Dell Networking W-Series ArubaOS 6.4.x Quick Start Guide

This document describes the initial setup of a Dell user-centric network that consists of a Dell controller and Dell Access Points (APs). The installation consists of the following steps:

1. Launch the WebUI or Console Setup Wizard to configure the controller.
2. Connect the controller to the wired network.
3. Configure the controller to allow APs, when installed and powered on, to able to locate and connect to the controller. If you are configuring mesh, define the mesh cluster profile, mesh radio profile, before installing APs in a mesh networking environment.
4. Install and connect your APs to the network.

Before you begin, review the contents of your controller shipment to ensure that you have received the following items, then read the Dell Software *Dell Software License Agreement*.

- The Dell controller with appropriate power cord and accessories
- The *Dell Networking W-Series ArubaOS 6.4.x Quick Start Guide*
- The *Dell Software License Agreement*

Install the Controller

The WebUI Startup Wizard allows you to configure access to the controller, install software licenses, and configure wireless local area networks (WLANs) for internal or guest users. The Startup Wizard is available the first time you connect to and log into the controller or whenever the controller is reset to its factory default configuration. The serial console setup dialog allows you to configure basic controller settings through a serial port connection to the controller. After you complete the Startup Wizard or serial console setup procedure, the controller reboots using the new configuration information you entered.

Do not connect the controller to your network when running the Setup Wizard or serial console setup dialog. The factory-default controller boots up with a default IP address and both DHCP server and spanning tree functions enabled. Once you have completed setup and rebooted the controller, you can use the controller CLI or WebUI to complete its configuration before connecting the controller to your network.

In addition to the traditional method mentioned above, the W-7000 Series controllers running ArubaOS 6.4.3 can be configured without user intervention with zero touch provisioning (ZTP). This option automatically configures the controller using DHCP, or mini-setup. For more details, see "Zero Touch Provisioning" on page 7.

NOTE: ZTP is enabled only on branch controllers. Only W-7000 Series controllers running on ArubaOS 6.4.3.1 or later can function as a branch controller. The factory-default software on W-7005, W-7010, and W-7030 controllers is ArubaOS 6.4.2.3, and does not support the branch controller feature. Hence, if W-7005, W-7010, and W-7030 controllers must function as a branch controller, they must be upgraded to ArubaOS 6.4.3.1. The W-7200 Series controllers, even if running ArubaOS 6.4.3.1, cannot function as a branch controller.

Initial Setup Using the WebUI Setup Wizard

The following browsers are officially supported for use with the Dell Networking W-Series ArubaOS 6.4.x Setup wizard and WebUI:

Table 1 *Supported Browsers for Controller WebUI*

Operating System	Supported Browser
MacOS	Apple Safari and Mozilla Firefox
Windows XP, Windows 7, Windows 8	Microsoft Internet Explorer 10 and 11, and Mozilla Firefox

You can launch the setup wizard using any PC or workstation that can run a supported Web browser. The PC or workstation must either be configured to obtain its IP address using DHCP, or configured to have a static IP address on the 172.16.0.0/24 subnetwork. The default IP address of the controller is 172.16.0.254. Connect a PC or workstation to any line port on the controller, then enter this IP address into a supported Web browser to launch the Setup Wizard.

To run the Setup Wizard:

1. Connect your PC or workstation to a line port on the controller.
2. Make sure that the controller is not connected to any device on your network.
3. Boot up the controller.
4. On your PC or workstation, open a Web browser and connect to https://172.16.0.254.
5. 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.
6. The initial window of the Mobility Controller Setup Wizard asks you to select one of the following deployment modes. Select **Standalone, Master, Local**, or **Branch** then click **Continue**.
   - **Standalone**: This is the only controller on the network.
   - **Master**: This controller will manage other controllers on the network.
   - **Local**: This controller will be managed by a master controller.
   - **Branch**: This controller will be a branch controller on the network. That is, all settings for this controller are managed by a master controller.
7. If you selected **Standalone** or **Master** in step 6, you will be prompted to select the **Campus WLAN** deployment mode. The **Remote Access Points** deployment mode allows you to configure additional settings specific to remote APs. Go to step 8.

   If you selected **Branch** in step 6, you will be prompted to enter the IP address or FQDN of the master controller for this branch. Go to step 9.

NOTE: By default, the last 1000BASE-X port of the branch controller is selected as the uplink port.

8. Enter the information described in Table 2, and, if desired, the optional configuration information described in "Optional Information" on page 3.

Table 2 *Required Information for the Setup Wizard*

Requirement	Description
System Name	A user-defined name by which the controller will be referenced. You can specify a name of up to 63 characters.

