

H3C RF MODULE EWPA1PCID**USER MANUAL**

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FCC NOTICE

This module has been tested and found to comply with the limits for a Class B digital module, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This module 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 module does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Connect the computer into an outlet on a circuit different from that to which the receiver is connected.
- Increase the separation between the computer and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

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

FCC Compliance Statement:

This module complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This module may not cause harmful interference
2. This module must accept any interference received, including interference that may cause undesired operation.

This module must accept any interference received, including interference that may cause undesired operation.

Products that contain a radio transmitter are labelled with FCC ID and may also carry the FCC logo.

Caution:

Exposure to Radio Frequency Radiation.

To comply with the FCC RF exposure compliance requirements, the following antenna

installation and module operating configurations must be satisfied:

For configurations using an approved external antenna, the separation distance between the antenna and any person's body (including hands, wrists, feet and ankles) must be at least 20cm (8 inch).

The transmitter shall not be collocated with other transmitters or antennas.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

This module is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their endproduct for any additional compliance requirements required with this module installed (for example, LVD TV ...etc.).

CAUTION: This module only could work when being installed into "client device" which could not transmit automatically, such as ROUTER or AP. , with the software driver limit.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

WARNING:

This Wireless Mini PCI Adapter does not support ad-hoc mode function

End Product Labeling

This transmitter module is authorized only for use in module where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: **"Contains FCC ID: U6I-RTV1SAPPCID"**

ICES 003 Statement

This Class B digital apparatus complies with Canadian ICES-003.

Declaration of Conformity

H3C, Inc. declares the following:

Product Name: H3C RF Module EWPA1PCID

Model No.: conforms to the following Product Standards:

Radiated Emission Standards:

ETSI EN 300 328-2: July 2000; FCC: 47 CFR Part 15, Subpart B, ANSI C63.4-1992; 47 CFR Part 15, Subpart C (Section 15.247), ANSI C63.4-1992.

Conducted Emission Standards:

ETS 300 826: Nov. 1997.

Immunity Standards:

IEC 801-2; IEC 801-3; IEC 801-4

Low Voltage Directive:

EN 60 950:1992+A1; 1993+A2; 1993+A3; 1995+A4; 1996+A11; 1997

Therefore, this product is in conformity with the following regional standards:

FCC Class B following the provisions of FCC Part 15 directive;

CE Mark following the provisions of the EC directive.

This Class B digital apparatus complies with Canadian ICES-003.

Product Overview

• Introduction

EWPA1PCID Module is dual-band, multi-mode, IEEE 802.11 b/g WLANs. It integrates a 2.4GHz radio, analog-to-digital and digital-to-analog (ADC/DAC) converters, a base-band processor, multi-protocol media access control (MAC), high speed UART, and a PCI/Card Bus host interface. It enable a high performance, cost effective, low power, compact solution that easily fit onto one side of a Mini PCI or PCI Card.

EWPA1PCID RF Module is one part of H3C MSR 20-1X series routers. With this module inside the Routers, which support WLAN function. As high-quality governmental, business and commercial sites oriented routers, the H3C MSR 20-1X series routers are multifunction routers developed for small businesses, branches of businesses, and home users. While “high quality business and commercial sites” need to satisfy users’ requirements for broadband, wireless and voice access modes and provide VPN and QoS supports, they have a high demand for the performance, stability, security and manageability of the router devices. The most significant characteristics of the MSR 20-1X series routers are high performance-to-cost ratio and low price. The routers provide different types of built-in communication interfaces to interface with networks of different types of media, and provide an SIC/DSIC slot for interface capability expansion.

Basic Setup

This chapter outlines the basic requirement for the installation and configuration of the module. This module is a part of H3C MSR 20-1X router . You must plug it into the router’s PCI slot, then you can use it.

1.1 Hardware Installation

1. Turn off your router and switch off the power from the main power supply.
2. Then insert the RF module into your PCI slot. Ensure that the RF module is properly seated into the slot.
3. Power on your PC.

1.2 Software Configuration

WLAN Service Configuration



The term "AP" or an AP icon in this document refers to an AP-capable router.

