SD-Branch Fundamentals Guide

Chapter 3 - Provisioning

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Fundamentals Guide

Copyright Information

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Provisioning

Aruba Gateways operating as VPNCs or BGWs can either be automatically or manually provisioned. Most deployments will implement manual provisioning for VPNCs and automatic provisioning for BGWs using ZTP. Automatic provisioning is preferred for BGWs as it simplifies and streamlines branch deployments.

Prerequisites

The following steps must be performed in Aruba Central server before provisioning Aruba Gateways, Aruba IAPs, or ArubaOS switches:

1. The device must be present in the Central device inventory. For most deployments this will be automatic as each newly purchased Aruba device will be added automatically.

2. The device must be subscribed and licensed. Aruba recommends enabling **Auto Subscribe** to automate device management subscription assignments to IAPs and Switches. Additionally each Gateway must be assigned a foundation or foundation-base license.

To streamline the provisioning process of Aruba Gateways in branch locations, each BGW must be assigned a system-ip. The system-ip can be automatically assigned using configuration applied to each BGW group or be applied on a per device basis using bulk configuration.

NOTE

For additional details on the system-ip please refer to the System IP section.

Automatic Provisioning

Most Aruba devices deployed in branches will be automatically provisioned. New Aruba Gateways are connected to the Internet and will automatically obtain IP addressing, reach out to Aruba Activate for firmware upgrades (if required), and then be redirected to Aruba Central where their configuration resides. Any device level configuration uploaded using bulk configuration combined with a BGW group configuration is pushed and applied to that gateway.

The Aruba Gateways must be assigned to a BGW group prior to communicating with Central in order for automatic provisioning to occur. The group assignment can be performed manually in Central or automatically using the Install Manager application.

Install Manager

Aruba offers the Install Manager application in Aruba Central to automate the provisioning of new devices for new branch sites along with a corresponding mobile application available for Android and Apple iOS devices. The Install Manager application in Central is used by IT staff to assign installers to each new branch site, configure the gateway, IAPs and ArubaOS Switch group assignments as well as monitor the deployment status.

A typical Install Manager provisioning workflow consists of the following steps:

1. IT staff will create a new site or import multiple sites under **Labels and Sites**.
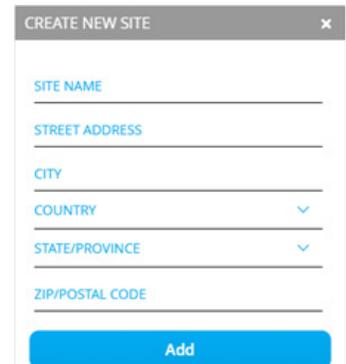
2. If auto-subscription is disabled IT staff will assign the device and foundation subscriptions to the new devices under **Subscription Assignment**.
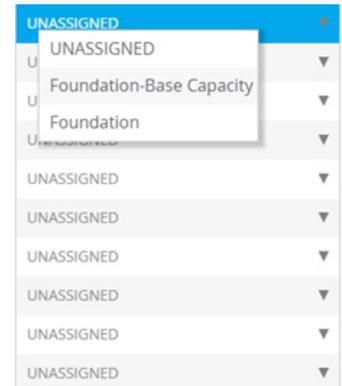
3. Navigate to **Install Manager** and configure the IAP, switch, and gateway group assignments for each site.

4. IT staff assign an existing installer to a site or add a new installer and assign a site under **Installers**. The installer's first name, last name, mobile phone number, site assignments, expiration date, and expiration time are configured.

    ADD INSTALLER

    First Name
    Agent

    Last Name
    Smith

    CODE
    +1   × ▼

    Mobile Number
    555-555-1212

    Valid Till
    08/16/2018

    × DEMO-BRANCH1   × DEMO-BRANCH2 | × ▼

    SAVE   CANCEL

5. Once on-site, the installer opens the Aruba Installer application, selects **Sign Up**, and enters their first name, last name, and mobile phone number. The information entered must match the installer configuration in Central. The installer selects **Register** to complete the registration process.

