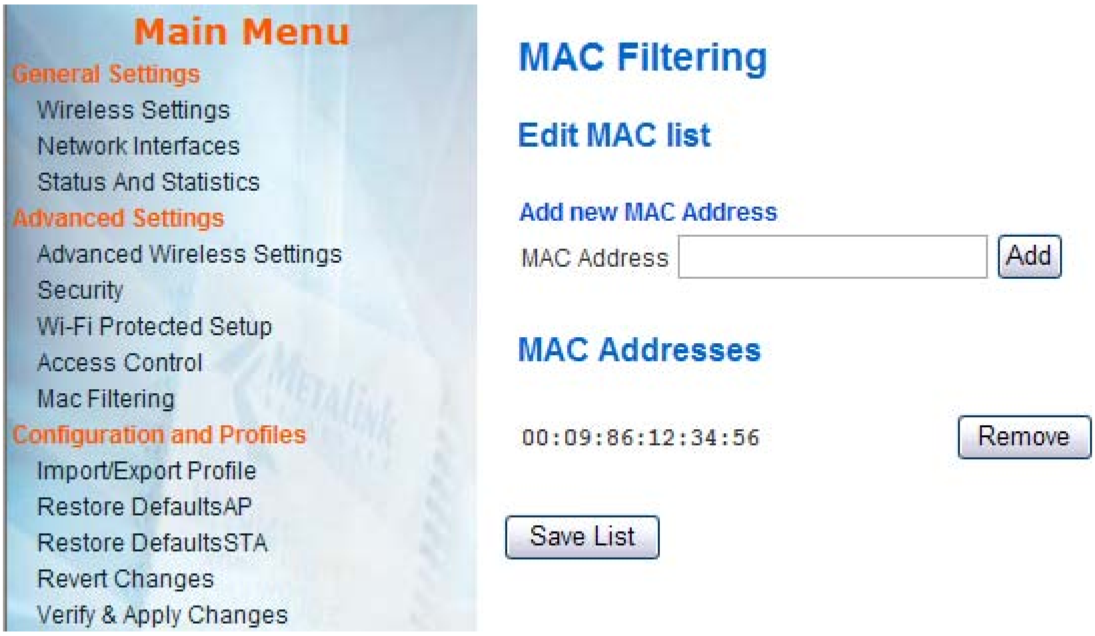
Maximum number of allowed connections: 16

Access control mode: Whilte List

2. From the Access Control Mode dropdown list, select from the following modes:
   - **Open** - The MAC will not check the ACL. The only limit for the association of STAs is the supported number of stations.
   - **White list** - Allow only stations in the ACL to connect. Reject all other stations.
   - **Black list** - Reject all stations in the ACL to connect. Allow all other stations to connect.

Editing the Access Control List

If you are using either the White or Black List mode, you should edit the Access Control List to add or remove MAC addresses as necessary.



00:09:86:12:34:56

4.3.3 Security (AP Only)

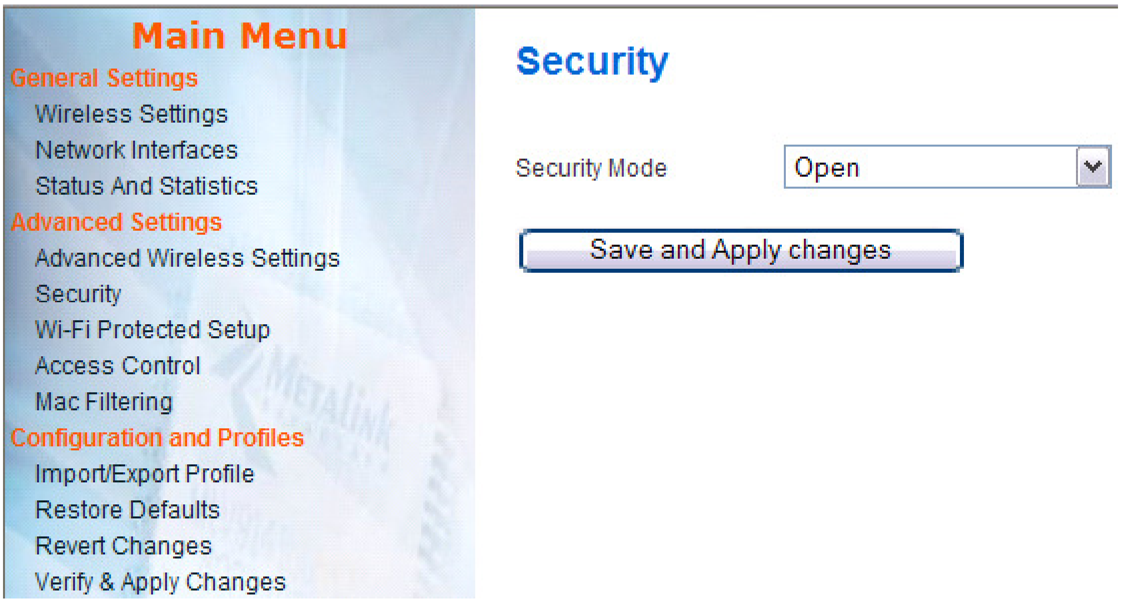
IMPORTANT: The WLANPlus security options are only relevant for AP mode.

WLANPlus features support for the following security protocols: WEP, WPA/WPA2 Personal, and WPA/WPA2 Enterprise. The security settings are defined in the AP. To configure the settings for any of these protocols, see the appropriate section:

- Setting WEP Security (on page 40)
- Setting WPA/WPA2-Personal Security (on page 41)
- Setting WPA/WPA2-Enterprise Security (on page 42)

Optionally, you can set Open Security (no encryption) (see "Setting Open Security (no encryption)" on page 39).

Setting Open Security (no encryption)



Security Mode: Open

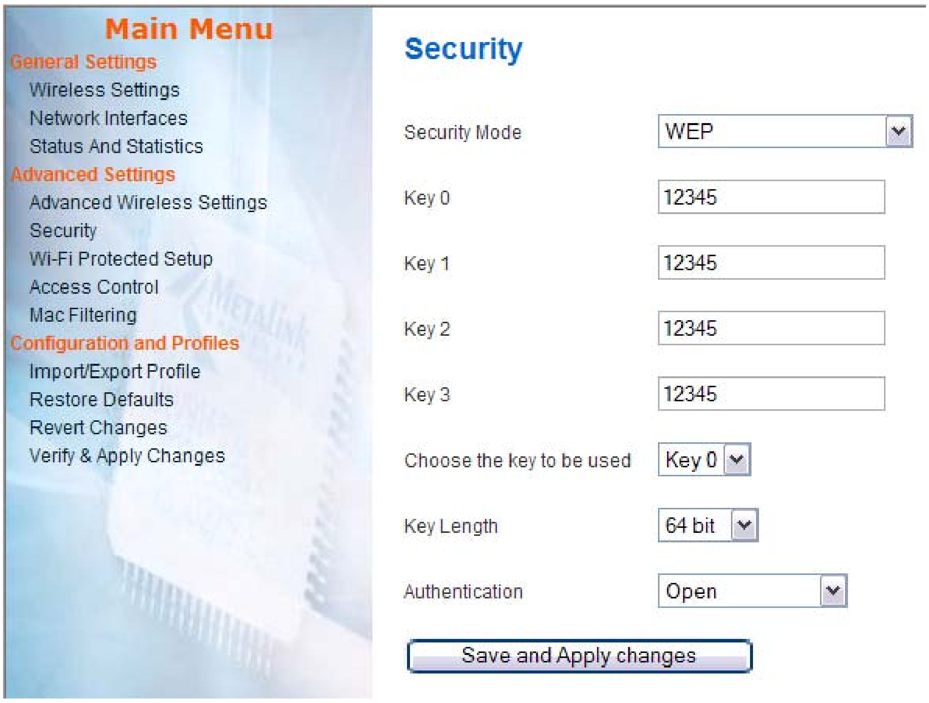
Figure 4-1 - AP Open Security Page

Setting to Open security disables the encryption of data between the AP and STAs.

To configure Open security:

1. In the AP's Configuration Management interface go to **Advanced Settings > Security**.
2. In the **Security Type** field, select **Open**.
3. Click **Save and Apply Changes**.
   The BSS encryption is disabled.

Setting WEP Security



Security

Security Mode	WEP
Key 0	12345
Key 1	12345
Key 2	12345
Key 3	12345
Choose the key to be used	Key 0
Key Length	64 bit
Authentication	Open

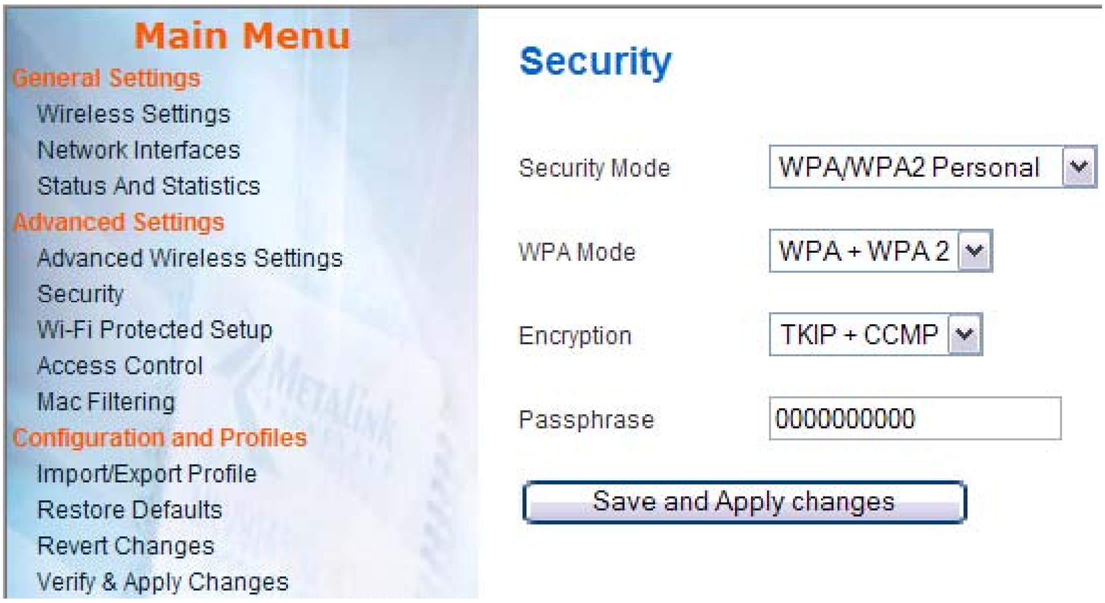
Figure 4-2 - AP WEP Security Page

The AP can be configured to provide WEP-based security encryption. Wired Equivalent Privacy (WEP) is the weakest security mode and is not recommended.