When configuring WLAN service, go to these sections for information you are interested in:

- WLAN Service Overview
- 802.11 Overview
- WLAN Topologies
- Protocols and Standards

- Configuring WLAN Service
- Displaying and Maintaining WLAN Service
- WLAN Service Configuration Example

WLAN Service Overview

Wireless Local Area Networks (WLAN) have become very popular because they are very easy to setup and use, and users need not care about the complex wiring connections and relocation problems. A WLAN is not completely wireless because the servers in the backbone are fixed and clients are mobile.

Using the WLAN solution, network operators and enterprises can provide wireless LAN services to their customers. These services include:

- WLAN client connectivity to conventional 802.3 LANs.
- Secured WLAN access with different authentication and encryption methods.
- Seamless roaming of WLAN clients in the mobility domain.

Terminology**Client**

A handheld computer or laptop with a wireless Network Interface Card (NIC) can be a WLAN client.

Access Point

A device that performs the bridging function from wireless to wired conversion and wired to wireless conversion of frames between a client and the Local Area Network (LAN).

Access Controller (AC)

A device that controls and manages all the APs in the WLAN. The AC communicates with an Authentication server for WLAN client authentication.

FAT Access Point (Fat AP)

A device that controls and manages all the wireless stations and performs the bridging operation from wireless to wired conversion and wired to wireless conversion of frames between a client and the LAN.

Wireless Medium

A medium that is used for transmitting frames between clients. Radio Frequency is used as the wireless medium in the WLAN system.

Distribution System

The distribution system is used to forward frames to their destination. It is the backbone to transmit frames between access points.

Split MAC

In Split MAC mode, the services to be managed are distributed between AP and AC. The AP manages real-time services like, beacon generation, power management, fragmentation and defragmentation. The AC manages services related to packet distribution, association, dissociation and reassociation.

Active Scanning

Active Scanning is used by clients to scan surrounding wireless networks and locate the compatible one. A client prepares a list of channels and transmits a probe request frame on each of them. When an AP receives these frames, it responds with its network parameters. Thus the client knows whether the AP can provide wireless services.

Passive Scanning

Type of scanning used by a client when it wants to save the battery power. The client prepares a list of channels to scan and listens to beacons on each of these channels. In this case, the AP needs to periodically broadcast beacon frames.

Authentication

A mechanism to ensure secure connection between client and AC or Fat AP. Two types of authentication mechanisms are used:

- Open system authentication
- Shared key authentication

Open System Authentication is the default authentication mechanism. In this mechanism, a client sends an authentication request frame to the AP, which relays this frame to the AC. The AC sends an authentication response to the AP, which conveys this response to the client. See WLAN Security Configuration for more information on shared key authentication.

De-Authentication

The AC or Fat AP sends a de-authentication frame to remove client(s) from the wireless system. De-authentication can occur due to many reasons, such as:

- Receiving an association/disassociation frame from a client which is unauthenticated.
- Receiving a data frame from a client which is unauthenticated.
- Receiving a PS-Poll frame from a client which is unauthenticated.
- The validity timer for a client expires and the port is not secured and so on.

Association

A client that wants to access the wireless network via an AP, must be associated with that particular AP.

Once the client chooses the compatible network and authenticates to an AP, it sends an association request frame to the AP. The AP sends an association response to the client and adds the client's information in its database. At a time a client can associate with only one AP. The association is always initiated by the client, but not by the AP.

Dissociation

A client sends a disassociation frame to the AP to end the association between them.

Dissociation can occur due to many reasons, such as:

- Receiving a data frame from a client which is authenticated and unassociated.
- Receiving a PS-Poll frame from a client which is authenticated and unassociated.

A disassociation frame is either unicast or broadcast.

Re-association

When a client is roaming from one AP area/BSS area to another, it sends a re-association request to the new AP/BSS area. The AP relays this re-association request to the AC. The AC then informs the previous AP to delete the client's information from its database, informs the new AP to add the client's information in its database and conveys successful reassociation information to the client.