Table 2 *Required Information for the Setup Wizard (Continued)*

Requirement	Description
Country Code	The country in which the controller will operate. The country code determines the 802.11 wireless transmission spectrum. You cannot change the country code for controllers designated for certain countries, such as the U.S. or Israel. Improper country code assignment can disrupt wireless transmissions. Most countries impose penalties and sanctions for operators of wireless networks with devices set to improper country codes.
Admin Password	Password of up to 32 characters for the **admin** user to log in to the controller.
Enable Mode Password	Password of up to 15 characters for the **admin** user to access the Enable mode in the CLI.
Date and Time	You can either manually set the date, time, and GMT time zone or specify the IP address of an NTP server from which the controller will obtain its date and time settings.
Connectivity Settings	Enter the IPv4 or IPv6 controller IP address and default gateway.The gateway is usually the IP address of the interface on the upstream switch or router to which you will connect the controller. The default gateway and the VLAN 1 IP address need to be in the same network.
Authentication Settings	• If you are configuring a master or local controller that uses pre-shared key authentication, enter the pre-shared key. • If you are configuring a master controller to use certificate authentication, enter the MAC addresses of the local controllers. • If you are configuring a local controller to use certificate authentication, enter the MAC address of the master controller.

NOTE: The default certificate installed in the controller does not guarantee security in production networks. Dell strongly recommends that you replace the default certificate with a custom certificate issued for your site or domain by a trusted Certificate Authority. See the *Dell Networking W-Series ArubaOS 6.4.x User Guide* for more information about certificates.

9. Enter the IP address or FQDN of the master controller. Click **Continue** to reboot the controller with default option.

Optional Information

The Setup Wizard to also allows you to:

- Create virtual local area networks (VLANs) in which wireless users are placed after authentication.
- Modify default port settings.
- Enable the Uplink firewall, and configure the following Management and Dell interface types.
  - Management Interfaces: SSH, HTTPS, SNMP and DHCP.
  - Dell Interfaces: RAP, VIA, VIA Mac and Site-to-Site VPN
- Install licenses for ArubaOS software modules.
- Configure internal and guest WLANs.
- Specify IP address pools to define the inner IP addresses assigned to VPN clients and access points connecting to a local controller, or to a standalone or master controller with remote APs.

If you plan on adding controller licenses or configuring additional VLANs, WLANs, or port settings on your controller, make a note of the desired licenses or settings before you launch the Setup wizard.

NOTE: The optional configuration settings described in the section above cannot be configured when running initial setup on a serial port connection.

Initial Setup on a Serial Port Connection

The serial port is located on the front panel of the controller. You can start the Initial Setup dialog when you connect a terminal, PC or workstation running a terminal emulation program to the serial port on the controller.

The serial port connection only allows you to configure the basic configuration required to connect the controller to the network. The recommended browser-based Setup Wizard allows you to also install software licenses and configure internal and guest WLANs (see "Initial Setup Using the WebUI Setup Wizard" on page 2). If you use the Initial Setup dialog to configure the controller, the browser-based Setup Wizard will not be available unless you reset the controller to its factory default configuration.

To run the Initial full setup dialog from a serial connection:

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

Table 3 *Terminal Communication Settings*

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

2. Connect your terminal or PC/workstation to the serial port on the controller using an RS-232 serial cable. All accessory kits shipped with Dell controllers contain an RJ-45 cable and DB-9 to RJ-45 adapter. You may need to provide a USB adapter to connect the serial cable to your PC.
3. Boot up the Dell controller. After the controller has booted up, you should see a screen similar to Figure 1 for branch controllers or Figure 2 for other controllers:

Figure 1 *Initial Setup Dialog*

```
User: admin
Password: ********
(Dell W-7024) >enable
Password:******

Auto-provisioning is in progress. Choose one of the following options to override or debug...
'enable-debug' : Enable auto-provisioning debug logs
'disable-debug': Disable auto-provisioning debug logs
'mini-setup'   : Stop auto-provisioning and start mini setup dialog for smart-branch role
'full-setup'   : Stop auto-provisioning and start full setup dialog for any role

Enter Option (partial string is acceptable):f
Are you sure that you want to stop auto-provisioning and start full setup dialog? (yes/no): y
Reading configuration from factory-default.cfg
```

4. (Applicable only for branch controllers) enter **f** to invoke full-setup. You will see a screen similar to Figure 2.