To configure WEP security:

1. In the AP's Configuration Management interface go to **Advanced Settings > Security**.
2. In the **Security Type** field, select **WEP**.
3. In the **Key Length** field, select one of the following:
   - 64 bit – enables 64-bit encryption. When selected the encryption key length may be 10 hexadecimal characters or five alphanumeric characters.
   - 128 bit – enables 128-bit encryption. When selected the encryption key length may be 26 hexadecimal characters or 13 alphanumeric characters.
4. In the **Choose the key to be used** field, select the index of the key that will used to encrypt/decrypt transmitted packets.
5. Enter the value of the key in the relevant key field. For example, if the value in the **Choose the key to be used** field is "2", enter the key into the **Key 2** field.
6. In the **Authentication** field, determine if the WEP authentication process will be performed prior to associating an STA to the BSS by selecting one of the following:
   - Open - indicates that the station will not be authenticated by the AP.
   - Pre-shared Key – indicates that the AP will require the STA to perform the authentication procedure using the same key that was defined above.
7. Click **Save & Apply Changes**.

Setting WPA/WPA2-Personal Security



Security

Security Mode: WPA/WPA2 Personal

WPA Mode: WPA + WPA 2

Encryption: TKIP + CCMP

Passphrase: 0000000000

Figure 4-3 - AP WPA/WPA2 Personal Security Page

The AP can be configured to provide WPA/WPA2 Personal security encryption. *WiFi Protected Access (WPA)* is the newest and most secure standard in Wi-Fi. *WPA2* is the newer version of WPA but with stronger encryption. WPA and WPA2 offer two encryption methods: TKIP and CCMP. CCMP is stronger than TKIP. Further details are below.

The WLAN Plus Evaluation Kit offers backwards compatibility to legacy devices that do not support advanced security modes such as WPA2.

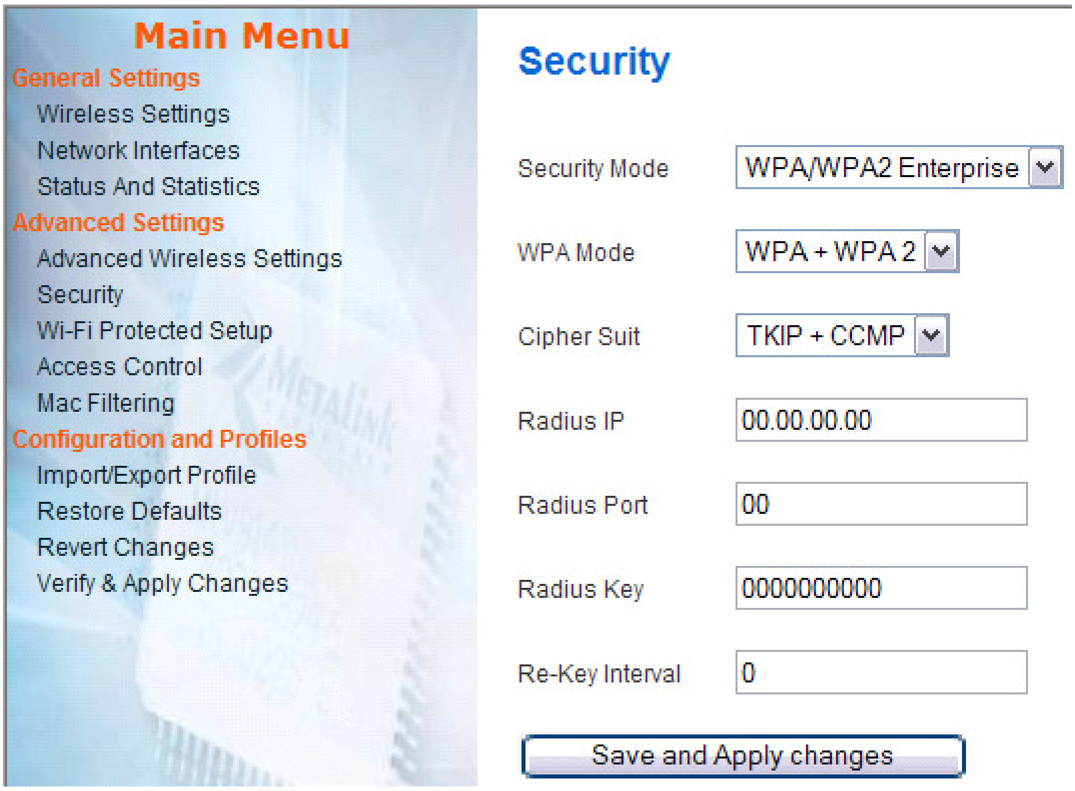
To configure WPA/WPA2 Personal security:

1. In the AP's Configuration Management interface go to **Advanced Settings** > **Security**.
2. In the **Security Type** field, select **WPA/WPA2 Personal**.
3. In the **WPA Mode** field, select one of the following:
   - **WPA** – WiFi Protected Access offers encryption and authentication improvements that are stronger than the Wireless Encryption Protocol (WEP) but weaker than the WPA2. Select this option if you would like to allow access by non-WPA2 devices (legacy) only.
   - **WPA2** – Newer version of WPA with stronger encryption.
   - **WPA + WPA2** – This option provides access to both WPA and WPA2-compatible devices.
4. In the **Encryption** field select one of the following:
   - **TKIP** - Temporal Key Integrity Protocol incorporates Message Integrity Code (MIC) to provide protection against hackers. TKIP was designed as part of a solution to replace WEP without replacing legacy hardware. Select this option if you would like allow access by non-CCMP compatible devices (legacy) only.

- **CCMP** - Counter Mode with Cipher Block Chaining Message Authentication Code Protocol is an IEEE 802.11i encryption protocol, created to replace, together with TKIP, the earlier, insecure WEP protocol. CCMP uses the Advanced Encryption Standard (AES) algorithm. In the CCMP, unlike TKIP, key management and message integrity is handled by a single component built around AES. Select this option to restrict access to CCMP-compatible devices only (non-legacy).
- **TKIP + CCMP** - This option provides access to both TKIP and CCMP compatible devices.

5. In the **Passphrase** field enter a pass phrase of 8-63 characters.
6. Click **Save and Apply Changes**.

Setting WPA/WPA2-Enterprise Security



Security Mode	WPA/WPA2 Enterprise
WPA Mode	WPA + WPA 2
Cipher Suit	TKIP + CCMP
Radius IP	00.00.00.00
Radius Port	00
Radius Key	0000000000
Re-Key Interval	0

Figure 4-4 - AP WPA/WPA2 Enterprise Security Page

WPA/WPA2-Enterprise uses a RADIUS (Remote Authentication Dial-In User Service) server for authentication. There are a few methods for performing the authentication by the RADIUS server. One method is to have a certificate installed at the STA-side (eap-tls). Other methods do not require this certification (eap-ttls, and eap-peap).

To configure WPA/WPA2 Enterprise security:

1. In the AP’s Configuration Management interface go to **Advanced Settings > Security**.
2. In the **Security Type** field, select **WPA/WPA2 Enterprise**.
3. In the **WPA Mode** field, select one of the following:
   - **WPA** – WiFi Protected Access offers encryption and authentication improvements that are stronger than the Wireless Encryption Protocol (WEP) but weaker than the WPA2. Select this option if you would like allow access by non-WPA2 devices (legacy) only.
   - **WPA2** – newer version of WPA with stronger encryption.
   - **WPA + WPA2** – This option provides access to both WPA and WPA2-compatible devices.
4. In the **Cipher Suite** field select one of the following:
   - **TKIP** - Temporal Key Integrity Protocol, incorporates Message Integrity Code (MIC) to provide protection against hackers. TKIP was designed as part of a solution to replace WEP but without replacing legacy hardware. Select this option if you would like allow access by non-CCMP compatible devices (legacy) only.
   - **CCMP** - Counter Mode with Cipher Block Chaining Message Authentication Code Protocol is an IEEE 802.11i encryption protocol, created to replace, together with TKIP, an earlier, insecure WEP protocol. CCMP uses the Advanced Encryption Standard (AES) algorithm. In the CCMP, unlike TKIP, key management and message integrity is handled by a single component built around AES. Select this option to restrict access to CCMP-compatible devices only (non-legacy).
   - **TKIP + CCMP** - This option provides access to both TKIP and CCMP compatible devices.
5. In the **Radius IP** field, enter the IP address of the RADIUS server.
6. In the **Radius Port** field, enter the relevant port number in the RADIUS server.
7. In the **Radius Key** field, enter the encryption key used by the AP to access the RADIUS server. The same key should be defined in the RADIUS server. The key length should be up to 128 characters. This key is used to register the AP on the RADIUS server and is then replaced by other keys.
8. In the **Re-Key Interval** field, enter the interval in seconds for the RADIUS server to replace the key for security purposes.
9. Click **Save and Apply Changes**.

4.3.4 Wi-Fi Protected Setup

Wi-Fi Protected Setup™ is an optional certification program from the Wi-Fi Alliance that is designed to ease the task of setting up and configuring security on wireless local area networks. WLANPlus features Wi-Fi Protected Setup, enabling the seamless setup of the secured network. In WPS there are two types of devices:

- **Registrar** – A logical entity with the authority to issue and revoke domain credentials. In this case the Registrar is usually the AP.
- **Enrollee** – A logical entity which receives the domain credentials from the Registrar. In this case the Enrollee is usually a STA.

The WPS feature allows connection between a Registrar and an Enrollee using two methods:

- **Personal Identification Number (PIN)** – A multi-digit number that is generated to enrol a specific client device on the WLAN.
- **Push Button Configuration (PBC) -** A configuration method triggered by pressing a physical/logical button on the enrolee device and on the registrar.

Configuring WPS via PIN

Setting a secured network connection between an AP and an STA using WPS via PIN involves the following steps:

1. Enabling WPS in the AP and then in the STA.
2. Entering the STA's PIN number in the AP and instructing the AP to configure the STA.
3. Instructing the STA to be configured by the AP.

IMPORTANT: Because you will need to setup the AP and the STA almost at the same time, it is advised to have both of them available to you at the same time.

