

RUCKUS SmartZone 100 and Virtual SmartZone- Essentials Hotspot 2.0 Interface Reference Guide, 5.2.1

Supporting SmartZone 5.2.1

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Document Conventions

The following table lists the text conventions that are used throughout this guide.

TABLE 1 Text Conventions

Convention	Description	Example
monospace	Identifies command syntax examples	<code>device(config)# interface ethernet 1/1/6</code>
bold	User interface (UI) components such as screen or page names, keyboard keys, software buttons, and field names	On the Start menu, click All Programs .
<i>italics</i>	Publication titles	Refer to the <i>RUCKUS Small Cell Release Notes</i> for more information.

Notes, Cautions, and Safety Warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

NOTE

A NOTE provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

ATTENTION

An ATTENTION statement indicates some information that you must read before continuing with the current action or task.



CAUTION

A CAUTION statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.



DANGER

A DANGER statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Command Syntax Conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

Convention	Description
bold text	Identifies command names, keywords, and command options.

Preface

Document Feedback

Convention	Description
<i>italic text</i>	Identifies a variable.
[]	Syntax components displayed within square brackets are optional.
	Default responses to system prompts are enclosed in square brackets.
{ x y z }	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x y	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, for example, passwords, are enclosed in angle brackets.
...	Repeat the previous element, for example, <i>member</i> [<i>member</i> ...].
\	Indicates a “soft” line break in command examples. If a backslash separates two lines of a command input, enter the entire command at the prompt without the backslash.

Document Feedback

RUCKUS is interested in improving its documentation and welcomes your comments and suggestions.

You can email your comments to RUCKUS at #Ruckus-Docs@commscope.com.

When contacting us, include the following information:

- Document title and release number
- Document part number (on the cover page)
- Page number (if appropriate)

For example:

- RUCKUS SmartZone Upgrade Guide, Release 5.0
- Part number: 800-71850-001 Rev A
- Page 7

RUCKUS Product Documentation Resources

Visit the RUCKUS website to locate related documentation for your product and additional RUCKUS resources.

Release Notes and other user documentation are available at <https://support.ruckuswireless.com/documents>. You can locate the documentation by product or perform a text search. Access to Release Notes requires an active support contract and a RUCKUS Support Portal user account. Other technical documentation content is available without logging in to the RUCKUS Support Portal.

White papers, data sheets, and other product documentation are available at <https://www.ruckuswireless.com>.

Online Training Resources

To access a variety of online RUCKUS training modules, including free introductory courses to wireless networking essentials, site surveys, and products, visit the RUCKUS Training Portal at <https://training.ruckuswireless.com>.

Contacting RUCKUS Customer Services and Support

The Customer Services and Support (CSS) organization is available to provide assistance to customers with active warranties on their RUCKUS products, and customers and partners with active support contracts.

For product support information and details on contacting the Support Team, go directly to the RUCKUS Support Portal using <https://support.ruckuswireless.com>, or go to <https://www.ruckuswireless.com> and select **Support**.

What Support Do I Need?

Technical issues are usually described in terms of priority (or severity). To determine if you need to call and open a case or access the self-service resources, use the following criteria:

- Priority 1 (P1)—Critical. Network or service is down and business is impacted. No known workaround. Go to the **Open a Case** section.
- Priority 2 (P2)—High. Network or service is impacted, but not down. Business impact may be high. Workaround may be available. Go to the **Open a Case** section.
- Priority 3 (P3)—Medium. Network or service is moderately impacted, but most business remains functional. Go to the **Self-Service Resources** section.
- Priority 4 (P4)—Low. Requests for information, product documentation, or product enhancements. Go to the **Self-Service Resources** section.

Open a Case

When your entire network is down (P1), or severely impacted (P2), call the appropriate telephone number listed below to get help:

- Continental United States: 1-855-782-5871
- Canada: 1-855-782-5871
- Europe, Middle East, Africa, Central and South America, and Asia Pacific, toll-free numbers are available at <https://support.ruckuswireless.com/contact-us> and Live Chat is also available.
- Worldwide toll number for our support organization. Phone charges will apply: +1-650-265-0903

We suggest that you keep a physical note of the appropriate support number in case you have an entire network outage.

Self-Service Resources

The RUCKUS Support Portal at <https://support.ruckuswireless.com> offers a number of tools to help you to research and resolve problems with your RUCKUS products, including:

- Technical Documentation—<https://support.ruckuswireless.com/documents>
- Community Forums—<https://forums.ruckuswireless.com/ruckuswireless/categories>
- Knowledge Base Articles—<https://support.ruckuswireless.com/answers>
- Software Downloads and Release Notes—https://support.ruckuswireless.com/#products_grid
- Security Bulletins—<https://support.ruckuswireless.com/security>

Using these resources will help you to resolve some issues, and will provide TAC with additional data from your troubleshooting analysis if you still require assistance through a support case or RMA. If you still require help, open and manage your case at https://support.ruckuswireless.com/case_management.

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Overview

This SmartZone 100 (SZ100) and Virtual SmartZone-Essentials (vSZ-E) Hotspot 2.0 Reference Guide describes the Hotspot 2.0 technology and provides configuration guidelines that SZ100/vSZ-E (collectively referred to as “the controller” throughout this guide) uses to enable Hotspot 2.0 based features on the Ruckus platform.

This guide is written for service operators and system administrators who are responsible for managing, configuring, and troubleshooting Wi-Fi networks. It assumes basic working knowledge of local area networks, wireless networking, and wireless devices.

NOTE

For caveats, limitations, and known issues that you must be aware of before upgrading to this release, refer to the Release Notes.

Most user guides and release notes are available in Adobe Acrobat Reader Portable Document Format (PDF) or HTML on the Ruckus Support Web site at <https://support.ruckuswireless.com/contact-us>.

Terminology

The table lists the terms used in this guide.

TABLE 2 Terms used in this guide

Terminology	Description
ANQP	Access Network Query Protocol
AP	Access Point
CN	Common Name
CP	Captive Portal
CUI	Chargeable User Identity
EAP	Extensible Authentication Protocol
FQDN	Fully Qualified Domain Name
GAS	Generic Advertisement Service
HS2.0	Hotspot 2.0
IDM	Identity Management
MCC	Mobile Country Code
MNC	Mobile Network Code
MNO	Mobile Network Operator
MO	Managed Object
MSO	Multiple System Operator
GTPv2-C	GPRS Tunnelling Protocol for Control plane
NBI	Northbound Interface

About This Guide

What's New in This Document

TABLE 2 Terms used in this guide (continued)

Terminology	Description
NAI	Network Access Identifier
OCSP	Online Certificate Status Protocol
OI	Organization Identifier
OMA-DM	Open Mobile Alliance's Device Management
OSEN	OSU Server-only authenticated layer 2 Encryption Network
OSU	Online Sign-Up
Passpoint	Hotspot 2.0 certification
PKI	Public Key Infrastructure
PPS-MO	Per Provider Subscription Management Object
RAC	Radio Access Controller
RADIUS	Remote Access Dial In User Service
Release1 Device	Hotspot 2.0 Release1 specification compliant device
Release 2 Device	Hotspot 2.0 Release 2 compliant device
RSN	Robust Security Network
SZ100/vSZ-E	Controller platforms
SSID	Service Set Identifier
SSL	Secure Socket Layer
T&C	Terms and Conditions
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TTLS	Tunneled TLS
UDI	User Define Interface
UE	User Equipment
UE-IP	User Equipment - IP Address
UE-MAC	User Equipment - MAC Address
UI	User Interface
URI	Uniform Resource Identifier
USIM	Universal Subscriber Identity Module
UTP	User Traffic Profile
UUID	Universal Unique Identifier
VSA	Vendor Specific Attributes
WAN	Wide Area Network
WFA	Wi-Fi Alliance
WLAN	Wireless Local Area Network

What's New in This Document

No change in content for the release 5.2.1.