Figure 2 *Initial Full Setup for Serial Port Connection*

```
****************** Welcome to the Dell W-7024 setup dialog ******************
This dialog will help you to set the basic configuration for the switch.
These settings, except for the Country Code, can later be changed from the
Command Line Interface or Graphical User Interface.

Commands: <Enter> Submit input or use [default value], <ctrl-l> Help
<ctrl-B> Back, <ctrl-F> Forward, <ctrl-A> Line begin, <ctrl-E> Line end
<ctrl-D> Delete, <BackSpace> Delete back, <ctrl-K> Delete to end of line
<ctrl-P> Previous question <ctrl-X> Restart beginning
```

5. The Serial Port Configuration Dialog displays the configuration prompts described in Table 4. The prompts may vary, depending upon the switch role you choose. Enter the required information at each prompt, then press **Enter** to continue to the next question.

Table 4 *Serial Console Configuration Dialog*

Console Prompt	Description
Enter System Name	Enter a name for the controller, or press **Enter** to use the default system name. You can specify a name of up to 63 characters.
Enter Switch Role, (master|local|standalone|branch)	Specify one of the following switch roles: • **Master**: This controller manages other controllers on the network. You are prompted to specify the type of authentication to be used by the master controller. If you are configuring a master controller that uses pre-shared key authentication to communicate with local controllers, enter the pre-shared key. If you are configuring a master controller to use certificate authentication, specify the MAC addresses of the local controllers. • **Local**: This controller will be managed by a master controller.You are prompted to specify the type of authentication to be used by the controller. If you are configuring a local controller to use pre-shared key authentication to communicate with the master controller, enter the IP address of the master controller and the pre-shared key. If you are configuring a local controller to use certificate authentication, specify the MAC addresses of the master controller. • **Standalone**: This is the only controller on your network. • **Branch**: This controller will most likely use cloud security architectures instead of dedicated security appliances, and where clients are likely to access applications in the cloud, rather than on local application servers.
Enter VLAN 1 interface IP address **NOTE:** This prompt is not applicable if the switch role is branch.	The controller takes its IP address from VLAN 1 and uses this IP address to communicate with other controllers and with APs. Enter an IPv4 VLAN 1 interface IP address, or press **Enter** without specifying an IP address to use the default address 172.16.0.254.
Enter VLAN 1 interface subnet mask **NOTE:** This prompt is not applicable if the switch role is branch.	Enter an IPv4 VLAN 1 interface IP subnet mask, or press **Enter** without specifying an IP address to use the default address 255.255.255.0.
Enter IP Default gateway **NOTE:** This prompt is not applicable if the switch role is branch.	This is usually the IP address of the interface on the upstream switch or router to which you will connect the controller. The default gateway and the VLAN 1 IP address need to be in the same network. Enter an IPv4 gateway IP address, or press Enter to continue without specifying an IP gateway.
Do you wish to configure an IPv6 address on vlan 1 (yes|no) [yes]: **NOTE:** This prompt is not applicable if the switch role is branch.	Enter **yes** to configure an IPv6 address on the VLAN 1 interface. If you enter **no**, you will not be able to configure an IPv6 address on VLAN 1.

Table 4 *Serial Console Configuration Dialog (Continued)*

Console Prompt	Description
Enter the VLAN 1 interface IPv6 address [2000::1]: **NOTE:** This prompt is not applicable if the switch role is branch.	The controller takes its IP address from VLAN 1 and uses this IP address to communicate with other controllers and with APs. Supported subnets are: Global Unicast: 2000::/3, Unique local unicast: fc00::/7 Enter an IPv6 VLAN 1 interface IP address, or press **Enter** without specifying an IP address to use the default address 2000::1.
Enter VLAN 1 interface IPv6 prefix length [64]: **NOTE:** This prompt is not applicable if the switch role is branch.	Enter a value from 0 to 128 to define an IPv6 VLAN 1 interface IP prefix length, or press **Enter** without specifying a prefix length to use the default value of 64.
Enter IPv6 default gateway [none]: **NOTE:** This prompt is not applicable if the switch role is branch.	This optional value is usually the IP address of the interface on the upstream switch or router to which you will connect the controller. The default gateway and the VLAN 1 IP address need to be in the same network. Enter an IPv6 gateway IP address to configure this setting, or press **Enter** to continue without specifying an IP gateway.
Enter Branch Master switch IP address **NOTE:** This prompt is applicable only if the switch role is branch.	Enter the IP address of the branch master controller. Enter branch master switch IP address or FQDN
Enter Branch wired uplink port [GE 1/0] **NOTE:** This prompt is applicable only if the switch role is branch.	Its not value 1 or 0, value should be 1/0 or 0/0/0 or any port based on the controller platform
Enter Branch wired-vlan Type (pppoe|dhcp|static) [static] **NOTE:** This prompt is applicable only if the switch role is branch.	Enter the type of the branch wired VLAN.
This controller is restricted to Country code US for United States, please confirm (yes|no)	If your controller has a country code that restricts its usage, enter **yes** to confirm this code.
Enter Time Zone	Enter the time zone for the controller, or press **Enter** to select the default time zone.
Enter Time in UTC	Enter the current time in UTC format, or press **Enter** to select the default time.
Enter Date (MM/DD/YYYY)	Enter the current date, or press **Enter** to select the default date.
Enter Password for admin login (up to 32 chars) **NOTE:** This prompt is not applicable if the switch role is branch.	Enter a password to allow the admin user to login to the controller WebUI, CLI and console interfaces. This password can be up to 32 alphanumeric characters long.
Enter Password for enable mode (up to 15 chars) **NOTE:** This prompt is not applicable if the switch role is branch.	Enter a password for the admin user to access Enable mode in the controller WebUI, CLI and console interfaces. This password can be up to 15 alphanumeric characters.
Do you wish to shutdown all the ports (yes|no)? [no] **NOTE:** This prompt is not applicable if the switch role is branch.	Enter yes to shut down all ethernet ports on the controller, or press Enter to allow all ports to remain active.