802.11 Overview

The following functions are provided by the WLAN-MAC:

- Beacon generation
- Handling Probe Requests
- Handling Open System Authentication
- Handling (Re) Association
- Handling Deauthentication
- Handling Disassociation
- Power Management
- Fragmentation and Defragmentation
- Dot11 to Ethernet Frame Conversion
- Ethernet to Dot11 Frame Conversion
- Keep Alive Mechanism
- Idle Timeout Mechanism
- Clear Channel Search

WLAN Topologies**WLAN Topologies for Fat APs**

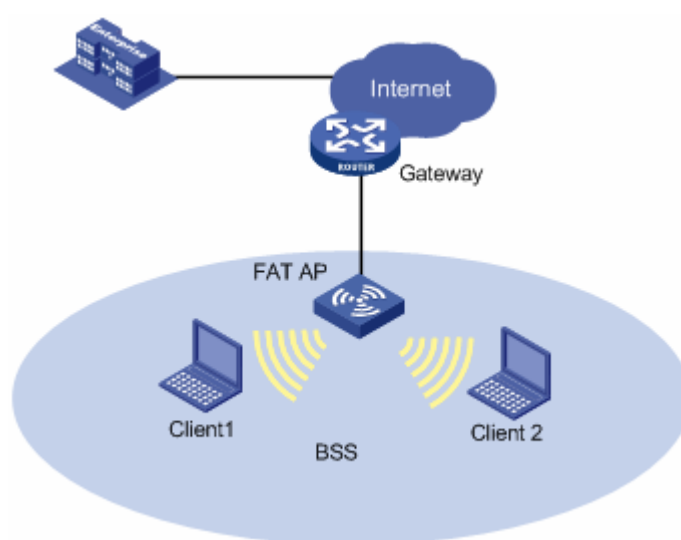
WLAN topologies for Fat APs consist of:

- Single BSS
- Multi-ESS
- Single ESS Multi-BSS

Single BSS

The coverage of an AP is called a Basic Service Set (BSS). Each BSS is identified by a BSSID. The most basic WLAN network can be established with only one BSS. All wireless clients associate with same BSS. If those clients have the same authorization, they can communicate with each other. Figure 1-1 shows a single BSS network.

Figure 1-1 Single BSS network

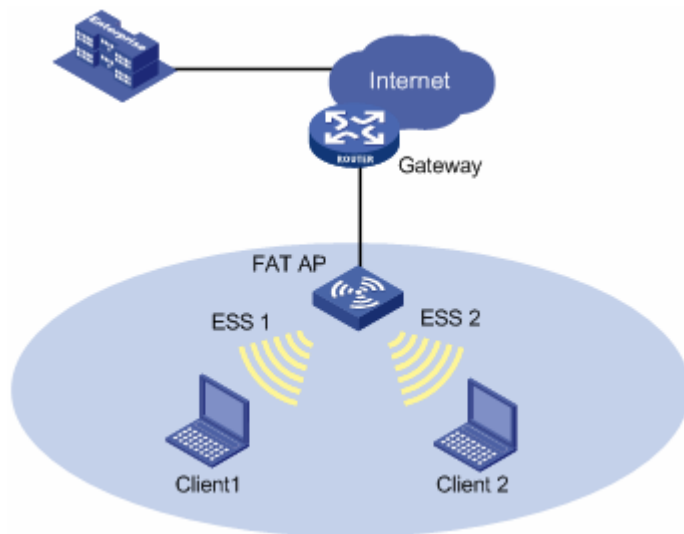


The clients can communicate with each other or reach a host in the Internet. Communication between clients within the same BSS is carried out through the Fat AP.

Muti-ESS

This topology describes a scenario where more than one ESS exists. When a mobile client joins the Fat AP, it can join one of the available ESSs. Figure 1-2 shows the multi-ESS network.

Figure 1-2 Multiple ESS network



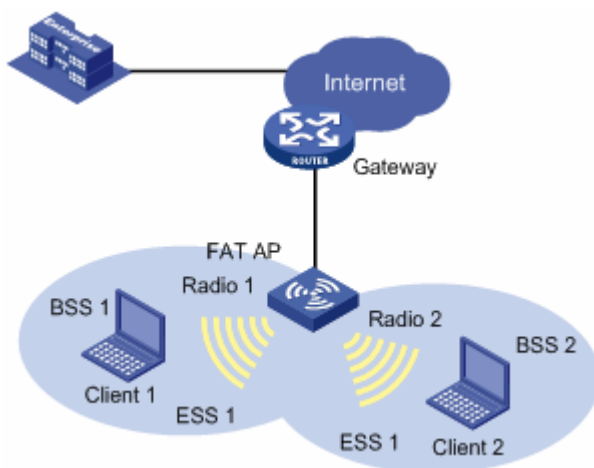
Generally a Fat AP can provide more than one logical ESS at the same time. The Fat AP can broadcast the current information of ESS by Beacon or Probe response frames. Clients can select an ESS it is interested to join.