Hotspot 2.0 Technology Overview

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Hotspot 2.0 Brief Overview

The Wi-Fi Alliance (WFA) ratified 802.11u (a.k.a. Hotspot 2.0) specification in February 2011. One of the primary objectives of the Hotspot 2.0 technology is to simplify mobile device's access to Wi-Fi networks.

The main components of the technology are:

- Automated network discovery and selection
- Secure authentication
- Online sign-up
- Policy management

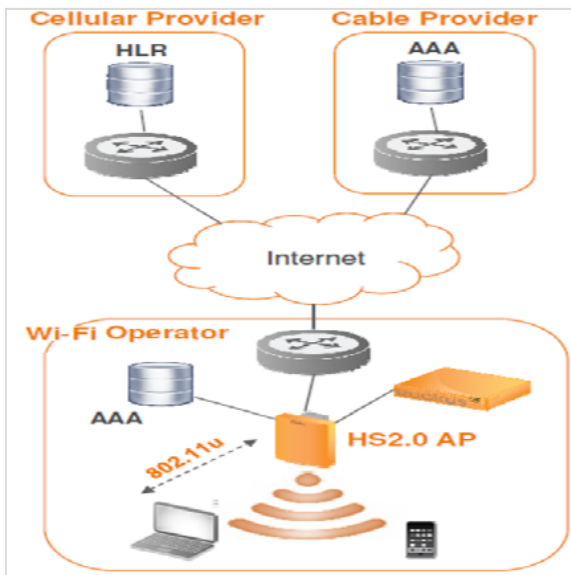
The Hotspot 2.0 Release 1 focuses on the Automated network discovery and selection and Secure authentication components, whereas release 2 goes into specification of Online sign-up and Policy management components.

Basic Operation of Hotspot 2.0

This section explains the basic operation of Hotspot 2.0.

A Hotspot 2.0 compliant mobile device communicates with Hotspot 2.0 compliant Wi-Fi infrastructure (Access Points) to discover the network Service Set Identifier (SSID) to associate with. It then securely connects to that SSID by presenting its access credentials. Post successful authentication, the device gets securely connected to Hotspot 2.0 enabled Wi-Fi. If a mobile device does not have any pre-existing credentials, then it will not get automatically associated with Hotspot 2.0 WLAN. Instead, the user will be notified of the OSU (Online Signup) services if available. If the user elects to sign up with one of these OSU services, then he/she will be directed to a sign-up portal over Hotspot 2.0 onboarding WLAN. Upon successful authentication, user will be provisioned with Hotspot 2.0 standards-based management object, known as PPS-MO (Per-Provider Subscription Management object). User will then be disconnected from onboarding WLAN and reconnected on the secure Hotspot 2.0 access WLAN. The Hotspot 2.0 technology allows users to seamlessly roam between his/her provider's home Wi-Fi network and the visited Wi-Fi network in different location. A Wi-Fi provider can partner with several roaming partners to provide Wi-Fi access to partner's subscribers. The roaming partners can include MSOs, MNOs, wireline operators, public venues, enterprises, and basically any entity that has Wi-Fi assets as shown in the figure below.

FIGURE 1 Working of Hotspot 2.0



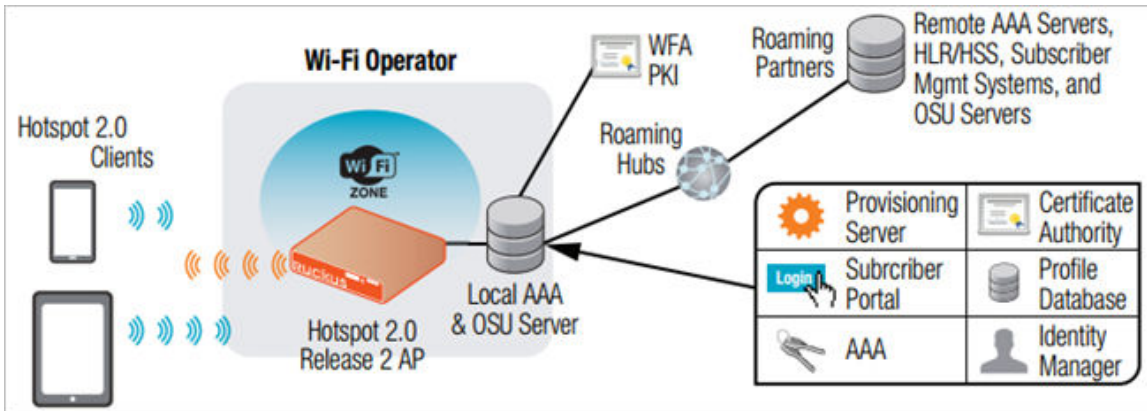
The onboarding WLAN for Hotspot 2.0 may be open WLAN or secure WLAN. The secure onboarding WLAN utilizes server-side only authentication, while the client side remains anonymous. The OSU service provider utilizes PPS-MO to provision necessary policy parameters such as expiration time, update interval, data usage limit etc. In a Hotspot 2.0 based network topology, entity offering Wi-Fi infrastructure may be termed as Wi-Fi operator, while the entity owning user database may be termed as Identity provider. A Wi-Fi operator may also act as an Identity provider and may partner with one or more external Identity providers.

Operators and Service Providers

Hotspot 2.0 has two entities – operators and service providers.

An operator is the owner of a set of Hotspot 2.0 enabled access points. Each operator can resell their Hotspot 2.0 service to a number of service providers. The operators deal mostly with physical network elements while the service providers keep track of user subscriptions and billing. An operator profile defines all the properties pertaining to an operator while a service profile defines the properties related to a service provider. If a WLAN is configured to provide Hotspot 2.0 service, it must be linked exactly as that of Hotspot 2.0 operator profile. However, each operator profile can simultaneously provide service to a number of service profiles.

FIGURE 2 Components of Hotspot 2.0



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Overview

The following are the entities that need to be configured for the Hotspot 2.0 R2 devices configuration flow.

NOTE

Hotspot 2.0 WLANs do not support IPv6.

Configuring Wi-Fi Operators

Follow these steps to define a Wi-Fi operator profile.

1. Click **Services&Profiles >Hotspot & Portals > Hotspot 2.0**
2. The Hotspot 2.0 page appears. In the Wi-Fi Operator section, click **Create**.
3. Configure the settings in the table to create a Hotspot 2.0 Wi-Fi operator and set configuration options.

TABLE 3 Wi-Fi operator configuration options

Option	Description
Name	Enter a name for this Wi-Fi operator profile.
Description (Optional)	Enter a description for the venue profile.
Domain Names	HS2.0 operator's domain name is a mandatory field, which specifies the operator's domain name. Hotspot 2.0 AP broadcasts the domain name to indicate the home Wi-Fi providers.
Signup Security	This is an optional field and is disabled by default. Enabling would mean that operator supports secure onboarding.
Certificate	Select the certificate for the operator - AAA. This can be the same certificate as the one used with OSU service.
Friendly Name	HS2.0 operator's friendly name is a mandatory field. Operator's friendly name is displayed on mobile client's screen. It is also used for operator verification during secure onboarding.

NOTE

In case of Signup Security - Onboarding WLAN assumes that the server possesses credentials that can be used to authenticate it to the client. In this case, the administrator should select the required AAA server certificate (which can be the certificate used for OSU). Onboarding WLAN facilitates network authentication before the actual onboarding. The server provides the certificate to the client and the later validates the server certificate before proceeding to online signup call flow. The certificate uploaded in the operator page can be same as the OSU certificate for the same operator.