To setup WPS via PIN:

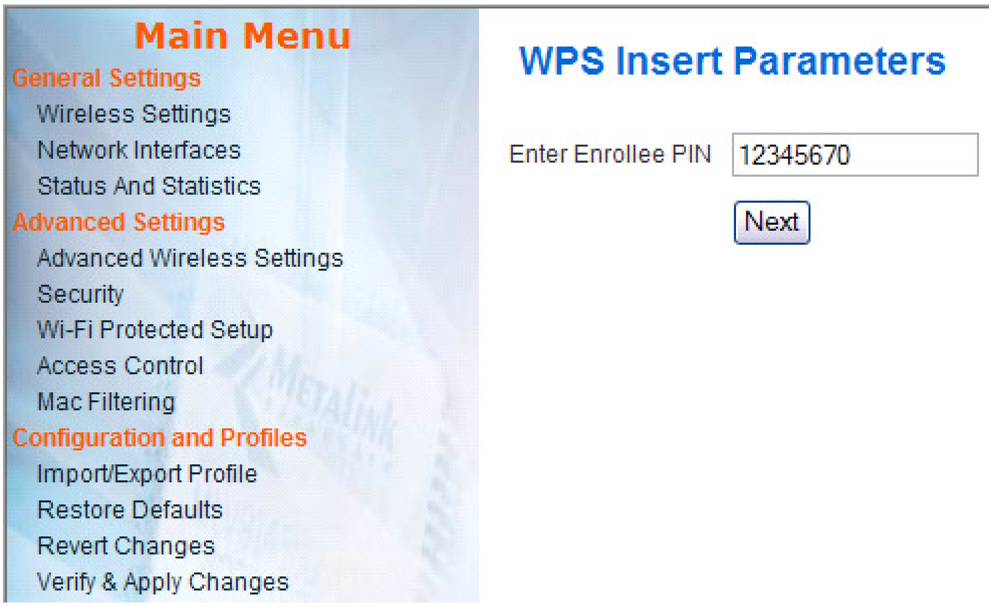
1. In the AP's Configuration Management interface go to **Advanced Settings > Wi-Fi Protected Setup**.
2. In the **WPS Status** field, select **Enabled**.
3. Click **Apply and Reboot**.
   The AP will reboot to apply the changes. This may take a few seconds.
4. In the AP's Configuration Management interface go to **Advanced Settings > Wi-Fi Protected Setup**.
5. In the **Device PIN** field, make sure the PIN number corresponds to the AP's PIN number. To change the PIN number, simply enter a new number into the field.
6. In the STA's Configuration Management interface go to **Advanced Settings > Wi-Fi Protected Setup**.
7. In the **WPS Status** field, select **Enabled**.
8. Click **Apply and Reboot**.
   The STA will reboot to apply the changes. This may take a few seconds.

9. In the STA's **Device PIN** field, ensure the PIN number corresponds to the STA's PIN number. To change the PIN number, simply enter the new number into the field.

IMPORTANT: Write down the STA's PIN number, you will need to enter this number in the AP side.

10. In the **Station Mode** field, ensure **Enrollee** is selected.
11. In the AP, click **Configure via PIN**.

    The WPS Insert Parameters page appears.

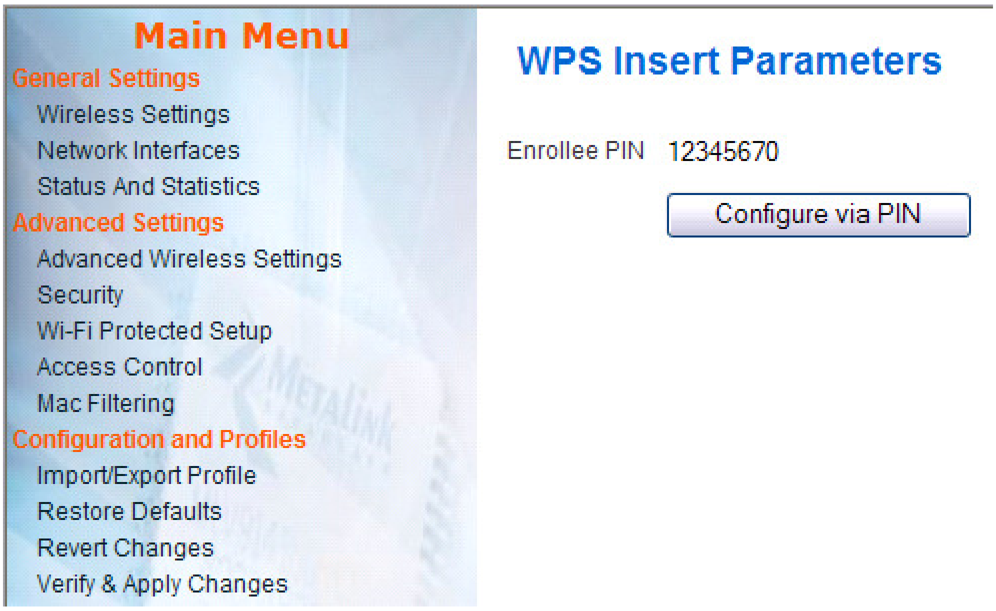


WPS Insert Parameters

Enter Enrollee PIN 12345670

12. In the **Enter Enrollee PIN** field, enter the PIN of the STA (Enrollee).
13. Click **Next**.

    The following page appears:



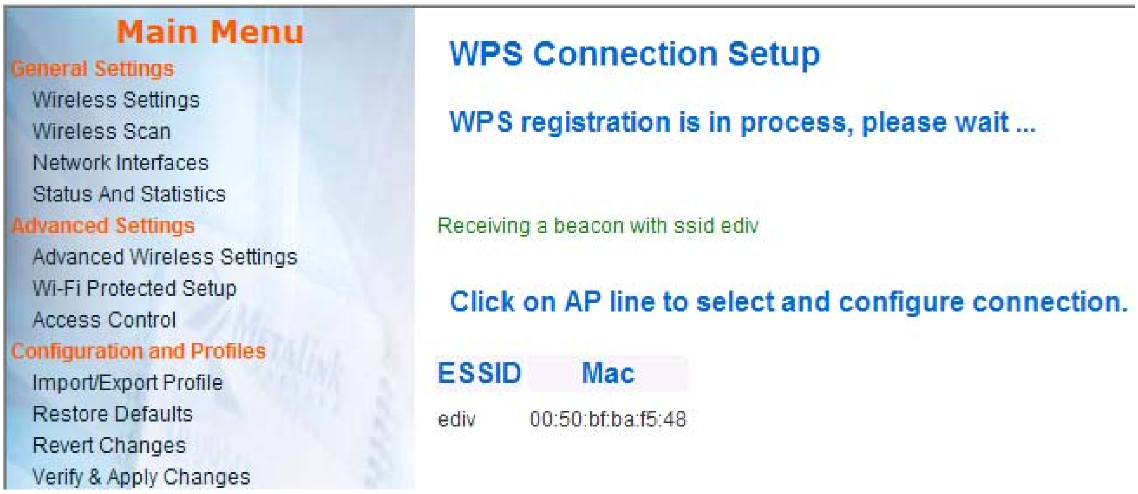
WPS Insert Parameters

Enrollee PIN 12345670

14. Click **Configure via PIN**.

    The AP will search for the corresponding STA.

15. In the STA, in the **Manual AP Selection** field, do one of the following:
    - Select **Yes** if you wish to select the AP from an AP list.
    - Select **No** if you wish to automatically connect to the first available and matching AP.
16. Click **Get configured via PIN**.
    - If you have selected the **No** option in the **Manual AP Selection** field, the STA will connect to the AP and the Successful Registration page displays the security type of the ESSID you have selected.
    - If you have selected the **Yes** option in the **Manual AP Selection** field, the WPS Connection Setup page appears. Proceed to the next step.



WPS Connection Setup

WPS registration is in process, please wait ...

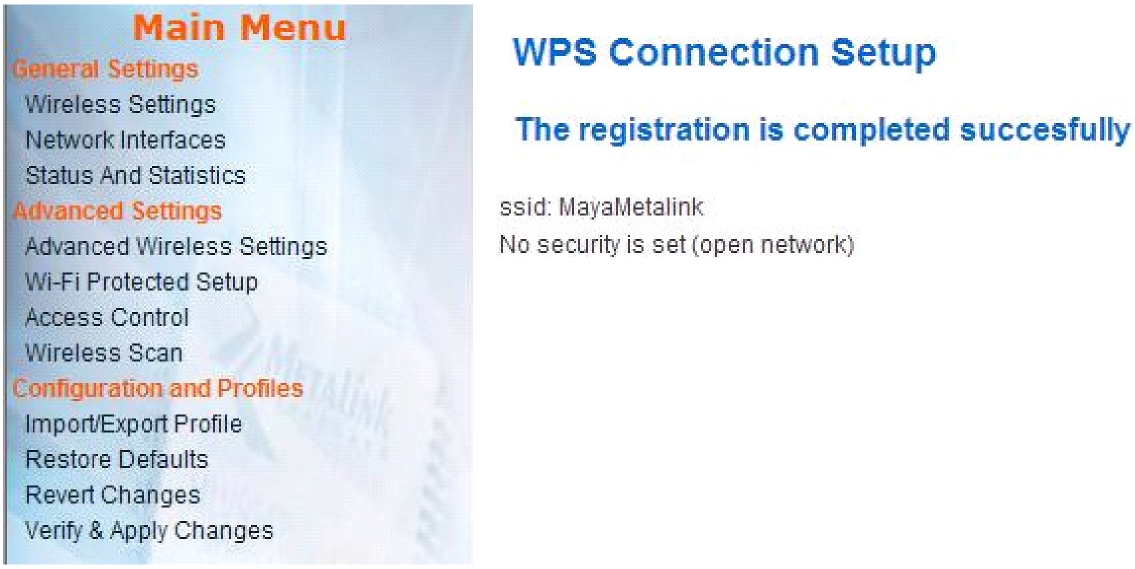
Receiving a beacon with ssid ediv

Click on AP line to select and configure connection.

ESSID	Mac
ediv	00:50:bf:ba:f5:48

17. Select the ESSID you want.

    The Successful Registration page displays the security type of the ESSID you selected.