Different ESS domains can be configured on the fat AP. The fat AP can be configured to allow advertising and accepting clients in these ESS domains once their credentials are accepted.

Single ESS Muti-BSS (The multi-radio case)

This topology describes a scenario where a Fat AP has two radios that are in the same ESS but belong to different BSSs.

Figure 1-3 Single ESS Multiple BSS network



This network scenario can be used 802.11b/g need to be supported. Figure 1-3 shows two clients connected to different radios belong to the same ESS but different BSSs.

Protocols and Standards

- ANSI/IEEE Std 802.11, 1999 Edition

- IEEE Std 802.11b
- IEEE Std 802.11g
- IEEE Std 802.11i
- IEEE Std 802.11-2004

Configuring WLAN Service

Configuration Task List

Task	Description
Configuring Global WLAN Parameters	Optional
Shutting Down a Radio Interface	Optional
Specifying a Country Code	Required
Configuring a WLAN Service Template	Required
Configuring a Radio of an AP	Required
Configuring a Radio Policy on an AC or a Radio of a Fat AP	Required

Configuring Global WLAN Parameters

Follow these steps to configure global WLAN parameters:

To do...	Use the command...	Remarks
Enter system view	system-view	—
Configure the client idle timeout interval for the Fat AP	wlan client idle-timeout interval	Optional By default, the idle timeout interval is 3600 seconds.
Configure the keep alive interval for the Fat AP	wlan client keep-alive interval	Optional By default, keep-alive function is disabled.
Enable the Fat AP to respond to broadcast probe requests	wlan broadcast-probe reply	Optional Enabled by default.

Shutting Down a Radio Interface

Follow these steps to shut down a radio interface:

To do...	Use the command...	Remarks
Enter system view	system-view	—
Enter radio interface view	interface wlan-radio interface-number	—
Shut down the radio interface	shutdown	Optional By default, the radio interface is enabled.

Specifying a Country Code

A country code identifies the country in which you want to operate radios. It determines characteristics such as operating power level and total number of channels available for the transmission of frames. You must set the valid country code or area code before configuring an AP.

Follow these steps to specify the country code:

To do...	Use the command...	Remarks
Enter system view	system-view	—
Specify the country code	wlan country-code code	By default, the country code is US.



For information about country codes, refer to WLAN Services Command.

Configuring a WLAN Service Template

A WLAN service template includes attributes such as SSID, WLAN-ESS interface binding, authentication method (open-system or shared key) information. A service template can be of **clear** or **crypto** type. If a clear type service template exists, you cannot change it to **crypto**. To do so, you must delete the clear type service template, and configure a new service template with type as **crypto**.

Follow these steps to configure a service template:

To do...	Use the command...	Remarks
Enter system view	system-view	—
Create a WLAN service template and enter WLAN service template view	wlan service-template service-template-number { clear crypto }	Required No WLAN service template is created by default.
Specify the service set identifier	ssid ssid-name	Required By default, no SSID is set.

To do...	Use the command...	Remarks
Disable the advertising of SSID in beacon frames	beacon ssid-hide	Optional By default the SSID is advertised in beacon frames. Note that hiding the SSID does very little to increase security.
Specify an authentication method	authentication-method { open system shared key }	Required For related configuration about the shared key, refer to WLAN Security in the WLAN Volume.
Specify the maximum associated clients per BSS	client max-count max-number	Optional By default, the max-number is equal to the maximum number of associated clients an AP permits. The default value is provided by PAF.
Enable the service template	service-template enable	Required

Configuring a Radio of an AP

Follow these steps to configure a radio of a Fat AP:

To do...	Use the command...	Remarks
Enter system view	system-view	—
Enter radio interface view	interface wlan-radio interface-number	—
Specify a radio type for the radio	radio-type { dot11b dot11g dot11a }	Required The default radio type depends on the device model.
Bind a service template to a WLAN-ESS interface for the radio	service-template service-template-number interface wlan-bss interface-number	Required
Specify a channel number for the radio	channel { channel-number auto }	Optional By default, auto mode is enabled.
Specify the maximum radio power	max-power max-power	Optional By default, the maximum radio power varies with radio types and country codes.

To do...	Use the command...	Remarks
Specify the type of preamble	preamble { long short }	Optional. By default, the short preamble is supported.