4. Click **OK**

FIGURE 3 Hotspot Wi-Fi Operator Profile

Create Hotspot 2.0 Wi-Fi Operator Profile

* Name:

Description:

* Domain Names: * Domain Name + Add X Cancel Delete

Domain Name
<input type="text"/>

Signup Security: Support Anonymous Authentication (OSEN)

* [?] Certificate: No data available + Create

* Friendly Names: * Language * Name + Add X Cancel Delete

Language	Name
English	<input type="text"/>

OK Cancel

5. Continue to Step 3: Define Identity Provider. You have completed defining the WiFi Operator Profile.

Defining the Identity Provider

The Hotspot 2.0 Identity provider gives authentication, accounting and online signup service. There can be one or more identity providers per Hotspot 2.0 access WLAN.

The Hotspot 2.0 identity provider contains multiple configurations and therefore it is split into different sub sections.

- [Network Identifier](#) on page 16
- [Online SignUp and Provisioning](#) on page 18
- [Authentication](#) on page 20
- [Accounting](#) on page 20
- [Review](#) on page 21

Network Identifier

Follow these steps to create a Hotspot 2.0 Identity Provider - Network Identifier.

1. Click **Services&Profiles > Hotspots & Portals > Hotspot 2.0 > Identity Provider**.
2. Click **Create New**

3. Configure the settings below to create a Hotspot 2.0 Network Identifier. Alternatively, the network identifier can be imported from an existing Hotspot 2.0 Wi-Fi operator.

Option	Description
Name	Enter a name for this network identifier profile.
Description (Optional)	Enter a description for the network identifier profile.
PLMNs	<p>Each record contains MCC and MNC.</p> <ul style="list-style-type: none"> • MCC: Set the correct country code for the geographical location. This is required when the controller sends MAP authentication information. Type the mobile country code digits. Decimal digit strings with maximum length of 3 and minimum length of 2. • MNC: Set the mobile network code based on the geographical location. This is required when controller sends MAP authentication information. Type the mobile network code digits. Decimal digit strings with maximum length of 3 and minimum length of 2.
Realms	List of NAI (Network Access Identifier) realms corresponding to service providers or other entities whose networks or services are accessible via this AP. Up to five NAI realm entries can be created. Each NAI realm entry can contain up to four EAP methods. Each EAP method can contain up to four authentication types. Realm entry is automatically generated according to PLMN grid and cannot be removed. The realm value cannot be changed.
Home OIs	OI (Organization Identifier) is a unique value assigned to the organization. The user can configure more than 3 OI values and can adjust the order since the AP takes only 3 OIs in the beacon.

4. Click **Next**. You have completed creating a Hotspot 2.0 Identity Provider - Network Identifier.
5. Continue to [Online SignUp and Provisioning](#) on page 18.

FIGURE 4 Create Hotspot 2.0 Network Identifier

Create Hotspot 2.0 Identity Provider

Network Identifier → Online Signup & Provisioning → Authentication → Accounting → Review

Name:

Description:

PLMNs: MCC MNC

MCC	MNC
<input type="text"/>	<input type="text"/>

Realms:

Name:

Encoding: RFC-4282

EAP Methods:

#1	#2	#3	#4
EAP Method: <input type="text" value="N/A"/>			

Name	Encoding	EAP Methods
------	----------	-------------

Online SignUp and Provisioning

Follow these steps to create a Hotspot 2.0 Identity Provider - OSU and Provisioning.

1. Click to enable SignUp and Provisioning to configure the service for the identity provider.
2. Alternatively you can skip this step to move to Authentication.

3. Configure the settings below to create a Hotspot 2.0 SignUp and Provisioning.

Option	Description
Provisioning Service	The provisioning service is responsible for any subscription provisioning process in which messages are communicated between the UE and the controller resulting in a PPS-MO provisioned into the UE. The provisioning supports both SOAP-XML and OMA-DM as communication protocols for the process based on the initial request coming from the UE. The provisioning service supports signup, remediation and policy update flows where the UE is provisioned with a full PPS -MO or only with internal node/s of the PPS-MO.
Common Language Icon	This is the default icon presented in the Release 2 device for this identity provider in case the device does not find any match for other icons per language in the table.
OSU Service Description	This table configures the friendly name, description and icon per language. This information is presented on the device when it receives ANQP message which includes OSU providers. Friendly names, which are required to be part of the OSU certificate is automatically populated in this table. In case description is also included in the OSU certificate it is automatically populated into the table. Administrators are required to set the matched icon per language as included in the OSU certificate.
Whitelisted Domain	The Administrator needs to add the domains of: <ul style="list-style-type: none"> • Remediation URL in case it is different from the external provisioning server domain • External Portal domain in case the provisioning server is external

4. Click **Next**. You have completed creating a Hotspot 2.0 Identity Provider SignUp and Provisioning step.

5. Continue to [Authentication](#) on page 20.

FIGURE 5 Hotspot Identity Provider - Online SignUp and Provisioning

Create Hotspot 2.0 Identity Provider

Network Identifier → **Online Signup & Provisioning** → Authentication → Accounting → Review

Enable Online Signup & Provisioning

- External Service URL is required
- OSU NAI Realm is required
- OSU Service Description is required

Provisioning Options

Provisioning Service: * External Service URL:

* Provisioning Protocol: OMA-DM SOAP-XML

Online Signup Options

* OSU NAI Realm: No data available

* Common Language Icon: Browse

* OSU Service Description:

Language	Friendly Name	Description	Icon	Format	Width	Height
English	<input type="text"/>	<input type="text"/>	<input type="text"/>			

Buttons: Browse, + Add, X Cancel, Delete

Whitelisted Domains:

* Domain Name + Add X Cancel Delete

Domain Name

Authentication

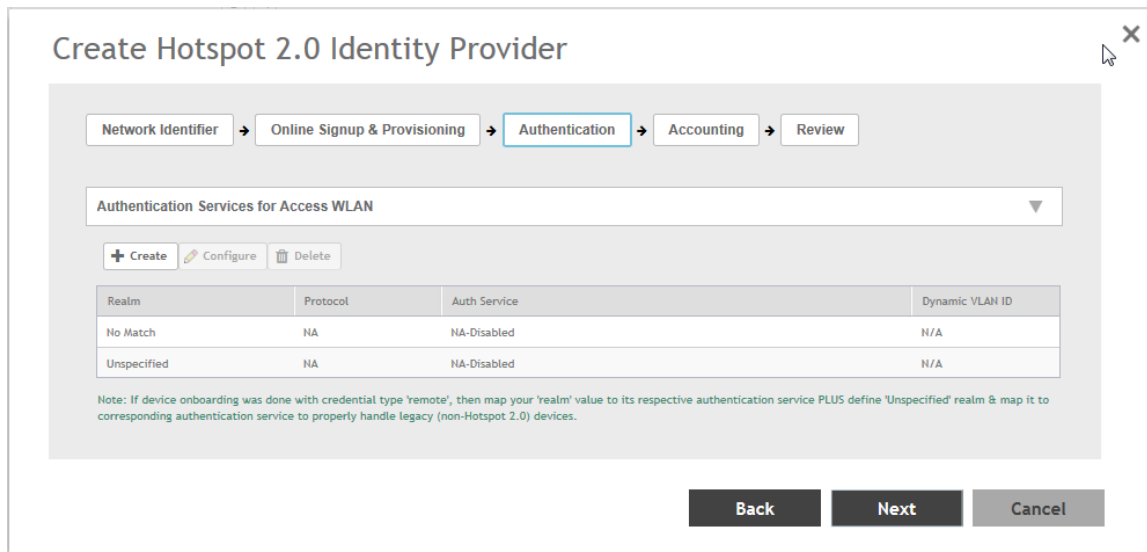
Follow these steps to create a Hotspot 2.0 Identity Provider - Authentication.