    Verizon   10:12   100%

    Sign Up   Sign In

    Agent   Smith

    +1   5555551212

    Register

6. The installer selects **Sign In** and enters their mobile phone number, then selects **Get OTP** to receive a one-time password via a SMS text message. The password is valid for 5 minutes and the installer must enter it to login and proceed. The password can be resent if required.
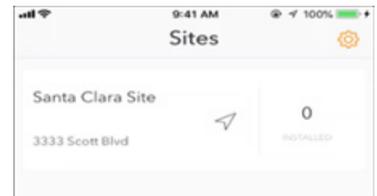
    Verizon   10:13   100%

    Sign Up   Sign In

    +1   5555551212

    Get OTP

7. The application will display a list of sites the installer has been assigned once they have signed in. The installer will select the appropriate site.

8. The installer scans the serial number and MAC address barcodes of each Aruba device which is in turn sent to Aruba Central.

9. If verification is successful, the installer will see a "Verified Successfully" message. The device's MAC address, serial number, information, and licensing status is displayed.
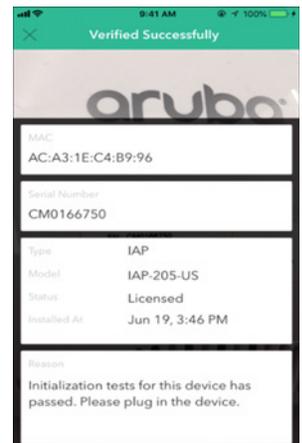
10. Once the devices have been connected to the network, the installer can view the status of each device. If installation was successful, the verified, licensed, and connected statuses will show as green.

Zero Touch Provisioning

Aruba devices can be automatically provisioned by Aruba Central using Zero Touch Provisioning. With ZTP, Aruba gateways, IAPs, and ArubaOS switches are able to automatically communicate with Central and download their group configuration without any user interaction. Each managed Aruba device can be manually assigned to their respective group in Central under **Global Settings > Manage Groups** or by assigning groups per site in advance under Site Installations in the Install Manager application. Unlike Aruba switches and IAPs, the group assignment for gateways must be performed prior to ZTP. This is required so that Central knows the role (BGW or VPNC) of the gateway. The group type must also be selected or the group type will display as "unprovisioned".

ZTP is the preferred method for deploying new branch devices is it eliminates the requirements for any on-site user interaction and configuration. An on-site installer can simply connect the Aruba devices and the ZTP process will automatically onboard and provision each branch device. While ZTP may be used to provision VPNCs in the data center, One Touch provisioning is often preferred as VPNCs typically require static IPv4 addresses along with specific VLAN and switchport configuration.

When deploying a new branch site, it is important to remember that any IAPs and ArubaOS switches at the branch will only be able to complete their ZTP process and receive their group configuration once the gateway(s) are provisioned and online. The IAPs and switches will not be able to communicate with Central until they are able to obtain IP addressing and domain name server (DNS) information from their respective gateway(s).

In order for a gateway to successfully perform ZTP, one or more ZTP ports must be connected to a WAN service that provides the following:

1. DHCP addressing
2. DHCP options 3 (Router) and 5 (Name Server)
3. Internet access

The WAN services at the branch can provide the gateway with either public or private RFC-1918 IPv4 addressing. Private IPv4 addressing is typically offered by intermediate CPE modems or gateways. If multiple WAN services are connected to the gateway, each WAN service must provide a non-overlapping IPv4 address. This may occur if multiple CPE modems or gateways are connected which provide RFC-1918 addressing since most vendors default to a common 192.168.0.0/24 address space.

WAN services can be connected to any switchport on an Aruba gateway except for Gigabit Ethernet 0/0/1 which is reserved for One Touch Provisioning (OTP). If the gateway is connected to multiple WAN services it will attempt to perform ZTP over each service until it is successful. The first WAN service that responds to the DHCP discover message will be selected first.

| ZTP Ports | Service Port | ZTP Ports | Service Port | ZTP Ports | Service Port |

| Aruba Gateway 7005 | Aruba Gateway 7008 | Aruba Gateway 7010 |

Figure 3-1 *ZTP Port Locations*

> **NOTE**
>
> The last copper port on the gateway is reserved for ZTP if it is running the firmware image shipped from the factory.