Configuring a Radio Policy on an AC or a Radio of a Fat AP

Follow these steps to configure a radio policy on an AC or a radio of a Fat AP:

To do...	Use the command...	Remarks
Enter system view	system-view	—
Enter radio view	interface wlan-radio radio-number	—
Set the interval for sending beacon frames	beacon-interval interval	Optional By default, the beacon interval is 100 time units (TUs).
Set the number of beacon frames between DTIM frames	dtim counter	Optional By default, the DTIM counter is 1.
Specify the maximum length of packets that can be transmitted without fragmentation	fragment-threshold size	Optional By default, the fragment threshold is 2346 bytes.
Specify the request to send (RTS) threshold length	rts-threshold size	Optional By default, the RTS threshold is 2346 bytes.
Set the maximum number of retransmission attempts for frames larger than the RTS threshold	long-retry threshold count	Optional By default, the long retry threshold is 5.
Specify the maximum number of attempts to transmit a frame shorter than the RTS threshold	short retry threshold count	Optional By default, the short retry threshold is 5.
Specify the interval for the AP to hold received packets	max-rx-duration interval	Optional By default, the interval is 2000 milliseconds.

Displaying and Maintaining WLAN Service

On a Fat AP

Operation	Command	Remarks
Display WLAN client information	display wlan client { interface wlan-radio [wlan-radio-number] mac-address mac-address service-template service-template-number } [verbose]	Available in any view
Display WLAN service template information	display wlan service-template [service-template-number]	Available in any view
Display WLAN client statistics	display wlan statistics client { all mac-address mac-address }	Available in any view
Cut off client(s)	reset wlan client { all mac-address mac-address }	Available in user view
Clear WLAN client statistics	reset wlan statistics client { all mac-address mac-address }	Available in user view

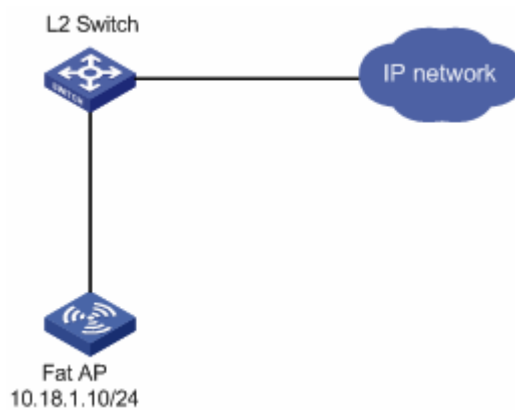
WLAN Service Configuration Example

Network requirements

As shown below, a Fat AP is connected to a L2 Switch. The IP address of the Fat AP is 10.18.1.10.

Network diagram

Figure 1-4 Network diagram for WLAN service configuration



Configuration procedure

Specify the country code.

<Sysname> system-view

[Sysname] wlan country code IN

Define the WLAN BSS interface.


```
<Sysname> system-view
[Sysname] interface wlan-bss 1
[Sysname-WLAN-BSS1] quit
# Define a WLAN service template and enable it.
[Sysname] wlan service-template 1 clear
[Sysname-wlan-st-1] ssid abc
[Sysname-wlan-st-1] authentication-method open-system
[Sysname-wlan-st-1] service-template enable
# Configure the radio of the Fat AP.
[Sysname] interface wlan-radio 2/0
[Sysname-WLAN-Radio2/0] beacon-interval 200
[Sysname-WLAN-Radio2/0] dtim 4
[Sysname-WLAN-Radio2/0] rts-threshold 2300
[Sysname-WLAN-Radio2/0] fragment-threshold 2200
[Sysname-WLAN-Radio2/0] short-retry threshold 6
[Sysname-WLAN-Radio2/0] long-retry threshold 5
[Sysname-WLAN-Radio2/0] max-rx-duration 500
[Sysname-WLAN-Radio2/0] radio-type dot11a
[Sysname-WLAN-Radio2/0] channel 149
[Sysname-WLAN-Radio2/0] max-power 10
[Sysname-WLAN-Radio2/0] service-template 1 interface WLAN-BSS 1
# Configure global WLAN features.
<Sysname> system-view
[Sysname] wlan client idle-timeout 3600
[Sysname] wlan client keep-alive 100
[Sysname] wlan broadcast-probe reply
```