WPS Connection Setup

The registration is completed succesfully

ssid: MayaMetalink
No security is set (open network)

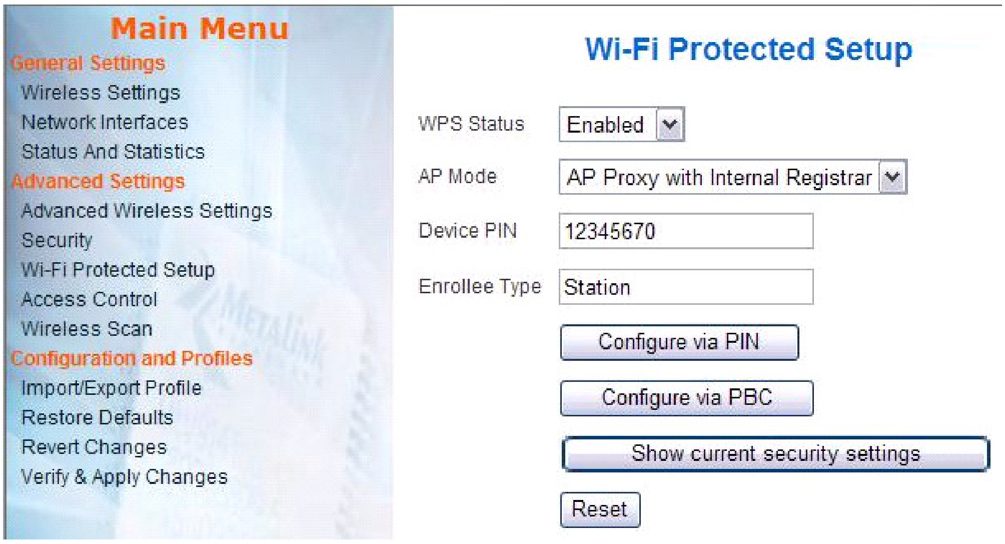
Configuring WPS via PBC

The following procedure enables you to connect to the Wi-Fi Protected Setup by using the Push Button Control of the devices you want to connect:

To configure WPS via PBC:

1. In the AP's Configuration Management interface go to **Advanced Settings > Wi-Fi Protected Setup**.

   The Wi-Fi Protected Setup page appears:



Wi-Fi Protected Setup

WPS Status: Enabled

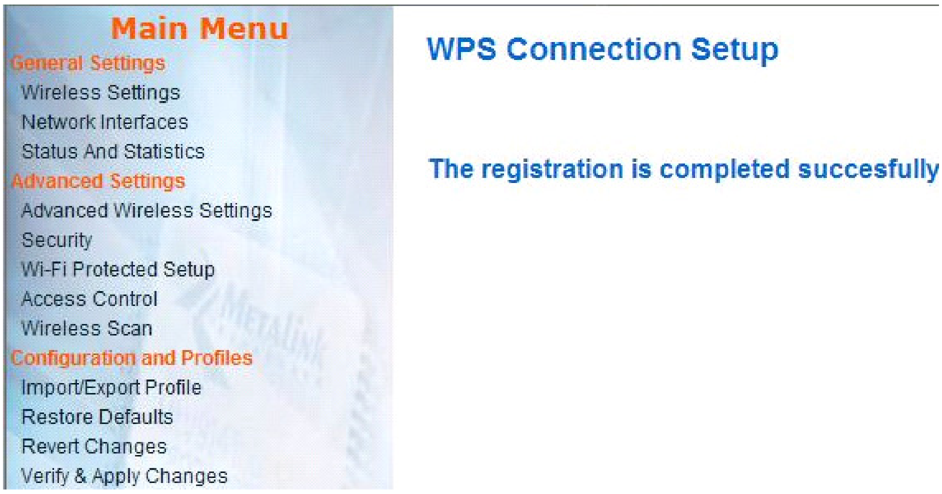
AP Mode: AP Proxy with Internal Registrar

Device PIN: 12345670

Enrollee Type: Station

2. In the **WPS Status** field, select **Enabled**.
3. In the **AP Mode** field, select **AP Proxy with Internal Registrar**.
4. In the **Device PIN** field, enter the PIN number of the device.
5. In the **Enrollee Type** field, enter the word **Station**.
6. To view the settings of the AP, click **Show Current Security Settings**.
7. Click **Configure via PBC**.
8. Press the hardware button of both devices at the same time.

   The devices connect to one another, and the Successful Registration page appears.



WPS Connection Setup

The registration is completed succesfully

4.3.5 Access Control

The Access Control page defines the Aggregation and WMM settings for the following access categories:

- Background
- Best Effort
- Video
- Voice

Each access category is configured separately by configuring the following settings:

Parameter	Description	Values
Use Aggregation <access category>	Defines whether or not the MAC will set up an ADDBA session.	**Yes** **No**
Accept Aggregation <access category>	Defines whether or not the MAC will accept an ADDBA request.	**Yes** **No**
Max Number of Packets in aggregation Background <access category>	Defines the maximum number of packets (sub-frames) in the aggregate.	
Max. Aggregation Size Background <access category>	Defines the maximum size of the aggregate (in bytes).	
Timeout Interval Background <access category>	Defines the timeout period (in time units, TU, where 1TU = 1024 µs) in which the aggregate should be closed with a "closing condition" before it is closed by the timer.	
Min size of packet in Aggregation Background <access category>	Defines the minimum size (in bytes) of a packets to be accumulated into the aggregate.	
ADDBA timeout Background <access category>	Defines the duration, in TUs, after which the ADDBA setup is terminated, if there are no frame exchanges within this duration by the Block Ack agreement.	?? 0 = disables the timeout
Aggregation Window Size Background <access category>	??	
CW min for STA Background <access category> (AP Only)	Defines the minimum contention window limit from which the random backoff is computed for an STA in BSS.	
CW max for STA Background <access category> (AP Only)	Defines the maximum contention window limit from which the random backoff is computed for an STA in BSS.	
AIFSN for STA Background <access category> (AP Only)	Arbitration Interframe Space Number for an STA in the BSS.	

Parameter	Description	Values
TXOP for STA Background <access category> (AP Only	Transmission opportunity for an STA in the BSS.	
CW min for AP Background <access category> (AP Only)	The contention window limits from which the random backoff is computed for AP.	
CW max for AP Background <access category> (AP Only)	The contention window limits from which the random backoff is computed for AP.	
AIFSN for AP Background <access category> (AP Only)	Arbitration interframe space number for AP.	
TXOP for AP Background <access category> (AP Only	Transmission opportunity for AP.	

4.4 Configuration and Profiles

WLANPlus features the ability to create and use configuration profiles. The configuration profiles are predefined configuration settings that can be used at any time.

4.4.1 Import/Export Configuration

Configuration settings can be imported and exported to a PC.

To import a configuration file:

1. Connect the Evaluation Kit to the PC from which you wish to import the file.
2. In the Configuration Management interface, go to **Configuration and Profiles > Import/Export Profile**.
3. Click **Browse**.
4. Select the configuration file you wish to upload (saved before).
5. Click **Upload**.

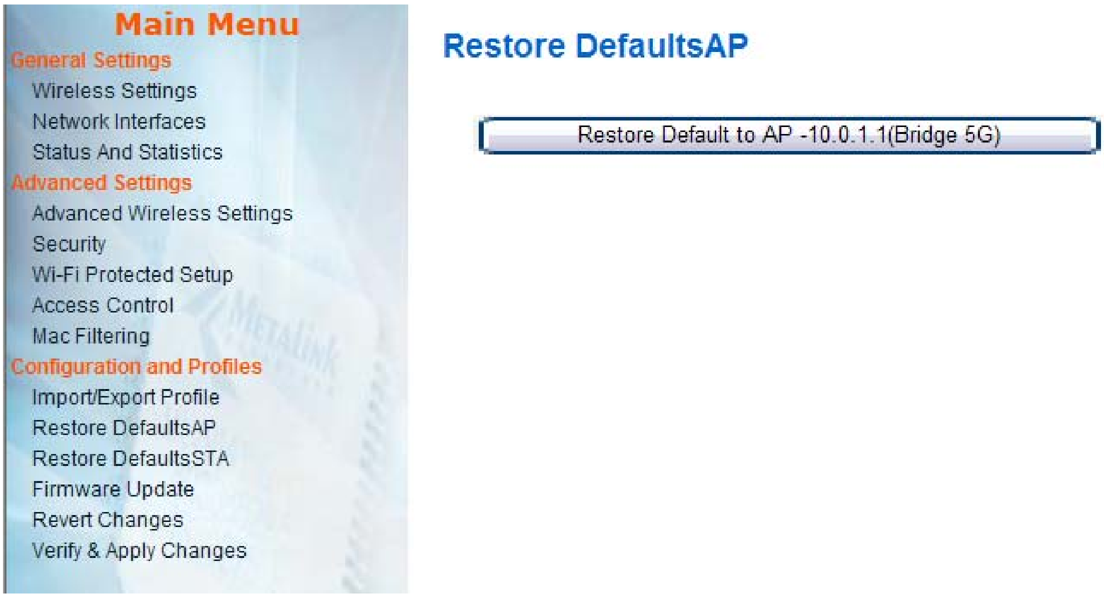
To export a configuration file:

1. Connect the Evaluation Kit to the PC to which you wish to export the file.
2. In the Configuration Management interface, go to **Configuration and Profiles > Import/Export Profile**.
3. Click **Download.**

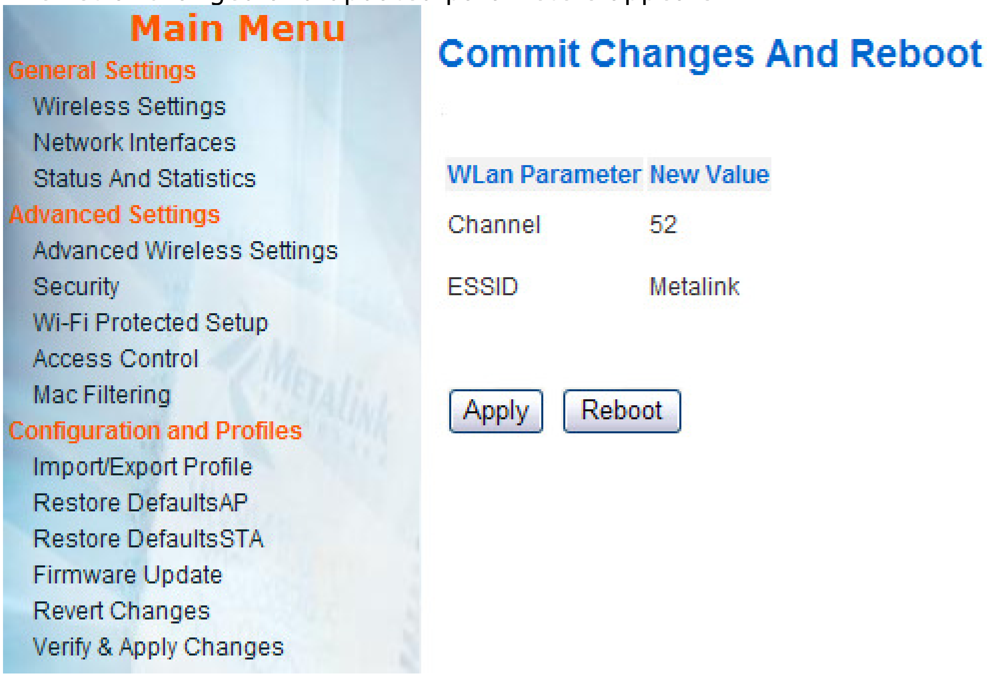
4.4.2 Restore Defaults (AP)