1. Click **Authentication** to configure the service for the identity provider.
2. Configure the authentication option settings below to create a Hotspot 2.0 SignUp and Provisioning.

Option	Description
Realm	The administrator should configure the realm mapping to the authentication service. The administrator should map the realm to an external RADIUS server which should be preconfigured in Services & Profiles > Hotspots & Portals > Hotspot 2.0 > Authentication . The default EAP method which the controller responds to is EAP-TTLS. In case the client is using other EAP methods (for example EAP-PEAP in legacy on-board devices) the controller falls back to the required EAP method.

3. Click **Next**. You have completed creating a Hotspot 2.0 Identity Provider - Authentication step.
4. Continue to [Accounting](#) on page 20.

FIGURE 6 Hotspot Identity Provider - Authentication



Accounting

Follow the steps in this section to create a Hotspot 2.0 Identity Provider - Accounting.

1. Click to enable Accounting for configuring the accounting service.

2. Configure the settings below to create a Hotspot 2.0 Identity Provider - Accounting.

Option	Description
Realm	In case the authentication's realm is set as remote credential type, administrator should set this realm here to the customer's external accounting server. The actual external accounting server should be preconfigured in Services & Profiles > Hotspots & Portals > Hotspot 2.0 > Accounting .

3. Click **Next**. You have completed creating a Hotspot 2.0 Identity Provider - Accounting step.
4. Continue to [Review](#) on page 21.

FIGURE 7 Hotspot Identity Provider - Accounting

The screenshot shows a wizard window titled "Create Hotspot 2.0 Identity Provider" with a close button (X) in the top right corner. At the top, there is a progress bar with five steps: "Network Identifier", "Online Signup & Provisioning", "Authentication", "Accounting" (which is highlighted with a blue border and a mouse cursor), and "Review". Below the progress bar, there is a checkbox labeled "Enable Accounting" which is checked. Underneath, there is a dropdown menu showing "Accounting Services for Access WLAN". Below the dropdown are three buttons: "+ Create", "Configure", and "Delete". A table is displayed with the following data:

Realm	Protocol	Accounting Service
No Match	NA	NA-Disabled
Unspecified	NA	NA-Disabled

Below the table, there is a note: "Note: A realm to service mapping define the accounting service for each of the realm specified in this table. When the accounting service for a particular realm is 'NA', then accounting is disabled." At the bottom of the window, there are three buttons: "Back", "Next", and "Cancel".

Review

Follow the steps in this section to review the created Hotspot 2.0 Identity Provider.

1. Click **Review** to review the configuration on one page before committing the changes to the server side. For each section is the review page, the administrator has the "Edit" button to bring the controller web interface back to the corresponding section.
2. Click **Submit** to create the Hotspot 2.0 Identity Provider.

Defining the Hotspot 2.0 WLAN Profile

Follow these steps to create a Hotspot 2.0 WLAN profile.

1. On the controller web interface, navigate to **Wireless LANs**.
2. Select **Zone**, and click **Create**.
3. On the **Create WLAN Configuration** page, in the section **Authentication Options**, go to the field **Authentication Type**, and select **Hotspot 2.0 Access**

Configuring Hotspot 2.0

Defining the Hotspot 2.0 WLAN Profile

4. In the Hotspot 2.0 Profile section, click **Create**.
5. Configure the settings in the table below to create a Hotspot 2.0 WLAN profile.

TABLE 4 WLAN profile configuration options

Option	Description
Name	Enter a name for this WLAN profile. This name identifies the WLAN profile when assigning an HS2.0 service to a HS2.0 WLAN.
Description (Optional)	Enter a description for the WLAN profile.
Operator	Select the operator profile. This name identifies the service operator when assigning an HS2.0 service to a HS2.0 WLAN.
Identify Providers	<p>Choose one or more identity providers. Choose the identity provider. You can configure an OSU SSID when you add an Identity Provider which enables OSU and provisioning. Since there may be more than one identity provider per Hotspot 2.0 profiles having its own authentication profile, the No Match and Unspecified mapping could be duplicated. To avoid duplication, the default identity provider is taken as the correct configuration for No Match and Unspecified mapping. OSU SSID can be Hotspot 2.0 Onboarding; Open or 802.1X EAP.</p> <p>NOTE To create a new identity provider refer to Defining the Identity Provider on page 16.</p>
Internet Option	Specify if this HS2.0 network provides connectivity to the Internet.
Access Network Type	Access network type (private, free public, chargeable public, etc.), as defined in IEEE802.11u, Table 7-43b.
IP Address Type	Select IP address type availability information, as defined in IEEE802.11u, 7.3.4.8.
Connection Capability	Provides information on the connection status within the hotspot of the most commonly used communications protocols and ports. 11 static rules are available, as defined in WFA Hotspot 2.0 Technical Specification, section 4.5.
Custom Connection Capability	Allows addition of custom connection capability rules. Up to 21 custom rules can be created.

6. Click **OK**. You have completed creating a Hotspot 2.0 services profile.

FIGURE 8 Hotspot 2.0 Services Profile

The screenshot shows the 'Create Hotspot 2.0 WLAN Profile' interface. It contains several input fields and sections:

- Name:** A text input field.
- Description:** A text input field.
- Operator:** A dropdown menu with 'No data available' and a '+ Create' button.
- Identity Providers:** A dropdown menu with 'No data available', '+ Add', 'Cancel', 'Delete', and 'Create' buttons. Below it is a table with columns for 'Identity Provider', 'Online Signup Service', and 'Default'.
- Advanced Options:** A section with a dropdown arrow. It includes:
 - Internet Option:** A checkbox labeled 'Specified with connectivity to the Internet' which is checked.
 - Access Network Type:** A dropdown menu with 'Private' selected.
 - IPv4 Address:** A dropdown menu with 'Single NATed private address' selected.
 - IPv6 Address:** A dropdown menu with 'Not Available' selected.
- Connection Capabilities:** A table with columns for 'Protocol Name', 'Protocol Number', 'Port Number', and 'Status'. The 'Status' column has a dropdown menu with 'Closed' selected. There are '+ Add', 'Cancel', and 'Delete' buttons.

At the bottom of the form are two buttons: 'Create' and 'Cancel'.

Defining the Hotspot 2.0 Venue Profile

Follow these steps to create a Hotspot 2.0 Venue profile (which is an optional step).

1. Click **Access Points** and select **AP Groups** or **Access PointsConfiguration** tab and click **Configure**.
2. In the Advanced Options section go to **Hotspot 2.0 Venue Profile** and click **Create**.
3. Configure the settings in the table below to create a Hotspot 2.0 Venue profile.

TABLE 5 Venue profile configuration options

Option	Description
Name	Enter a name for this venue profile. This name identifies the venue profile when assigning an HS2.0 service to a HS2.0 venue.
Description (Optional)	Enter a description for the venue profile.
Venue Options	
Venue Names	Create a new venue name. Select the language and enter the venue name in that language.
Venue Category	Select venue category and venue type as defined in IEEE802.11u, Table 7.25m/n.
WAN Metrics	Provides information about the WAN link connecting an IEEE 802.11 access network and the Internet; includes link status and backhaul uplink/downlink speed estimates

4. Click **OK**. You have completed creating a Hotspot 2.0 venue profile.

Configuring Hotspot 2.0

Defining the Hotspot 2.0 Venue Profile

NOTE

Venue configuration can be assigned to AP/AP Group/AP Zone and its priority is in the same order. This means that its first AP configuration followed by AP group and last AP zone configurations. Venue profile cannot be selected at WLAN level.