6. At the end of the Initial Setup, you are asked to review and confirm your configuration changes. Enter **y** to accept the changes. The controller reboots.

NOTE: If you want to complete optional configuration options (e.g. disabling spanning tree or installing software licenses) before connecting the controller to the network, refer to the *Dell Networking W-Series ArubaOS 6.4.x User Guide* for additional information on controller configuration.

Connect the Controller to the Wired Network

Once controller setup is complete, connect a port on the controller to the appropriately-configured port on a Layer-2 switch or router. Make sure that you have the correct cables and that the port LEDs indicate proper connections. Refer to the Installation Guide for your Dell controller for port LED and cable descriptions.

Zero Touch Provisioning

Zero touch provisioning (ZTP) makes the deployment of branch controllers plug-n-play. The branch controller now learns all the required information from the network and provisions itself automatically.

With ZTP, a branch controller automatically gets its local and global configuration and license limits from a central controller. A branch controller with factory default settings gather the required information from the network and then provision itself automatically.

The main elements for ZTP are:

- Auto discovery of master controller.
- Configuration download from the master controller.

Provisioning Modes

The following modes are supported:

- **auto**: In this mode, controller provisions completely automatically. The controller gets the local IP address and routing information from DHCP and gets the master controller information and regulatory domain from one of the supported servers. Then, it downloads the entire configuration from the master controller.
- **mini-setup**: In this mode, controller gets its local IP address and routing information from DHCP server. However, user is required to provide master controller information and regulatory domain. Then, it downloads the entire configuration from the master controller.
- **full-setup:** In this mode, controller gets all the basic provisioning information from user inputs. However, even in this mode, controller can download configuration from the master controller if the controller role is specified as branch controller.

NOTE: In the default state, controller starts in complete auto mode. While the controller is trying to provision automatically, user are also provided an option to override the auto-mode at any time and select the desired mode. If there is "NO" ZTP provisioning through external DHCP server, then quick setup will wait for the user to provide inputs.

NOTE: For auto provisioning, last physical interface port of a W-7000 Series controller should be connected as uplink which will be in VLAN 4094 and act as a DHCP client.

Automatically Provisioning a Branch Controller

An auto provisioning branch controller acts as a DHCP client to get its local IP address, routing information, and master controller information and regulatory domain from a DHCP server.

A factory-default branch controller boots in auto provisioning mode. To interrupt the auto provisioning process, enter the string **mini-setup** or **full-setup** at the initial setup dialog prompt shown below:

```
Auto-provisioning is in progress. Choose one of the following options to override or debug...
'enable-debug' : Enable auto-provisioning debug logs
'disable-debug': Disable auto-provisioning debug logs
'mini-setup' : Stop auto-provisioning and start mini setup dialog for smart-branch role
'full-setup' : Stop auto-provisioning and start full setup dialog for any role
Enter Option (partial string is acceptable):_
```

If the controller can not complete ZTP provisioning through an external DHCP server, then the initial setup process waits for the user to provide input

DHCP Server Provisioning

- The controller gets its local IP address and routing information from DHCP. The controller also adds "ArubaMC" as vendor class identifier (VCI-option 60) in its DHCP requests and the DHCP server sends that information as vendor-specific information (VSI - option 43) in its response to the controller.
- The controller gets the master information and country code from the DHCP server. The DHCP server is configured with the master information corresponding to that identifier.