To load a Default Profile for AP

1. From the Main Menu, select **Restore Defaults AP**.
2. Click the **Restore defaults** button.



The list of changed and updated parameters appears:



WLan Parameter	New Value
Channel	52
ESSID	Metalink

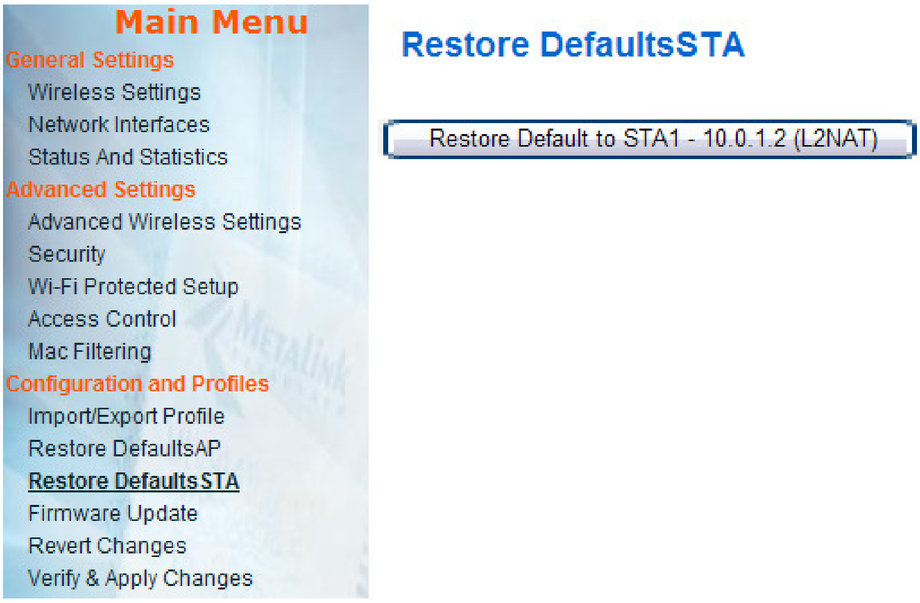
To save the configuration, click **Apply**. If some parameters needed to be changed, change them then apply the changes and reboot. (For example, to set a unique ESSID,) go to the wireless setting screen, change the ESSID, click **Apply** then click **Reboot**.

NOTE: If the device is restarted without applying the changes, the changes will not be saved.

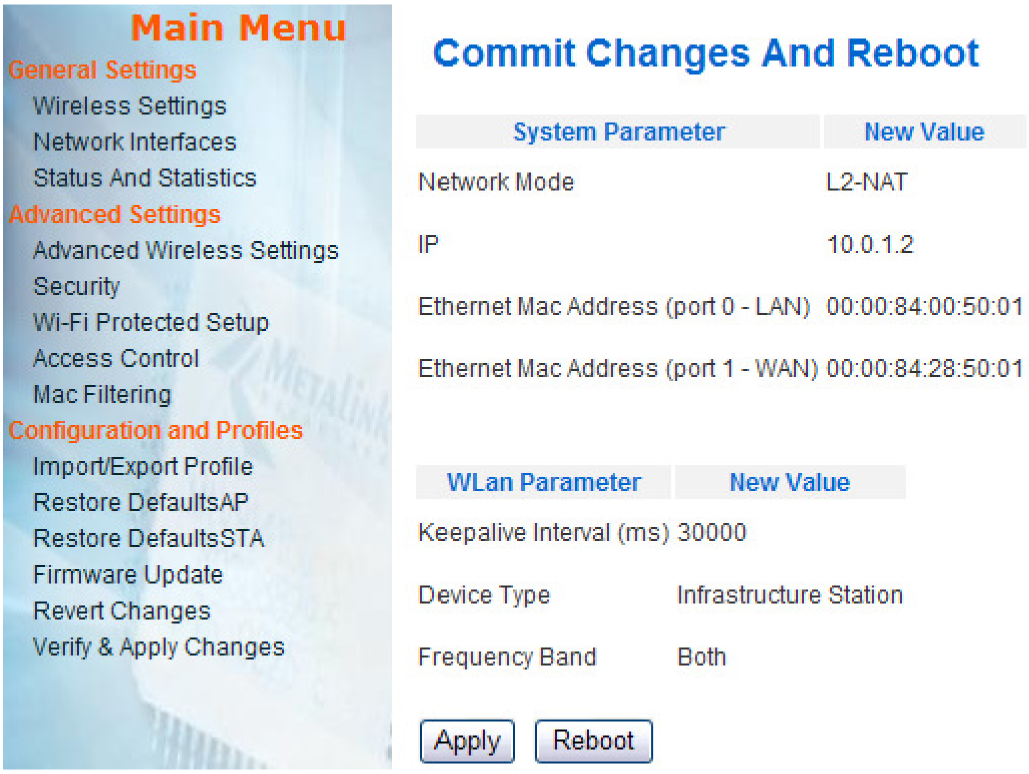
4.4.3 Restore Defaults (Station)

To load a Default Profile for station (Video Bridge)

1. From the Main Menu, select **Restore Defaults STA**.
2. Click the **Restore defaults** button.



3. The list of changed and updated parameters appears:



Commit Changes And Reboot

System Parameter	New Value
Network Mode	L2-NAT
IP	10.0.1.2
Ethernet Mac Address (port 0 - LAN)	00:00:84:00:50:01
Ethernet Mac Address (port 1 - WAN)	00:00:84:28:50:01

WLan Parameter	New Value
Keepalive Interval (ms)	30000
Device Type	Infrastructure Station
Frequency Band	Both

4. To save the configuration, click **Apply**.

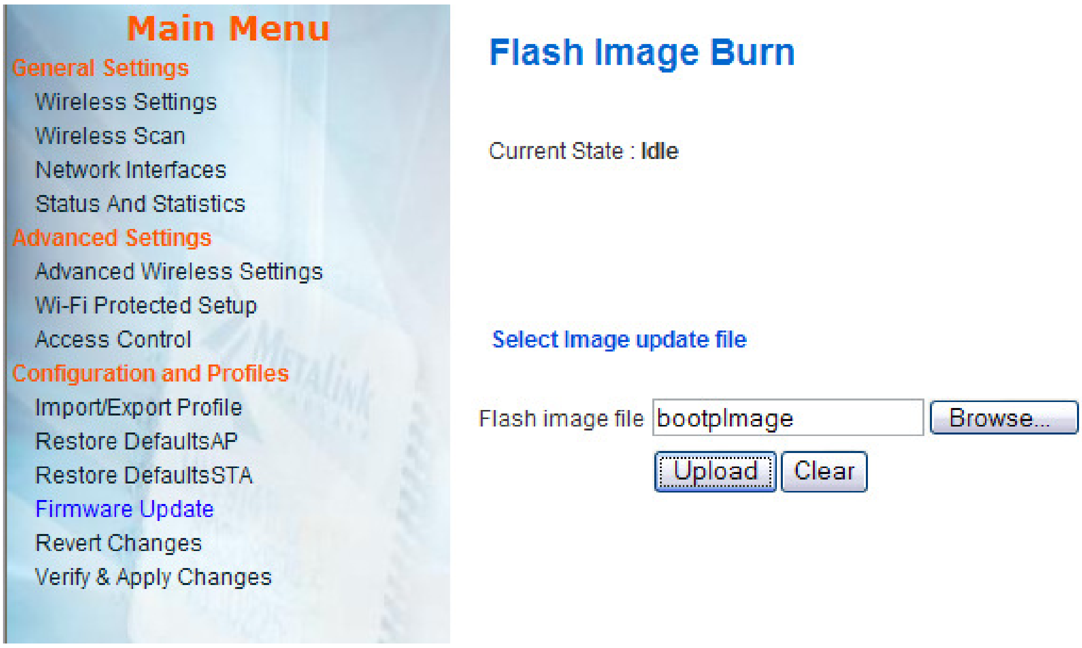
NOTE: If the device is restarted without applying the changes, the changes will not be saved.

4.4.4 Firmware Updates

To update firmware version to a device

1. From the Main Menu, click **Firmware Update**.
2. Click **Browse** and select the new firmware file to be loaded.

NOTE: Ensure you select the file with the new firmware version. The file name must be "*bootpImage*". Other files will not be uploaded to protect from burning wrong file.



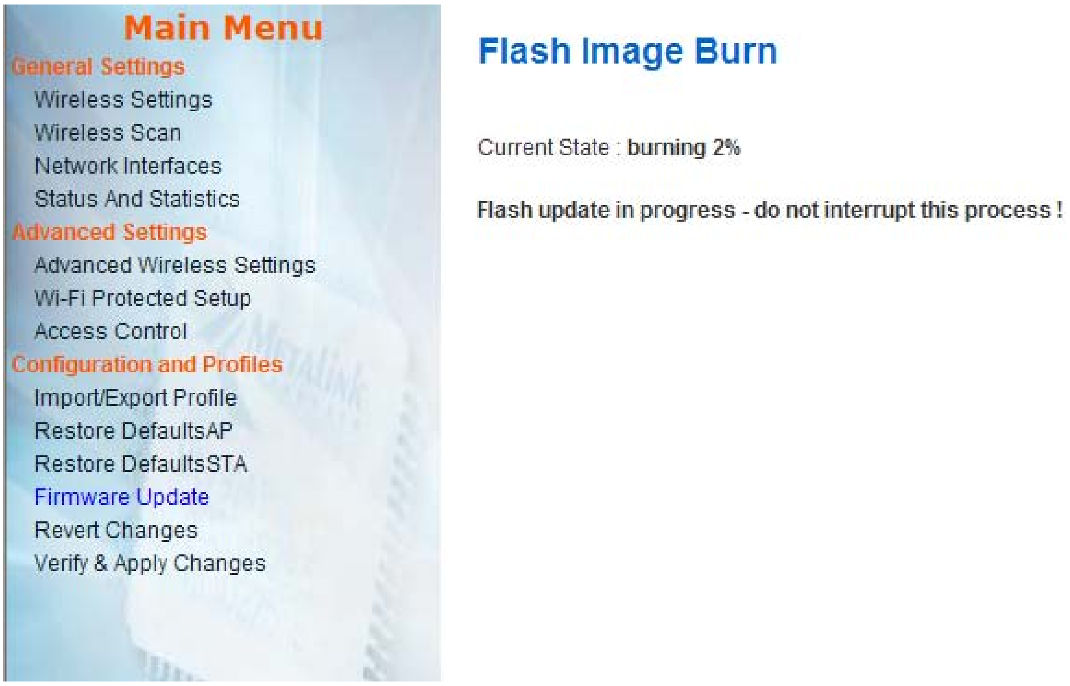
Current State : Idle

Flash image file bootpImage

3. To start the firmware update process, click **Upload**.

   The percentage of the burning process will appear on the screen.