FIGURE 9 Hotspot 2.0 Venue Profile

The screenshot shows a web-based configuration interface titled "Create Hotspot 2.0 Venue Profile". The interface includes the following fields and controls:

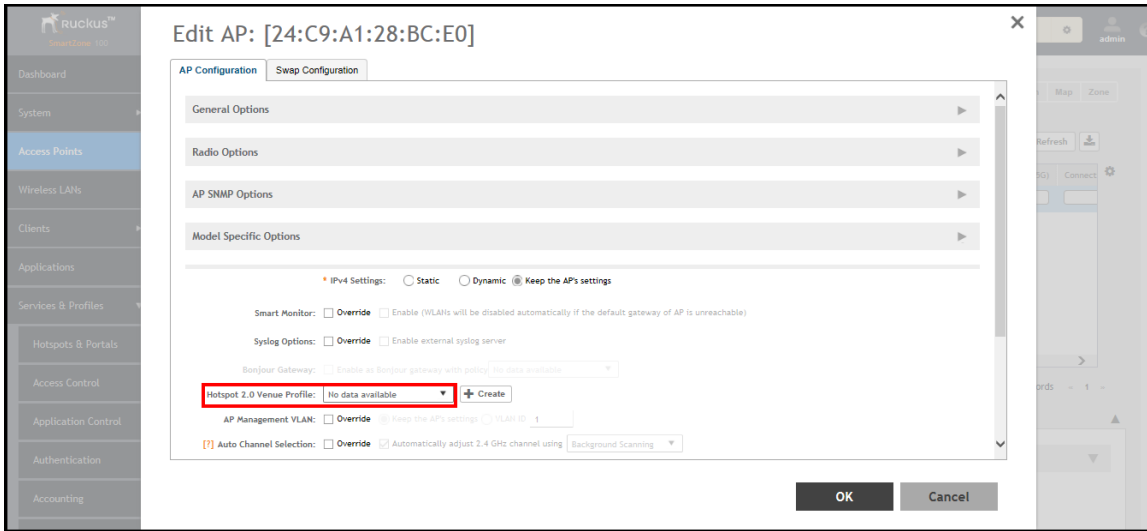
- Name:** A text input field.
- Description:** A text input field.
- Venue:** A dropdown menu.
- Venue Names:** A table with columns for "Language" and "Name". The "Language" column has a dropdown menu currently set to "English". To the right of the table are buttons for "+ Add", "X Cancel", and a trash icon labeled "Delete".
- Venue Category:** Two dropdown menus: "Group" (set to "Unspecified") and "Type" (set to "Unspecified").
- WAN Metrics:** Two input fields: "Downlink Speed" (with "kbps" label) and "Uplink Speed" (with "kbps" label).

At the bottom right of the form are two buttons: "Create" and "Cancel".

Adding a Venue Profile in an AP

1. Click **Access Points**, select an AP from the list and click **Configure**. Refer to the Administration Guide for details.
2. Go to **AP Configuration > Advanced Options** to set the Hotspot 2.0 Venue profile from the drop down list as seen in the figure below.
3. Click **OK**.

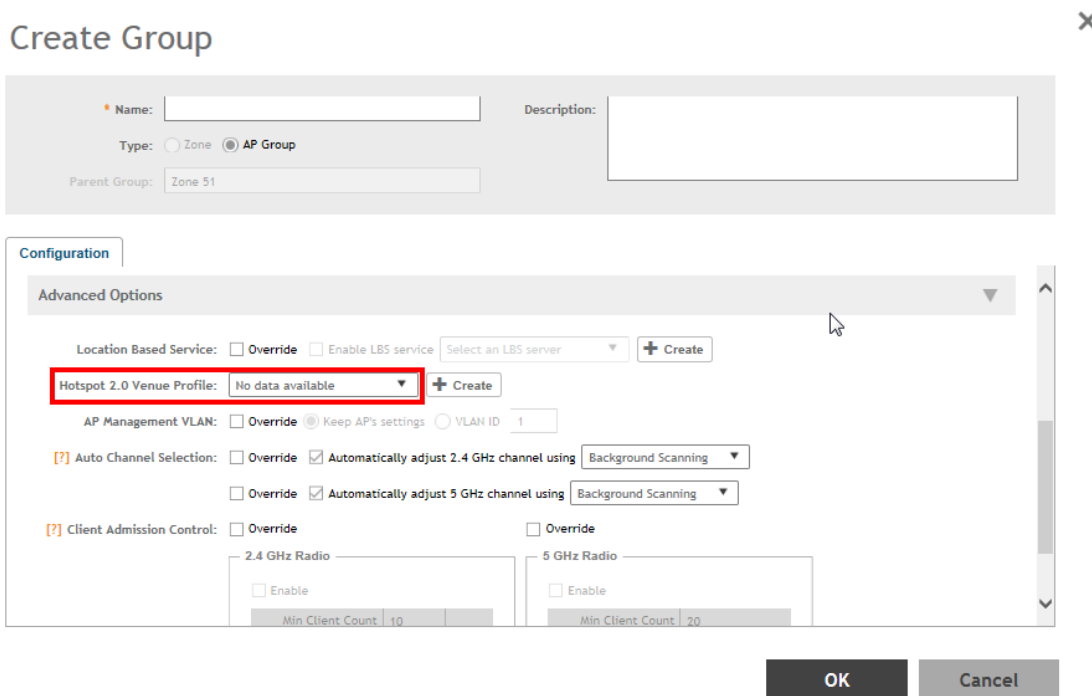
FIGURE 10 Hotspot 2.0 Venue Profile in the AP



Adding a Venue Profile in an AP Group

1. Click **Access Points** and select the **AP Group**. Refer to the SZ100 and vSZ-E Administration Guide for details.
2. Go to **Advanced Options** to set the Hotspot 2.0 Venue profile from the drop down list as seen in the figure below.
3. Click **OK**.

FIGURE 11 Hotspot 2.0 Venue Profile section on the AP Group page



Hotspot 2.0 R2 Device Workflow

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- Access Hotspot 2.0..... 27
- AAA Combinations..... 29

Onboarding Flow

Based on the access WLAN configuration, the AP sends beacon frames with extra information suitable for interpretation by a Hotspot 2.0 R2 compliant device. This information includes the Realm, EAP method, the SSID for onboarding and a list of OS and their provisioning server URLs.

A list of OSU (pairs of icon and friendly name) is presented at the network selection and the user is required to click on one of the icons. This list will be displayed if there are no MO or matching realms to those configured on the UE.

The UE sends a HTTPS SOAP-XML request to the OSU server (also called as provisioning server) including UE's MAC address, the URL of the portal, and redirect URI. The controller pushes the domains of the OSU and portal to AP who passes requests to them without DNAT or redirecting them.

The NGINX component acts as a proxy for all HTTPS requests to the OSU server and OSU portal. It handles certificates and OCSP stapling (server side certificate validation against the CA), which is a new requirement in Passpoint standard.

After sending a successful OCSP response to the UE, the OSU server generates a session ID for this UE. It responds to the UE with the URL of the portal as per the configuration.

Each authentication service in the controller has in its configuration group attribute mapping to the controller user role. Among other attributes, the user role defines (used more in legacy devices) the maximum number of devices a user can on board with. IDM validates the number of devices used does not exceed the maximum devices configured in the user role.

After successful authentication (regardless of the authentication service used), the IDM generates a user entry in Cassandra with all its related information. It also generates a MO credential composed of username and password. The username structure is UUID and is randomly generated during creation.