The ZTP process is broken into three phases:

1. The gateway will attempt to obtain an IPv4 address via DHCP out of VLAN 4094 which is assigned to the ZTP enabled switchports.

2. The gateway will resolve the Activate fully-qualified domain name (FQDN) and establish an HTTP Secure (HTTPS) session to Activate. The gateway provides Activate with its serial number, MAC address, and model. Aruba Activate authenticates the device and redirects the gateway to Central.

   Aruba Activate will trigger a firmware upgrade if one is required. The gateway will reboot and restart the ZTP process upon upgrading.

3. The gateway will resolve the Aruba Central FDQN and establish a HTTPS session to Central. The gateway provides Central with its serial number, MAC Address, model and certificate. Central authenticates the device and pushes the required firmware image (if required) along with group configuration.
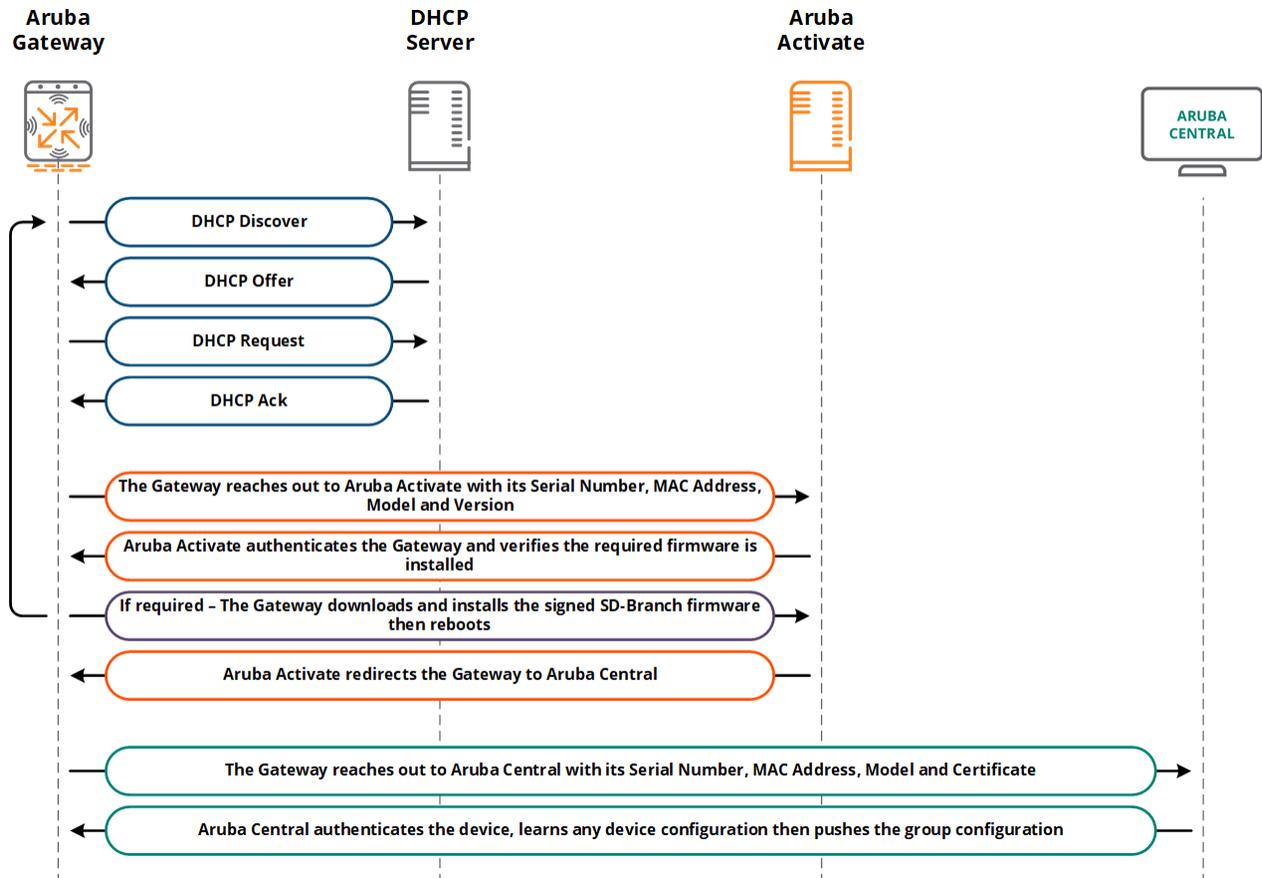
Figure 3-2 *ZTP and Auto-Upgrade Process*