IMPORTANT: Before the upgrade completes, do not interrupt the process, reboot the device, or turn off the power.

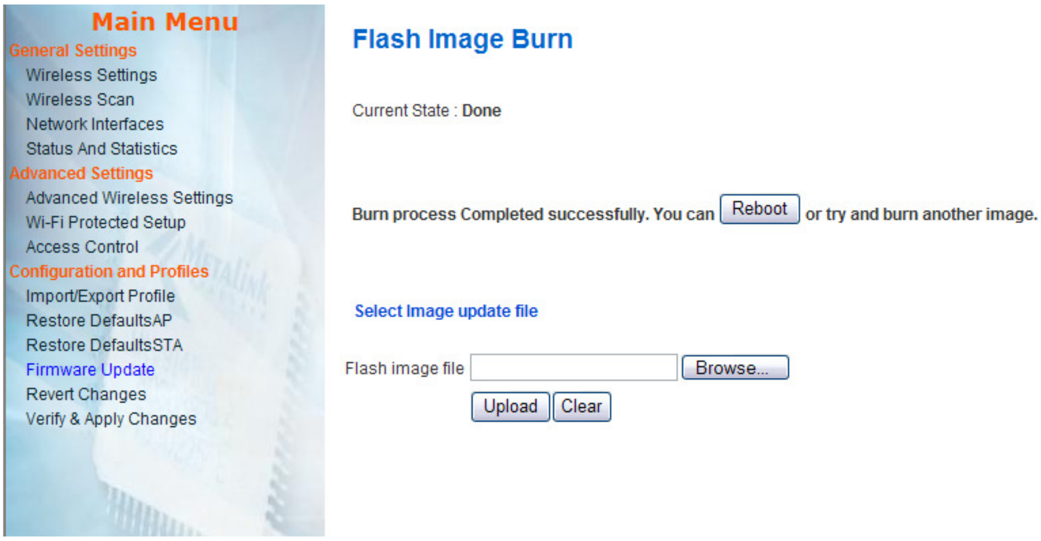


Flash Image Burn

Current State : burning 2%

Flash update in progress - do not interrupt this process !

When the new Firmware update is finished, a notification appears.



Flash Image Burn

Current State : Done

Burn process Completed successfully. You can Reboot or try and burn another image.

Select Image update file

Flash image file

4. Click **Reboot**.

   After the firmware update is complete, it is advised to restore the defaults to verify that the new functions in the updated firmware are working correctly. For instructions, see Restore Defaults (AP) (page 50) or Restore Defaults (Station) (page 51).

4.4.5 Revert Changes

The Revert Changes module contains the following functions that control H/W settings:

- **Revert** – reverts to the previous configuration settings
- **Reboot** – reboots the Evaluation Kit

To revert to previous settings:

1. In the Configuration Management interface, go to **Configuration and Profiles > Revert Changes**.
2. Click **Revert**.
3. Click **Apply**.

To reboot the Evaluation Kit:

1. In the Configuration Management interface go to **Configuration and Profiles > Revert Changes**.
2. Click **Reboot**.

4.4.6 Verify and Apply Changes

The Verify and Apply Changes function performs a global commit of the changes made.

To verify and apply changes:

1. In the Configuration Management interface go to **Configuration and Profiles > Verify and Apply Changes**.

   The Commit Changes And Reboot window opens.
2. To apply the changes, click **Apply**.
   -or-

   To reboot the AP/STA, click **Reboot**.

5. Streaming Video over WLANPlus

In this chapter

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Streaming Video with VideoLAN Media Player 56
Receiving Video with VideoLAN Media Player 58
Setting VideoLAN Media Player for Multicast Mode........ 58
Installing NFS.. 59

5.1 Overview

This chapter describes two ways to stream video from the AP to the STA(s):

- **Unicast Streaming** – a straightforward method for video streaming. The WLANPlus evaluation kit CD-ROM includes a Unicast streaming program called VideoLAN Media Player. VideoLAN is used for both streaming and receiving or playing-back the video stream. Therefore, it should be installed on both the Video Streamer and the Video Receiver. This method does not incorporate a retransmission mechanism, and it is therefore more susceptible to video glitches.
- **NFS Streaming** – NFS is Linux's "Network File System". It may be used to stream video. This method includes a retransmission mechanism, which reduces its susceptibility to video glitches caused by link interferences.

5.2 Installing the VideoLAN Media Player

The VideoLAN Media Player should be installed on both the Video Streamer and the Video Receiver. If you wish to stream to more than one station simultaneously, you will need to run a different instance of VideoLAN Media Player to play each stream separately.

To Install VideoLAN Media Player on the Video Streamer:

1. Insert the WLANPlus CD-ROM into the Video Streamer CD-ROM drive.
2. Open the VideoLAN folder.
3. Double click **vlc-0.8.5-win32.exe**
4. Follow the on-screen instructions.

For Linux-based Video Streamers, VideoLAN should be available as part of your Linux distribution package. Refer to the OS documentation for installation instructions.

To install VideoLAN Media Player on the Video Receiver:

1. Insert the WLANPlus CD-ROM into the Video Streamer CD-ROM drive.
2. Open the VideoLAN folder.
3. Double click **vlc-0.8.5-win32.exe**
4. Follow the on-screen instructions.

   To setup multiple stations, repeat for each station.

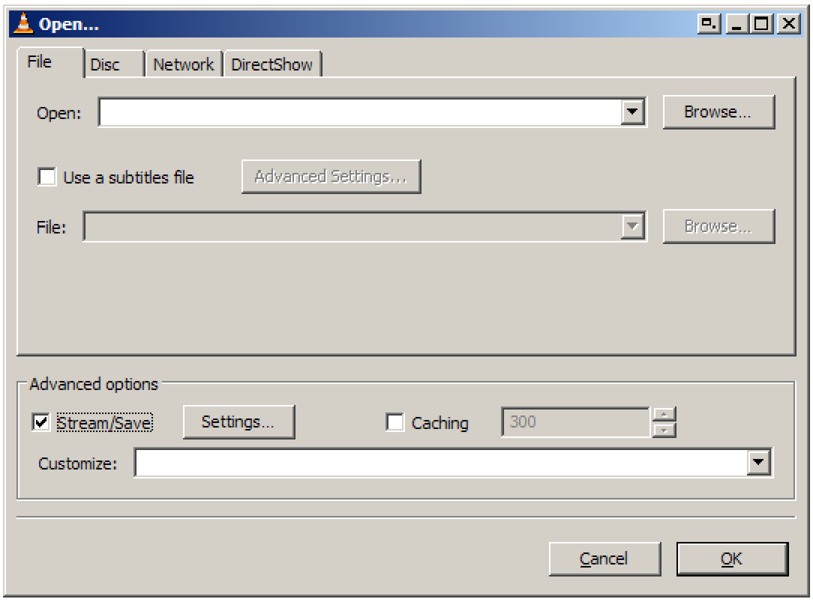
5.3 Streaming Video with VideoLAN Media Player

To stream to more than one station simultaneously, you will need to run a different instance of VideoLAN Media Player for each stream.

To run VideoLAN Media Player on the Video Streamer:

1. From the **Start** >**Programs** menu, select **VideoLAN Media Player**.
2. From the **File** menu select **Open File**.

   The Open… window appears with the File tab selected.



☐ Use a subtitles file

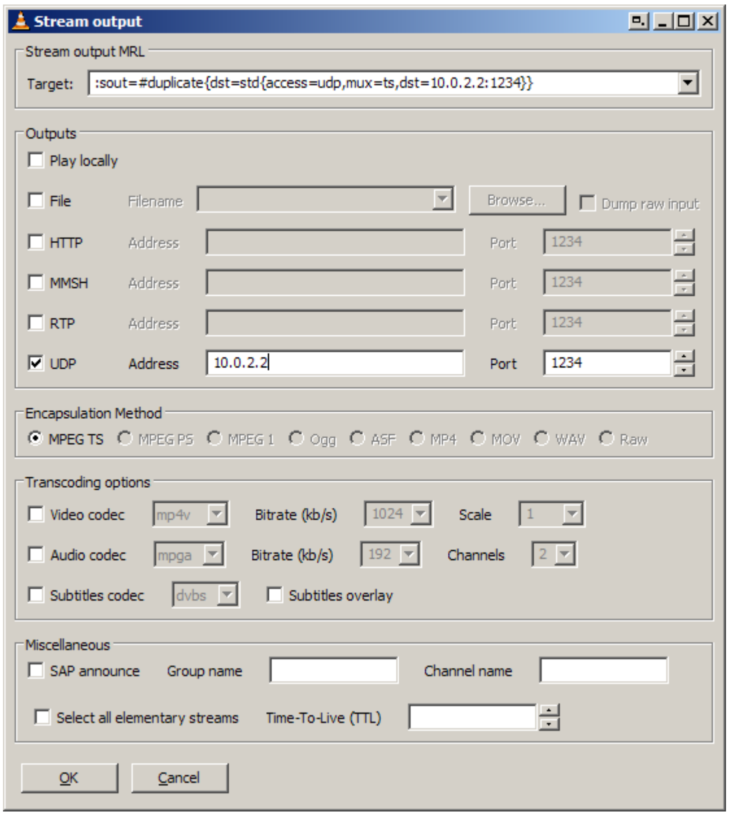
☑ Stream/Save

☐ Caching 300

3. Select the **Stream/Save** checkbox at the bottom.

4. Click **Settings**.

   The Stream Output window appears.