The portal redirects the UE to the URL stored in the redirectUri parameter, the value supplied by the UE upon initially contacting the portal. The UE initiate another HTTPS SOAP-XML request to the OSU server. The OSU server uses the session ID (generated at the beginning) to retrieve the user's credentials to generate PPS-MO entity provided to the UE in an SOAP-XML format. Among its attributes, this PPS-MO is set for EAP-TTLS authentication.

This PPS-MO includes all required information for the UE to connect a Hotspot 2.0 SSID (the realm leaf node is defined by the realm value set in **Identity Provider > Online Signup & Provisioning > Authentication configuration**). At this point the UE disconnects from the onboarding WLAN and automatically connects to the Hotspot 2.0 SSID as per the information in PPS-MO.

Access Hotspot 2.0

Based on access WLAN configuration AP sends beacon transmitting which can be captured by R2 device. Among the information provided are: Realm, EAP method, List of OS's [provisioning server URLs], SSID of onboarding, etc.

Since UE already has PPS-MO, it finds a match between the configured realms in the PPS-MO to the realm transmitted by AP which is related to one of the identity providers configured in the Hotspot 2.0 profile. At this point, the UE initiates an EAP-TTLS request and the AP proxies it to the controller's RAC (Radio Access Controller) module.

Since UE already has PPS-MO, it finds a match between the configured realms in the PPS-MO to the realm transmitted by AP which is related to one of the identity providers configured in the Hotspot 2.0 profile. At this point, the UE initiates an EAP-TTLS request and the AP proxies it to the controller's RAC (Radio Access Controller) module.

NOTE

In this release AP's direct RADIUS authentication request to an external server for Hotspot 2.0 WLAN is not supported.

1. Read Password - RAC sends the username to IDM. IDM locates the user and replies with its password. RAC matches it to the password received from the UE in the EAP-TTLS request. In case the match is successful, RAC sends the second request otherwise the access reject is sent back to UE.
2. Authorization Status - RAC sends the username again and the IDM tries authorizing the user according to:
 - a. Password expiration
 - b. Update Identifier
 - c. User's status

In case any one of the above three validations fail IDM responds back with an appropriate response to RAC which triggers the following use case.

In case the validation is successful, IDM responds correspondingly to RAC, which returns the access accept to the UE and the UE is authenticated and authorized to browse the Internet.

RAC includes the outer identity of the EAP-TTLS in the username attribute of the access accept response. RAC includes the new *UE-Username* attribute from the IDM response for authorization status request in the CUI attribute of the access accept response. This *UE-Username* includes the username which the user used for onboarding.

De-Auth

De-Auth is in case IDM finds user's expiration has been expired it sends a special response to RAC. The RAC responds to the access accept with the new De-Auth attribute including the De-Auth URL. It means that the UE is not yet authorized. When the UE receives this kind of response (access accept with De-Auth attribute) it initiates the HTTPS request to the De-Auth URL provided in the RADIUS response. This URL is handled by the controller's portal, which displays the message that the user is disabled.

Remediation

In case IDM finds the user's expiration has been expired or the update identifier attribute in the EAP-TTLS request does not match the value in IDM's record for the user, it sends a response to RAC, which includes the remediation URL. RAC identifies this response and replies with the access accept including the new remediation URL attribute. It means that the UE is not yet authorized.

When the UE receives this kind of response (Access Accept with remediation URL) it initiates the HTTPS SOAP-XML request to the remediation URL (handled by OSU server) provided in the RADIUS response. This is followed by the digest request to the OSU server, which queries the IDM for the remediation reason.

In case the credential type is set to *Remote*, SmartZone OSU server does not support any remediation flows, as elaborated in this section.

Password Expired

In case IDM finds user's expiration has been expired the OSU server redirects the UE to a specific path into the SGC portal.

Update Identifier

In case the reason for remediation is that the update identifier does not match the OSU server generates an updated PPS-MO with the updated identifier. It responds back to the UE, which initiates the new access request along with the new updated PPS-MO information.

AAA Combinations

Short reference description. In SmartZone 5.0 authentication server includes the RADIUS server.

TABLE 6 AAA Combinations

WLAN Type	Enable Proxy to the controller	RADIUS
Open	Yes	✓
802.1X	Yes	✓
Hotspot (WISPr)	Yes	✓
Onboarding	Yes	✓
Hotspot 2.0	Yes	✓

External Onboarding and Remediation Portal Integration

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Overview

This document contains the integration requirements for configuring external portal for onboarding and remediation.

The external portal communicates through the controller's NBI. The NBI IP address (nbiip) is the same as controller Management IP address and is included in the redirection URL from the OSU. One of the required parameters to NBI is the NBI password. NBI password is configured in the controller web interface. Navigate to **System > General Settings > Northbound Interface** to set or modify the password. HS2.0 R2 specification requires OCSP Stapling for HTTPS related requests. Since this external portal handles HTTPS requests, it also supports OCSP Stapling. A recommended approach is to use NGINX as a proxy for the external portal to handle OCSP Stapling. The Onboarding and Remediation flows, are related to the flows as described in Hotspot 2.0 R2 Device Workflow chapter.

Authentication in Onboarding Flow

Authentication against a remote database is performed by the NBI in the onboarding flow. The portal collects the required information, such as user name, password, and sends a HTTP request (JSON) to the NBI. The URL path, which the external onboarding portal sends as HTTP request to NBI are one of the below:

```
http://nbiIP:9080/portalintf
https://nbiIP:9443/portalintf
```

NOTE

9080 is plain-text and 9443 is HTTPS (SSL).

The OSU redirects the UE to the portal path with the following parameters:

- WsgWlanId - WLAN ID
- ClientMac- UE MAC address
- RedirectURI - The URL, which the portal redirects the UE at the end of the flow.

For example:

```
https://EXTERNAL_PORTAL_FQDN:EXTERNAL_PORTAL_PORT/
EXTERNAL_PORTAL_PATH?WsgWlanId=1&ClientMac=98:0C:82:5E:34:10&
RedirectURI=http%3A%2F%2F127.0.0.1:12345
```

Request Content

```
{
"MSG-ID":< Unique ID for the message>,
"APIVersion":"3.1.0",
"Vendor" : "Ruckus",
"RequestPassword" : "<NBI password as set in SCG>",
"UE-MAC":<Device MAC>
```

External Onboarding and Remediation Portal Integration Authentication in Onboarding Flow

```
"RequestType": "RegistrationOnboarding",
"RequestCategory": "UserManagement",
"Input": {
  "hsReleaseVersion": "2",
  "credentials": {
    "loginName": <user login name>,
    "loginPassword": <user password>
  },
  "authenticationServerName": <authentication sever name>
},
"remediation": "false"
}
```

Parameters:

- MSG-ID identifies the related request and response
- UE-MAC value is taken from the request parameter *-ClientMac*
- Login name and password are user inputs
- Authentication server name is taken from the authentication service configuration specified in **Services & Profiles > Hotspots & Portals > Hotspot 2.0 > Identity Provider > Authentication > Create > Service > Create** in the controller web interface as seen in the figure. This configuration is applied to the specific Online Signup & Provisioning in **Services & Profiles > Hotspots & Portals > Hotspot 2.0 > Identity Provider**.