> **NOTE**
>
> The Aruba gateway has to resolve the Aruba Activate server FQDN https://device.arubanetworks.com during the ZTP process as well as the Aruba Central URL assigned by the Activate server, otherwise the ZTP provisioning process will fail.

> **NOTE**
>
> The automatic firmware upgrade from Activate is supported for Aruba gateways running the factory firmware with image 6.5.1.4 and above. If the gateway is running ArubaOS 8.0 or above then a manual firmware upgrade is required.

One Touch Provisioning

ZTP is the preferred method for deploying gateways that dynamically obtain their IP addressing from an Internet Service Provider (ISP). The gateway is connected to the Internet services, obtains an IPv4 address then communicates with Aruba Central to obtain its configuration.

There may be circumstances where a gateway requires additional configuration before it can communicate with Central. E.g., the gateway may require:

1. Static addressing
2. Point-to-Point Protocol over Ethernet (PPPoE) credentials to initiate the Internet service
3. Specific VLAN configuration

To account for these deployment scenarios, Aruba offers a "one touch provisioning" feature for gateways which can be accessed using either the serial console or web user interface. The OTP feature is only available for gateways in their factory default state and cannot be accessed once a gateway has received its configuration from Central.

Web User Interface

OTP using the web user interface allows static IP addressing and PPPoE credentials to be configured on Aruba gateways. The web user interface is the recommended option for BGW deployments when static IP addressing or PPPoE credentials are required for the BGW communicate with Central. This configuration is typically performed by the installer.

OTP is performed on a gateway via the WebUI using the following procedure:

1. Boot the Aruba Gateway.
2. Once the Aruba Gateway is booted, connect a PC or workstation to the **Ge0/0/1** port. The PC or workstation must be configured to obtain its IPv4 address using DHCP.
3. Open a Web browser and connect to **https://172.16.0.254**. The controller contains a default server certificate to validate the device on the network. At the **Security Alert**, click **Yes** to proceed with the **Setup Wizard**. The alert will vary by web browser.
4. Select the **By connecting to activate/central** provisioning method and then click **Next**.

The WebUI provides an option to configure a WAN uplink with a static IP addressing as well as configure PPPoE credentials. Examples of each configuration are provided in figure 3-3:

Figure 3-3 *One Touch Provisioning using Static IP and PPPoE*

Serial Console

One touch provisioning using the serial console allows static IP addressing, PPPoE credentials, and specific VLAN configurations to be configured on gateways. The serial console is recommended when a VPNC or BGW requires more advanced configurations such as requiring a specific VLAN IDs or trunk configurations.

OTP can be performed on a gateway via the serial console using the following procedure:

1. Configure a terminal or terminal emulation program to use the following communication settings:

Baud Rate	Data Bits	Parity	Stop Bits	Flow Control
9600	8	None	1	None

2. Connect the terminal or workstation to the serial port on the controller using an RS-232 serial cable. All accessory kits shipped with Aruba gateways contain an RJ-45 cable and DB-9 to RJ-45 adapter. It may be necessary to use a USB adapter to connect the serial cable to the terminal or workstation.