Target: :sout=#duplicate{dst=std{access=udp,mux=ts,dst=10.0.2.2:1234}}

☑ UDP Address 10.0.2.2 Port 1234

● MPEG TS

5. Do one of the following:
   - For UDP output, check the UDP checkbox.
   - For RTP output, check the RTP checkbox.
6. Enter the IP address of the Video Receiver (destination) into the Address field.
7. Enter the Port number of the Video Receiver into the Port field. The default number, “1234”, can be used unless you required otherwise.
8. Click **OK**.
9. In the Open window click **Browse**.

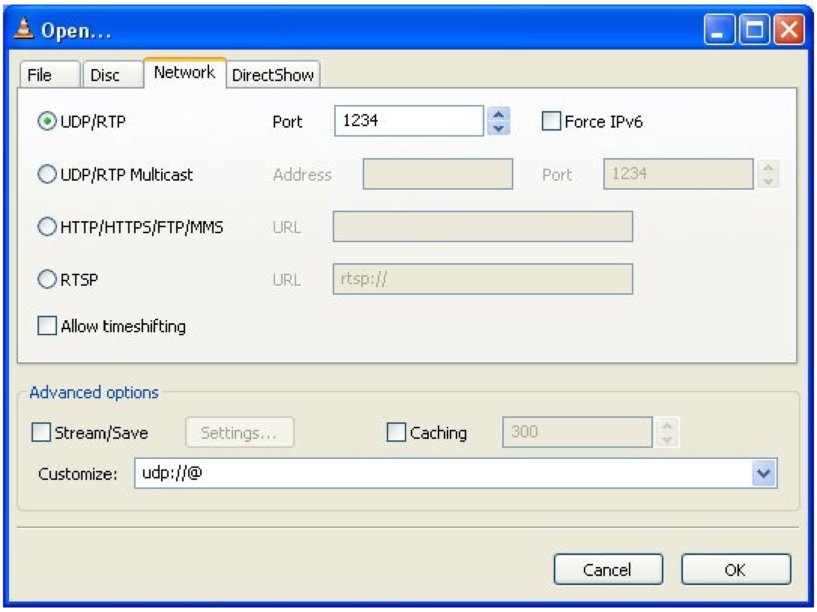
   A file system window appears.
10. Select the file you wish to stream.
11. Click **OK**.
12. To stream to more than one station simultaneously, install an additional instance of VideoLAN Media Player and repeat the procedure.

5.4 Receiving Video with VideoLAN Media Player

The video stream can be played back by a separate instance of VideoLAN Media Player that is installed on the Video Receiver.

To run VideoLAN Media Player on the Video Receiver:

1. From the **Start** >**Programs** menu, select **VideoLAN Media Player**.
2. From the **File** menu select **Open Network Stream**.
   The Open Network Stream window appears with the Network tab selected.



● UDP/RTP Port 1234 □ Force IPv6

○ UDP/RTP Multicast Address Port 1234

○ HTTP/HTTPS/FTP/MMS URL

○ RTSP URL rtsp://

□ Allow timeshifting

□ Stream/Save □ Caching 300

Customize: udp://@

3. Select **UDP/RTP** (default).
4. Enter the Port number in the Port field. If you did not change the default value on the Video Streamer's port settings (1234), use the default value.
5. Click **OK**.

5.5 Setting VideoLAN Media Player for Multicast Mode

Considering that proper multicast configuration was set in the Evaluation Kit, different configurations of the VLC are required.

To configure the VLC at the AP:

1. In the VLC program, click **File** > **Open File** and select a file to be streamed.
2. Click **Settings**, in the Send to a multicast field, enter the following multicast address: 225.0.0.0 to 239.255.255.255
3. Under Miscellaneous, change the TTL (Time to Live) field to 4.
4. Click **OK**.

To configure the VLC at the STA:

1. In the VLC program, click **File** >**Open Network Stream**.
2. Under Settings, in the UDP/RTP Multicast field, enter the address as set in the AP side as multicast.
3. Click **OK**.

5.6 Installing NFS

The NFS (Network File System) offers a good solution to streaming video over UDP in problematic link interference conditions. To use NFS, you will need to install an NFS Server on the Video Streamer, and an NFS Client on the Video Receiver. Although instructions are given for Red Hat Linux systems, the information is relevant for other Linux distributions as well.

To install an NFS server on a Linux-based Video Streamer:

1. From the **Application** menu, open **System Settings** and select **Services**.

   The Services window appears.
2. Select the **NFS** checkbox.
3. Create a new directory (for example, "/shared"). This directory will be exported to the NFS clients.
4. Locate the video file to be streamed and copy it into this directory.
5. To define the directories to be exported to the NFS clients and their access rights, edit the /etc/exports file as follows: <path> <ip_mask> (permission, access type)

   For example:

   ```
   #
   /shared 10.10.*.*(ro,sync)
   ```

   Available parameters:

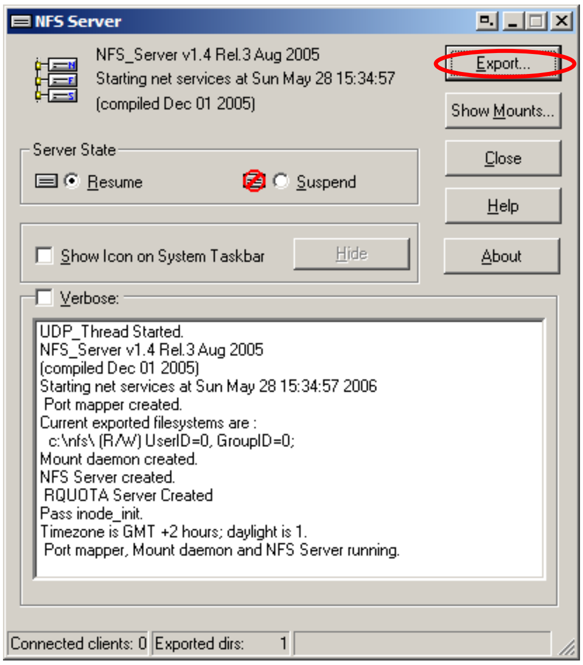
   - **Path** (for example, /shared) - Name of the directory containing the video files to be shared
   - **IP Mask** (for example, 10.10.*.*) - IP mask for addresses that are allowed to access this directory
   - **Permissions** (for example, ro) - The access type for each IP mask
   - **Access Type** (for example, sync) - Specifies whether the access is synchronous or asynchronous
6. For these changes to take affect do one of the following:
   - Restart the Video Streamer.
   - Call "/etc/rc.d/nfsserver restart" (this may not work on every Linux distribution).

   The NFS server is now installed.

To install and setup NFS Server on the a Windows-based Video Streamer:

1. Insert the *WLANPlus CD*-ROM into the Video Streamer CD-ROM drive.
2. Open the **nfsAxe** folder.
3. Double click the **setup.exe** file.
4. Follow the on-screen instructions.
5. Launch the NFS server from the **Programs** menu.
6. First time users only - Click **Yes** to create a list of exported directories.

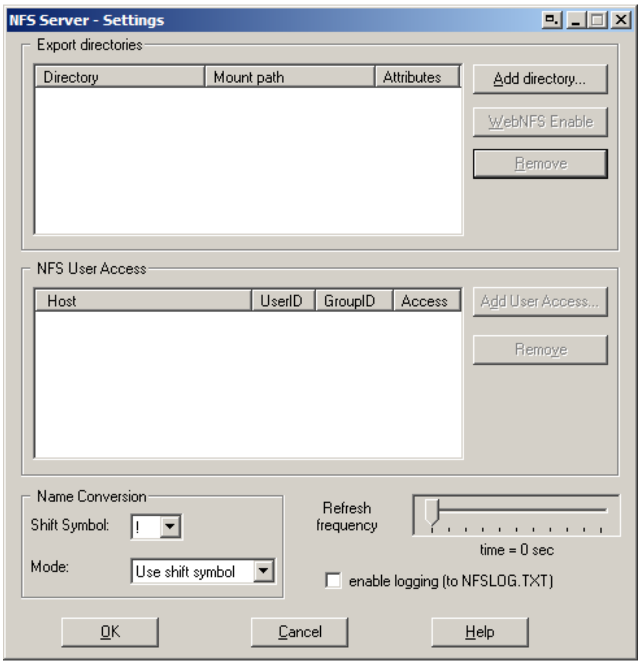
7. In the NFS Server screen, click **Export.**



```
NFS_Server v1.4 Rel.3 Aug 2005
Starting net services at Sun May 28 15:34:57
(compiled Dec 01 2005)
```

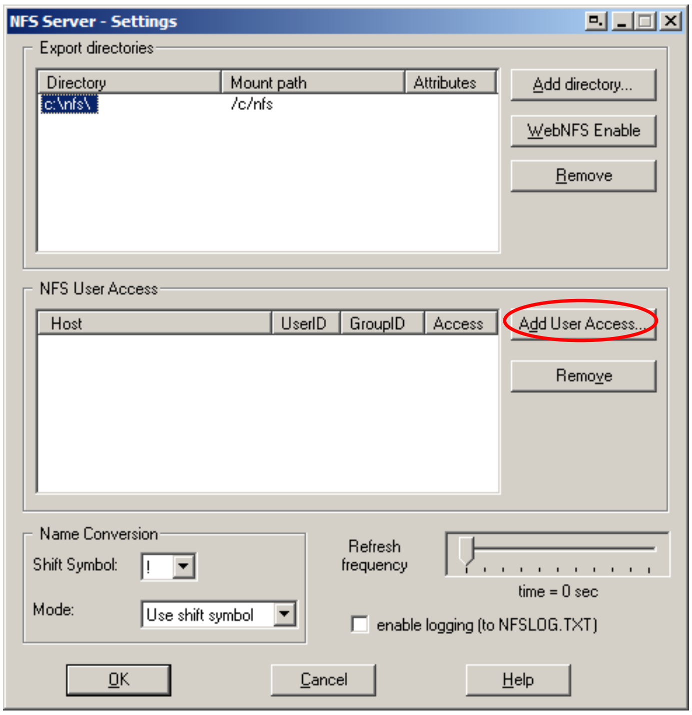
```
UDP_Thread Started.
NFS_Server v1.4 Rel.3 Aug 2005
(compiled Dec 01 2005)
Starting net services at Sun May 28 15:34:57 2006
 Port mapper created.
Current exported filesystems are :
  c:\nfs\ (R/W) UserID=0, GroupID=0;
Mount daemon created.
NFS Server created.
 RQUOTA Server Created
Pass inode_init.
Timezone is GMT +2 hours; daylight is 1.
 Port mapper, Mount daemon and NFS Server running.
```

The **NFS Settings** screen appears:



8. Click **Add Directory** and select the directory you want to export.

9. Select the directory, and click **Add User Access**.



Directory	Mount path	Attributes
c:\nfs\	/c/nfs	

Host	UserID	GroupID	Access

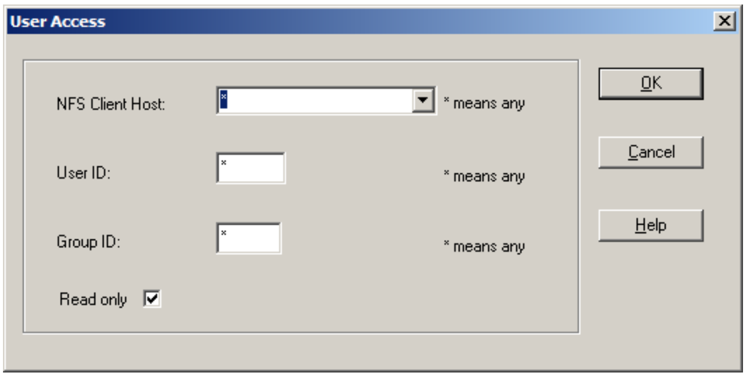
Shift Symbol: !