FIGURE 12 Authentication Configuration

Create Authentication Service

Name:

Friendly Name:

Description:

Service Protocol: RADIUS Active Directory LDAP OAuth

RADIUS Service Options

RFC 5580 Out of Band Location Delivery: Enable for Ruckus AP Only

Primary Server

IP Address:

Port:

Shared Secret:

Confirm Secret:

Secondary Server

Backup RADIUS: Enable Secondary Server Automatic Fallback Disable

IP Address:

Create **Cancel**

FIGURE 13 Identity Provider Configuration

Create Hotspot 2.0 Identity Provider

Network Identifier → **Online Signup & Provisioning** → Authentication → Accounting → Review

Enable Online Signup & Provisioning

- External Service URL is required
- OSU NAI Realm is required
- OSU Service Description is required

Provisioning Options

Provisioning Service: * External Service URL:

* Provisioning Protocol: OMA-DM SOAP-XML

Online Signup Options

* OSU NAI Realm: No data available

* Common Language Icon: Browse

* OSU Service Description:

Language	Friendly Name	Description	Icon	Format	Width	Height
English						

+ Add - Cancel Delete

Whitelisted Domains:

Domain Name

+ Add - Cancel Delete

Authentication in Remediation Flow

In remediation, OSU module in controller provides the URL to the device as the URL for the portal. This is for manual remediation flow.

The OSU redirects the UE to the portal path with the following parameters:

- WsgWlanId - WLAN ID
- ClientMac- UE MAC address
- RedirectURI - URL, which the portal redirects to the UE at the end of the flow.
- ExternalUsername - Username used for remote authentication
- InternalUsername - Username sent for digest authentication
- AuthServerName- Authentication name as seen in the controller web interface - **Services & Profiles > Hotspots & Portals > Hotspot 2.0 >Identity Provider > Authentication**

Example:

```
https://EXTERNAL_PORTAL_FQDN:EXTERNAL_PORTAL_PORT/  
EXTERNAL_PORTAL_PATH?WsgWlanId=1&ClientMac=98:0C:82:5E:34:10  
&RedirectURI=http://127.0.0.1:1234 &ExternalUsername=  
testuser1-uid&InternalUsername= e552a465-1873-4d44@  
osuserver.hs20.ruckus&AuthServerName=radius&RemediationReason  
=expired_password
```

The following is the content requested for remediation authentication.

Request Content

External Onboarding and Remediation Portal Integration

Authentication in Remediation Flow

```
{
"MSG-ID":< Unique ID for the message>,
"APIVersion":"3.1.0",
"Vendor" : "Ruckus",
"RequestPassword" : <NBI password as set in SCG>,
"UE-MAC":<Device MAC>
"RequestType":"RegistrationOnboarding",
"RequestCategory":"UserManagement",
"Input":{
"userLookupParameters":{
"loginName":<internal user name>,
"authenticationMethod":"MO"
},
"hsReleaseVersion":"2",
"credentials":{
"loginName":<external user name>,
"loginPassword":<user password>
"authenticationServerName":<authentication sever name>
},
"remediation":"true"
}
}
```

Parameters

- *MSG-ID* identifies the related request and response
- *UE-MAC* value is taken from the request parameter - *ClientMac*
- *loginName* (internal user name and external user name) and *UE-MAC* is retrieved from request parameters using the value names respectively - *InternalUsername*, *ExternalUsername* and *ClientMac*
- *loginPassword* is taken from user input

OCSP Stapling Support

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Overview

Hotspot 2.0 (R2) technical specification requires OCSP Stapling as specified in RFC 6066 section 8 (certificate status request) as part of the TLS extension. It requires the devices to get the certificate revocation status and check that AAA server (for Anon-TLS or EAP-TTLS) certificates or OSU server certificate have not been revoked using OCSP within the TLS connection.

SmartZone has 2 different modules which handles this requirement:

1. NGINX - Provisioning and remediation servers in the controller are running on the top of Tomcat, but Tomcat does not support OCSP Stapling. To support OCSP Stapling, NGINX, which is a 3rd party proxy server is used. NGINX is positioned ahead of the Tomcat web server, proxying the content of each request to the Tomcat server once the TLS has been established.
2. RAC - For Hotspot 2.0, there are two points in the call flow where the controller RAC module interacts with the OCSP server.
 - a. During Anonymous TLS for onboarding call flow as seen in the figure.
 - b. During EAP-TTLS access flow as seen in the figure.

Client (mobile device) includes the Certificate Status request in the TLS request message and RAC module includes the Certificate Status in the TLS response message.

The OCSP message is a standard message derived based on the certificate uploaded for the given service provider.

