



WLAN Security

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Information About WPA1 and WPA2

Wi-Fi Protected Access (WPA or WPA1) and WPA2 are standards-based security solutions from the Wi-Fi Alliance that provide data protection and access control for wireless LAN systems. WPA1 is compatible with the IEEE 802.11i standard but was implemented prior to the standard's ratification; WPA2 is the Wi-Fi Alliance's implementation of the ratified IEEE 802.11i standard.

By default, WPA1 uses Temporal Key Integrity Protocol (TKIP) and Message Integrity Check (MIC) for data protection while WPA2 uses the stronger Advanced Encryption Standard encryption algorithm using Counter Mode with Cipher Block Chaining Message Authentication Code Protocol (AES-CCMP). By default, both WPA1 and WPA2 use the 802.1X for authenticated key management. However, the following options are also available:

- PSK—When you choose PSK (also known as WPA preshared key or WPA passphrase), you need to configure a preshared key (or a passphrase). This key is used as the Pairwise Master Key (PMK) between clients and authentication server.
- Cisco Centralized Key Management uses a fast rekeying technique that enables clients to roam from one access point to another without going through the controller, typically in under 150 milliseconds (ms). Cisco Centralized Key Management reduces the time required by the client to mutually authenticate with the new access point and derive a new session key during reassociation. Cisco Centralized Key Management fast secure roaming ensures that there is no perceptible delay in time-sensitive applications, such as wireless Voice over IP (VoIP), Enterprise Resource Planning (ERP), or Citrix-based solutions. Cisco Centralized Key Management is a CCXv4-compliant feature. If Cisco Centralized Key Management is selected, only Cisco Centralized Key Management clients are supported.

When Cisco Centralized Key Management is enabled, the behavior of access points differs from the controller's for fast roaming in the following ways:

- If an association request sent by a client has Cisco Centralized Key Management enabled in a Robust Secure Network Information Element (RSN IE) but Cisco Centralized Key Management IE is not encoded and only PMKID is encoded in RSN IE, then the controller does not do a full authentication. Instead, the controller validates the PMKID and does a four-way handshake.

- If an association request sent by a client has Cisco Centralized Key Management enabled in RSN IE and Cisco Centralized Key Management IE is encoded and only PMKID is present in the RSN IE, then the AP does a full authentication. The access point does not use PMKID sent with the association request when Cisco Centralized Key Management is enabled in RSN IE.
- 802.1X+Cisco Centralized Key Management—During normal operation, 802.1X-enabled clients mutually authenticate with a new access point by performing a complete 802.1X authentication, including communication with the main RADIUS server. However, when you configure your WLAN for 802.1X and Cisco Centralized Key Management fast secure roaming, Cisco Centralized Key Management-enabled clients securely roam from one access point to another without the need to reauthenticate to the RADIUS server. 802.1X+Cisco Centralized Key Management is considered as an optional Cisco Centralized Key Management because both Cisco Centralized Key Management and non-Cisco Centralized Key Management clients are supported when this option is selected.

On a single WLAN, you can allow WPA1, WPA2, and 802.1X/PSK/Cisco Centralized Key Management/802.1X+Cisco Centralized Key Management clients to join. All of the access points on such a WLAN advertise WPA1, WPA2, and 802.1X/PSK/Cisco Centralized Key Management/ 802.1X+Cisco Centralized Key Management information elements in their beacons and probe responses. When you enable WPA1 and/or WPA2, you can also enable one or two ciphers, or cryptographic algorithms, designed to protect data traffic. Specifically, you can enable AES and/or TKIP data encryption for WPA1 and/or WPA2. TKIP is the default value for WPA1, and AES is the default value for WPA2.

Information About AAA Override

The AAA Override option of a WLAN enables you to configure the WLAN for identity networking. It enables you to apply VLAN tagging, Quality of Service (QoS), and Access Control Lists (ACLs) to individual clients based on the returned RADIUS attributes from the AAA server.