Mode: Use shift symbol

time = 0 sec

□ enable logging (to NFSLOG.TXT)

The **User Access** window appears:



NFS Client Host: * — * means any

User ID: * — * means any

Group ID: * — * means any

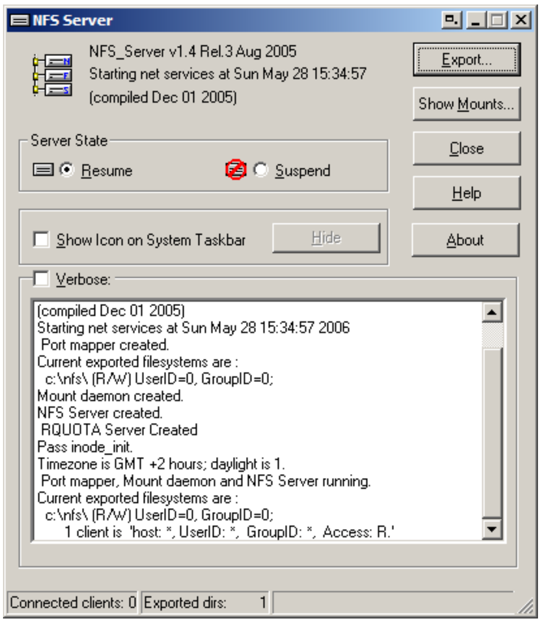
Read only ☑

10. To restrict access enter one of the following:
    - A specific **NFS Client Host**
    - A specific **User ID**
    - A specific **Group ID**

TIP: If you do not want to restrict access to the shared content, do not make any changes and click **OK**.

11. Click **OK**.

12. In **Server State** select **Resume.**



```
NFS_Server v1.4 Rel.3 Aug 2005
Starting net services at Sun May 28 15:34:57
(compiled Dec 01 2005)
```

Server State: ● Resume ○ Suspend

□ Show Icon on System Taskbar

□ Verbose:

```
(compiled Dec 01 2005)
Starting net services at Sun May 28 15:34:57 2006
 Port mapper created.
Current exported filesystems are :
  c:\nfs\ (R/W) UserID=0, GroupID=0;
Mount daemon created.
NFS Server created.
 RQUOTA Server Created
Pass inode_init.
Timezone is GMT +2 hours; daylight is 1.
 Port mapper, Mount daemon and NFS Server running.
Current exported filesystems are :
  c:\nfs\ (R/W) UserID=0, GroupID=0;
      1 client is  'host: *, UserID: *,  GroupID: *,  Access: R.'
```

Connected clients: 0 | Exported dirs: 1

The NFS Server is ready.

In order to access the folder exported by the NFS server, you need to perform a “mount” operation.

To setup NFS Client on a Linux-based Video Receiver:

1. Create a local folder in the video receiver file system. This folder will be the mount point. For example, the folder named can be called “/mounted”.
2. Call the “mount” command: `mount -t nfs server-IP:/shared /mounted`

   The new folder is mapped to the remote folder “/shared” on the NFS server.
3. Try to access “/mounted” and check that you can see the files stored on the NFS server under the folder “/shared”.

   The procedure below describes a quicker method for performing mounts and should be used to perform multiple “mounts”.

To setup NFS Client on a Linux-based Video Receiver to perform "multi-mounts":

1. Open the `/etc/fstab` file.
2. Add the following line:

   ```
   <server>:</path/of/dir> </local/mnt/point> nfs <options> 0 0
   ```

   For example:

   ```
   Server-IP:/shared /mounted nfs -o rsize=8192,wsize=8192,intr
   ```
3. Call the “mount” command: `mount -a nfs server-IP:/shared /mounted`

   The new folder is mapped to the remote folder “/shared” on the NFS server.
4. Try to access “/mounted” and check that you can see the files stored on the NFS server under the folder “/shared”.

Appendix A: Default Settings for AP Profile

AP - band 5.2Ghz HT CB Aggr Bridge mode Addr 10.0.1.1

Page Name	Parameter Name	Value
Wireless settings	Device Type	Access Point
	Frequency Band	If the board supports 5GHz this is the frequency, otherwise 2.4 Ghz.
	Channel	Auto
	Spectrum BW usage	40MHz
	Secondary channel offset	Upper
	ESSID	Metalink
	IP	10.0.1.1
Network Interfaces	Subnet	255.255.255.0
	Ethernet Mac Address (port 0 - LAN)	00:00:84:00:50:99
	Ethernet Mac Address (port 1 - WAN)	00:00:84:28:50:99
	Network mode	Bridge
	Wireless LAN Mac Address	Received from the module's EEPROM
	Use Radar Detect	No
	Use LDPC	Yes
	Use Hidden SSID	No
	ERP Protection Type	RTC/CTS

Page Name	Parameter Name	Value
	Use Overlapping BSS Protection	Yes
	11n Protection Type	RTC/CTS
	Enable AP forwarding	Yes
	Use reliable multicast	Yes
	Percentage of maximal transmit power	100%
	WPS Status	Disabled
	Current Security Mode	Open
Wi-Fi Protected Setup	Maximum number of allowed connections	16
Security	Access control mode	Open
MAC Filtering	Use Aggregation	NO
	Accept Aggregation	Yes
Access Control - Background	Max. Number Of Packets in aggregation	7
	Max. Aggregation size	12000
	Timeout Interval	3
	Min. size of packet in Aggregation	10
	ADDBA timeout	0
	Aggregation Window Size	64
	CW min for STA	15
	CW max for STA	1023
	AIFSN for STA	7
	TXOP for STA	0
	CW min for AP	15
	CW max for AP	1023
	AIFSN for AP	7
	TXOP for AP	0
	Use Aggregation	Yes
	Accept Aggregation	Yes

Page Name	Parameter Name	Value
Access Control – Best Effort	Max. Number Of Packets in aggregation	10
	Max. Aggregation size	16000
	Timeout Interval	3
	Min. size of packet in Aggregation	10
	ADDBA timeout	0
	Aggregation Window Size	64
	CW min for STA	15
	CW max for STA	1023
	AIFSN for STA	3
	TXOP for STA	0
	CW min for AP	15
	CW max for AP	63
	AIFSN for AP	3
	TXOP for AP	0
	Use Aggregation	Yes
	Accept Aggregation	Yes
Access Control – Video	Max. Number Of Packets in aggregation	7
	Max. Aggregation size	12000
	Timeout Interval	3
	Min. size of packet in Aggregation	10
	ADDBA timeout	0
	Aggregation Window Size	64
	CW min for STA	7
	CW max for STA	15
	AIFSN for STA	2
	TXOP for STA	3008
	CW min for AP	7
	CW max for AP	15
	AIFSN for AP	1
	TXOP for AP	3008

Page Name	Parameter Name	Value
	Use Aggregation	Yes
	Accept Aggregation	Yes
Access Control – Voice	Max. Number Of Packets in aggregation	2
	Max. Aggregation size	10000
	Timeout Interval	10
	Min. size of packet in Aggregation	10
	ADDBA timeout	0
	Aggregation Window Size	64
	CW min for STA	3
	CW max for STA	7
	AIFSN for STA	2
	TXOP for STA	1504
	CW min for AP	3
	CW max for AP	7
	AIFSN for AP	1
	TXOP for AP	1504

Appendix B: Default Settings for STA(x) Profile

STA1 HT Aggr WDS mode Addr 10.0.1.2

Page Name	Parameter Name	Value
Wireless settings	Device Type	Infrastructure Station
	Frequency Band	Depends on the board type
Network Interfaces	IP	10.0.1.2
	Subnet	255.255.255.0
	Ethernet Mac Address (port 0 - LAN)	00:00:84:00:50:01
	Ethernet Mac Address (port 1 - LAN)	00:00:84:28:50:01
	Enable bridge mode	Bridging – MAC Cloning
	Wireless LAN Mac Address	Received from the module's EEPROM
Advanced Wireless Settings	Use Radar Detect	No
	Use LDPC	Yes
	ERP Protection Type	RTS/CTS
	11n Protection Type	RTS/CTS
	Percentage of maximal transmit power	100%
	Use Aggregation	No
	Accept Aggregation	Yes
	Max. Number Of Packets in aggregation	7

Page Name	Parameter Name	Value
	Max. Aggregation size	12000
	Timeout Interval	3
	Min. size of packet in Aggregation	10
	Aggregation Window Size	64
Access Control – Best Effort	Use Aggregation	Yes
	Accept Aggregation	Yes
	Max. Number Of Packets in aggregation	10
	Max. Aggregation size	16000
	Timeout Interval	3
	Min. size of packet in Aggregation	10
	ADDBA timeout	0
	Aggregation Window Size	64
Access Control – Video	Use Aggregation	Yes
	Accept Aggregation	Yes
	Max. Number Of Packets in aggregation	7
	Max. Aggregation size	12000
	Timeout Interval	3
	Min. size of packet in Aggregation	10
	ADDBA timeout	0
	Aggregation Window Size	64
Access Control – Voice	Use Aggregation	Yes
	Accept Aggregation	Yes
	Max. Number Of Packets in aggregation	2
	Max. Aggregation size	10000

	Timeout Interval	10
	Min. size of packet in Aggregation	10
	ADDBA timeout	0
	Aggregation Window Size	64
Wi-Fi Protected Setup	WPS Status	Disabled
Wireless Scan	ESSID / Wildcard	Empty

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