FIGURE 14 Interaction with OCSP server during Anonymous TLS

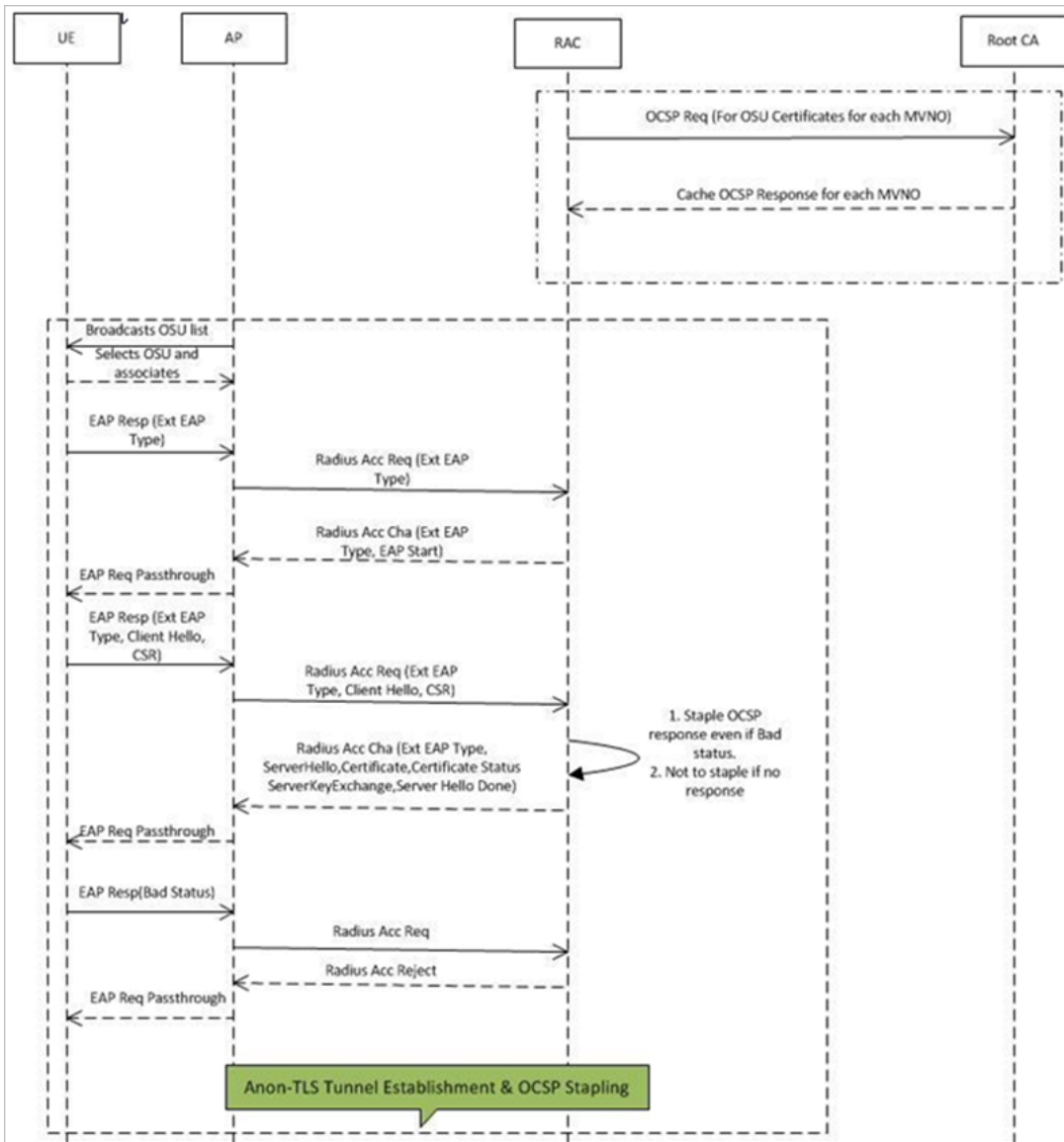
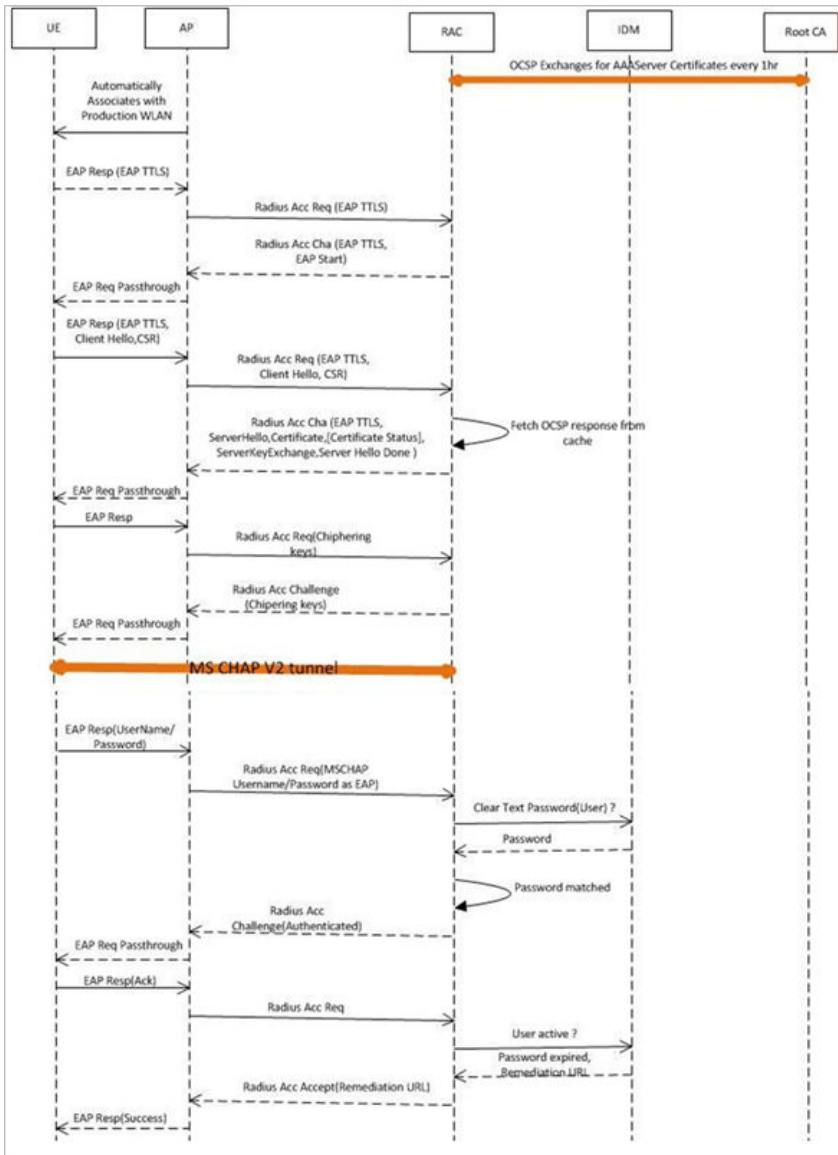


FIGURE 15 Interaction with OCSP server during EAP-TLS



The figures show the important fields in the OCSP messages. These are standard message, which operators and administrators should be aware of for successful call flows. Possible values of the certificate status field are good, bad or revoked.

NOTE

If the client (mobile device) requests for Certificate Status request, RAC provides the status if it is available. In case the certificate status is not provided, it is up to the client to continue or abort the call.

NOTE

If the client (mobile device) requests for Certificate Status request, RAC provides the status if it is available. In case the certificate status is not provided, it is up to the client to continue or abort the call.

FIGURE 16 Important OCSF Message

```
Frame 6: 258 bytes on wire (2064 bits), 258 bytes captured (2064 bits) on interface 0
Ethernet II, Src: Ruckuswl_3f:4a:f0 (24:c9:a1:3f:4a:f0), Dst: Cisco_78:8d:5b (d8:24:bd:78:8d:5b)
Internet Protocol Version 4, Src: 192.168.1.101 (192.168.1.101), Dst: 117.18.237.29 (117.18.237.29)
Transmission Control Protocol, Src Port: 28934 (28934), Dst Port: http (80), Seq: 1, Ack: 1, Len: 192
Hypertext Transfer Protocol
Online Certificate Status Protocol
  tbsRequest
    requestList: 1 item
      Request
        reqCert
          hashAlgorithm (SHA-1)
            issuerNameHash: 3da0ab5cd66978b7ba2dfabc751742ac260ae4ea
            issuerKeyHash: 02d44ea01ada729753d06bceb4320da9aa46b292
            SerialNumber : 0x0ea55bbdbb4c24e197de10b5d9232a9a
          requestExtensions: 1 item
            Extension
              Id: 1.3.6.1.5.5.7.48.1.2 (id-pkix.48.1.2)
              BER: Dissector for OID:1.3.6.1.5.5.7.48.1.2 not implemented. Contact wireshark developers if you want this supported
              [Expert Info (Warn/undecoded): BER: Dissector for OID 1.3.6.1.5.5.7.48.1.2 not implemented]
```

FIGURE 17 OCSF Response Message

```
Hypertext Transfer Protocol
Online Certificate Status Protocol
  responseStatus: successful (0)
  responseBytes
    ResponseType Id: 1.3.6.1.5.5.7.48.1.1 (id-pkix-ocsp-basic)
    BasicOCSPResponse
      tbsResponseData
        responderID: byKey (2)
        producedAt: 2015-01-26 07:38:00 (UTC)
        responses: 1 item
          SingleResponse
            certID
              hashAlgorithm (SHA-1)
                issuerNameHash: 3da0ab5cd66978b7ba2dfabc751742ac260ae4ea
                issuerKeyHash: 02d44ea01ada729753d06bceb4320da9aa46b292
                serialNumber : 0x0ea55bbdbb4c24e197de10b5d9232a9a
            certStatus: good (0)
            thisUpdate: 2015-01-26 07:38:00 (UTC)
            nextUpdate: 2015-02-02 07:53:00 (UTC)
          signatureAlgorithm (sha256withRSAEncryption)
```

Response received

Serial # from Request should match

Apple and Samsung Hotspot 2.0 Release 1 (Passpoint) Devices

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Overview

Apple and Samsung have a subset of new devices, which support new configuration file format (XML based) with credentials for accessing authentication of Hotspot 2.0 SSIDs.

The following are the Apple devices that support the R1 provisioning via a mobile configuration profile:

- iOS7 (5, 5C, 5S) and newer supports R1
- Mac OS X Mavericks and newer supports R1

NOTE

It was impossible to distinguish between the iPad 2 (which does not support HS2.0 R1) and the iPad Mini v1 (which does support HS2.0 R1). Due to that, Ruckus chose to exclude iPad 2 from the provisioning option so as not to offer provisioning to unsupported devices.

To view the Samsung devices that support the R1 provisioning via a mobile configuration profile, click on the following link. http://www.wi-fi.org/product-finder-results?sort_by=default&sort_order=desc&categories=1,2,4,5,3&capabilities=1&companies=362