Prerequisites for Layer 2 Security

WLANs with the same SSID must have unique Layer 2 security policies so that clients can make a WLAN selection based on the information advertised in beacon and probe responses. The available Layer 2 security policies are as follows:

- None (open WLAN)
- WPA+WPA2



Note

- Although WPA and WPA2 cannot be used by multiple WLANs with the same SSID, you can configure two WLANs with the same SSID with WPA/TKIP with PSK and Wi-Fi Protected Access (WPA)/Temporal Key Integrity Protocol (TKIP) with 802.1X, or with WPA/TKIP with 802.1X or WPA/AES with 802.1X.
- A WLAN configured with TKIP support will not be enabled on an RM3000AC module.

- Static WEP (not supported on Wave 2 APs)

How to Configure WLAN Security

Configuring Static WEP Layer 2 Security Parameters (GUI)

Procedure

- Step 1** Choose **Configuration** > **Tags & Profiles** > **WLANs**.
- Step 2** On the **WLANs** page, click the name of the WLAN.
- Step 3** In the **Edit WLAN** window, click the **Security** tab.
- Step 4** From the **Layer 2 Security Mode** drop-down list, select the **Static WEP** option.
- Step 5** (Optional) Check the **Shared Key Authentication** check box to set the authentication type as shared. By leaving the check box unchecked, the authentication type is set to open.
- Step 6** Set the **Key Size** as either **40 bits** or **104 bits**.
- 40 bits: The keys with 40-bit encryption must contain 5 ASCII text characters or 10 hexadecimal characters.
 - 104 bits: The keys with 104-bit encryption must contain 13 ASCII text characters or 26 hexadecimal characters.
- Step 7** Set the appropriate **Key Index**; you can choose between 1 to 4.
- Step 8** Set the **Key Format** as either **ASCII** or **Hex**.
- Step 9** Enter a valid **Encryption Key**.
- 40 bits: The keys with 40-bit encryption must contain 5 ASCII text characters or 10 hexadecimal characters.
 - 104 bits: The keys with 104-bit encryption must contain 13 ASCII text characters or 26 hexadecimal characters.
- Step 10** Click **Update & Apply to Device**.
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Configuring Static WEP Layer 2 Security Parameters (CLI)

Before you begin

You must have administrator privileges.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: Device# <code>configure terminal</code>	Enters global configuration mode.
Step 2	wlan profile-name wlan-id SSID_Name Example: Device# <code>wlan test4 1 test4</code>	Enters the WLAN configuration submode. <i>profile-name</i> is the profile name of the configured WLAN. <i>wlan-id</i> is the wireless LAN identifier. The range is 1 to 512. <i>SSID_Name</i> is the SSID which can contain 32 alphanumeric characters. Note If you have already configured this command, enter wlan profile-name command.
Step 3	disable ft Example: Device(config-wlan)# <code>disable ft</code>	Disables fast transition.
Step 4	no security ft over-the-ds Example: Device(config-wlan)# <code>no security ft over-the-ds</code>	Disables fast transition over the data source on the WLAN.
Step 5	no security ft Example: Device(config-wlan)# <code>no security ft</code>	Disables 802.11r Fast Transition on the WLAN.
Step 6	no security wpa {akm wpa1 wpa2} Example: Device(config-wlan)# <code>no security wpa wpa1 ciphers tkip</code>	Disables the WPA/WPA2 support for a WLAN.
Step 7	security static-wep-key [authentication {open shared}] Example: Device(config-wlan)# <code>security static-wep-key authentication open</code>	The keywords are as follows: <ul style="list-style-type: none"> • static-wep-key—Configures Static WEP Key authentication. • authentication—Specifies the authentication type you can set. The values are open and shared.
Step 8	security static-wep-key [encryption {104 40} {ascii hex} [0 8]]	The keywords are as follows:

	Command or Action	Purpose
	Example: <pre>Device(config-wlan) # security static-wep-key encryption 104 ascii 0 1234567890123 1</pre>	<ul style="list-style-type: none"> • static-wep-key—Configures Static WEP Key authentication. • encryption—Specifies the encryption type that you can set. The valid values are 104 and 40. 40-bit keys must contain 5 ASCII text characters or 10 hexadecimal characters. 104-bit keys must contain 13 ASCII text characters or 26 hexadecimal characters. • ascii—Specifies the key format as ASCII. • hex—Specifies the key format as HEX.
Step 9	end Example: <pre>Device(config) # end</pre>	Returns to privileged EXEC mode. Alternatively, you can also press Ctrl-Z to exit global configuration mode.