3. Boot the gateway.

4. After the gateway has booted the following screen should appear. The OTP setup is activated by typing **static-activate** followed by the **enter** key:

```
Choose one of the following options to override or debug auto-provisioning...
    'enable-debug'     : Enable auto-provisioning debug logs
    'disable-debug'    : Disable auto-provisioning debug logs
    'mini-setup'       : Start mini setup dialog. Provides minimal customi-
zation and requires DHCP server
    'full-setup'       : Start full setup dialog. Provides full customiza-
tion
    'static-activate'  : Provides customization for static or PPPOE ip as-
signment.
Enter Option (partial string is acceptable): static-activate
```

The serial console allows a static IP address and PPPoE credentials as well as specific VLAN configuration to be configured. The following examples demonstrate typical one touch configurations that can be performed using the serial console:

- BGW implementing PPPoE on a specific access VLAN and port:

```
Enter Controller VLAN ID [1]: 4092
Enter Uplink port [GE 0/0/0]: GE 0/0/3
Enter Uplink port mode (access|trunk) [access]:
Enter Uplink Vlan IP assignment method (static|pppoe) [static]: pppoe
Enter Uplink Vlan PPPoE username: username
Enter Uplink Vlan PPPoE password: ********
Re-enter Uplink Vlan PPPoE password: ********
Do you want to configure port-channel (yes|no) [no]: no
```

- VPNC requiring static addressing and an 802.1Q tagged VLAN:

```
Enter Controller VLAN ID [1]: 4001
Enter Uplink port [GE 0/0/0]:
Enter Uplink port mode (access|trunk) [access]: trunk
Enter Native VLAN ID [1]: 1
Enter Uplink Vlan IP assignment method (static|pppoe) [static]: static
Enter Uplink Vlan Static IP address [192.168.1.1]: 192.168.120.20
Enter Uplink Vlan Static IP netmask [255.255.255.0]: 255.255.255.0
Enter IP default gateway [none]: 192.168.120.1
Enter DNS IP address [none]: 1.1.1.1
Do you wish to configure IPV6 address on vlan (yes|no) [yes]: no
Do you want to configure port-channel (yes|no) [no]: no
```

Bulk Configuration Upload

When bulk configuration upload is used, an Aruba Gateways configuration is populated in advance in a CSV template file and then uploaded to Central. All configuration defined in the template for a device is applied to the respective VPNC or BGW device configuration. Bulk configuration upload is incremental and allows new configurations or changes to be uploaded into Central at any time.

Bulk configuration upload requires the sample device template file to be downloaded, populated with the correct values, and then uploaded back into Central. The device template can be downloaded by navigating to **Gateway Management > Interfaces > Bulk configuration upload** and Selecting the **Download Sample File** option. Doing so will download an empty CSV template file that includes headers and descriptions only. Selecting the **Download Device Template** option will download a CSV template file that includes the headers, descriptions, and will be prepopulated with the MAC addresses and group assignments of existing gateways (Figure 3-4):

Figure 3-4 *Bulk Configuration Upload*

Parameters that can be configured and uploaded using the template file include:

- Hostnames
- VLAN Configuration
- DHCP Pools
- PPPoE Credentials
- Gateway Redundancy
- VRRP Configuration
- System IP Configuration

Pre-provisioning a new gateway using the bulk configuration upload method requires populating at least the **MAC Address**, **Group**, **Model,** and **Hostname** fields. The population of the remaining fields will be dependent on the individual VPNC or BGW configuration requirements. E.g., deploying a VPNC or BGW using static IP address assignments will necessitate population of the **VLAN Id**, **VLAN IP**, **VLAN Subnet** and **Controller VLAN** fields (Figure 3-5):

	A	B	C	D	E	F	G	V	W	X	AG
35	MAC Address	Group	Model	Hostname	VLAN Id	VLAN IP	VLAN Subnet	VLAN Id	VLAN IP	VLAN Subnet	Controller VLAN
36	00:0b:86:b8:66:e8	DEMO-BRANCH-GW	A7005	DEMO-BR1-GW1	10	192.168.88.1	255.255.255.128	11	192.168.88.129	255.255.255.128	10
37	00:0b:86:be:63:e8	DEMO-BRANCH-GW	A7005	DEMO-BR2-GW1	10	192.168.89.1	255.255.255.128	11	192.168.89.129	255.255.255.128	10

Figure 3-5 *Bulk Configuration Template Pre Provisioning Example*