Configuring WPA + WPA2 Layer 2 Security Parameters (GUI)

Procedure

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- Step 1** Click **Configuration > Tags and Profiles > WLANs**.
 - Step 2** Click **Add** to add a new WLAN Profile or click the one you want to edit.
 - Step 3** In the **Edit WLAN** window, click **Security > Layer2**.
 - Step 4** From **Layer 2 Security Mode** drop-down menu, select **WPA + WPA2**.
 - Step 5** Configure the security parameters and then click **Save and Apply to Device**.
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Configuring WPA + WPA2 Layer 2 Security Parameters (CLI)



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- Note** The default values for security policy WPA2 are:
- Encryption is AES.
 - Authentication Key Management (AKM) is dot1x.
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Before you begin

You must have administrator privileges.

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 2	wlan profile-name wlan-id SSID_Name Example: Device# wlan test4 1 test4	Enters the WLAN configuration submode. <ul style="list-style-type: none"> • <i>profile-name</i> is the profile name of the configured WLAN. • <i>wlan-id</i> is the wireless LAN identifier. The range is 1 to 512. • <i>SSID_Name</i> is the SSID that contains 32 alphanumeric characters. <p>Note If you have already configured this command, enter wlan profile-name command.</p>
Step 3	security wpa {akm wpa1 wpa2} Example: Device (config-wlan) # security wpa	Enables WPA or WPA2 support for WLAN.
Step 4	security wpa wpa1 Example: Device (config-wlan) # security wpa wpa1	Enables WPA.
Step 5	security wpa wpa1 ciphers [aes tkip] Example: Device (config-wlan) # security wpa wpa1 ciphers aes	Specifies the WPA1 cipher. Choose one of the following encryption types: <ul style="list-style-type: none"> • aes—Specifies WPA/AES support. • tkip—Specifies WPA/TKIP support. <p>The default values are TKIP for WPA1 and AES for WPA2.</p> <p>Note You can enable or disable TKIP encryption only using the CLI. Configuring TKIP encryption is not supported in GUI.</p> <p>When you have VLAN configuration on WGB, you need to configure the encryption cipher mode and keys for a particular VLAN, for example, encryption vlan 80 mode ciphers tkip. Then, you need to configure the encryption cipher mode globally on the</p>

	Command or Action	Purpose
		multicast interface by entering the following command: encryption mode ciphers tkip .
Step 6	security wpa akm {cckm dot1x ft pmf psk}	Enable or disable Cisco Centralized Key Management, 802.1x, Fast Transition, Protected Management Frame, or PSK.
Step 7	security wpa psk set-key {ascii hex} {0 8} password Example: Device(config-wlan)# security wpa psk set-key ascii 0 test	Enter this command to specify a preshared key, if you have enabled PSK. WPA preshared keys must contain 8 to 63 ASCII text characters or 64 hexadecimal characters.
Step 8	security wpa akm ft {dot1x psk sae} Example: Device(config-wlan)# security wpa akm ft psk	Enable or disable authentication key management suite for fast transition. Note You can now choose between PSK and fast transition PSK as the AKM suite.
Step 9	security wpa wpa2 Example: Device(config-wlan)# security wpa wpa2	Enables WPA2.
Step 10	security wpa wpa2 ciphers aes Example: Device(config-wlan)# security wpa wpa2 Example:	Configure WPA2 cipher. • aes —Specifies WPA/AES support.
Step 11	show wireless pmk-cache	Displays the remaining time before the PMK cache lifetime timer expires. If you have enabled WPA2 with 802.1X authenticated key management or WPA1 or WPA2 with Cisco Centralized Key Management authenticated key management, the PMK cache lifetime timer is used to trigger reauthentication with the client when necessary. The timer is based on the timeout value received from the AAA server or the WLAN session timeout setting. Note <ul style="list-style-type: none"> • The command will show VLAN ID with VLAN pooling feature in VLAN-Override field. • Sticky key caching (SKC) is not supported.