DHCP Interface— DHCP server is configured with the same option-60 information ("ArubaMC"). DHCP server is also configured with option-43 information with master IP or Master IP and Country Code. Vendor-specific information is encoded as "<Master-IP-address>", or "<Master-ip-address>,<Country-code>", where

- Master-IP-address contains IP address of master controller in dotted-notation (a.b.c.d) string format.
- Country code contains one of the valid country codes, for example, "US", "AU", "IN", so on.

If controller does not receive "ArubaMC" in option-60, or if the received IP address is not valid, option-43 will be completely discarded and ZTP will move to the next discovery method.

The DHCP options are as follows:

```
dhcp server profile "ouzo_uplink1"
----------------------------------
Parameter                    Value
---------                    -----
Domain name for the pool          N/A
DHCP server pool                  192.168.1.0/255.255.255.0
DHCP pool lease time              0 days 1 hr 0 min 0 sec
Vendor Class Identifier           ArubaAP
DHCP default router address       192.168.1.1
Configure DNS servers             10.13.6.110
Configure netbios name servers    N/A
DHCP Option                       43 text 10.16.66.8,US

DHCP Option                       60 text ArubaMC
Exclude address                   N/A
Exclude address                   N/A
```

Configure the Controller to Support APs

Before you install APs in a network environment, you must ensure that the APs will be able to locate and connect to the controller when powered on. Specifically, you need to ensure the following:

- When connected to the network, each AP is assigned a valid IP address
- APs are able to locate the controller

Each Dell AP requires a unique IP address on a subnetwork that has connectivity to a controller. Dell recommends using the Dynamic Host Configuration Protocol (DHCP) to provide IP addresses for APs; the DHCP server can be an existing network server or a Dell controller configured as a DHCP server.

If an AP is on the same subnetwork as the master controller, you can configure the controller as a DHCP server to assign an IP address to the AP. The controller must be the only DHCP server for this subnetwork.

Enable DHCP Server Capability

Use the following procedure to use the controller WebUI to enable DHCP server capability:

1. Enter the IP address of the controller in the URL of a browser window to access the controller WebUI.
2. At the WebUI login page, enter the **admin** user name and the password you entered during the Initial Setup.
3. Navigate to the **Configuration > Network > IP > DHCP Server** page.
4. Select the **Enable DHCP Server** checkbox.
5. In the **Pool Configuration** section, click **Add**.
6. Enter information about the subnetwork for which IP addresses are to be assigned. Click **Done**.
7. If there are addresses that should not be assigned in the subnetwork:
   a. Click **Add** in the **Excluded Address Range** section.
   b. Enter the address range in the **Add Excluded Address** section.
   c. Click **Done**.
8. Click **Save Configuration** at the top of the page to save the configuration to the controller's flash memory.

Controller Discovery

A Dell AP can discover the IP address of the controller in one of several ways. The Dell Discovery Protocol (ADP) is enabled by default on all Dell APs and controllers. If all APs and controllers are connected to the same Layer-2 network, APs will use ADP to discover their controllers. If the devices are on different networks, you must configure the AP to use a Layer-3 compatible discovery mechanism such as DNS, DHCP, or IGMP forwarding after installing the AP on the network. For details, refer to the *Dell Networking W-Series ArubaOS 6.4.x User Guide*.

With ADP, APs send out periodic multicast and broadcast queries to locate the master controller. If the APs are in the same broadcast domain as the master controller, the controller automatically responds to the APs' queries with its IP address. If the APs are not in the same broadcast domain as the master controller, you need to enable multicast on the network. If multicast is not an option, then the APs can be configured to use DNS or DHCP based provisioning to contact the controller.

Plan for a Mesh Network Environment

NOTE: The information in this section applies only if you are configuring and deploying APs in a mesh networking environment. If you are not, proceed to "Install the APs" on page 10.

Before you install APs in a mesh networking environment, you must do the following:

- Define and configure the mesh cluster profile and mesh radio profile before configuring an AP to operate as a mesh node. An AP configured for mesh is also known as a mesh node.
- Provision one of the following mesh roles on the AP:
  - Mesh portal: The gateway between the wireless mesh network and the enterprise wired LAN.
  - Mesh point: APs that can provide traditional Dell WLAN services (such as client connectivity, intrusion detection system (IDS) capabilities, user roles association, LAN-to-LAN bridging, and Quality of Service (QoS) for LAN-to-mesh communication) to clients on one radio and perform mesh backhaul/network

connectivity on the other radio. Mesh points provides LAN-to-LAN bridging through their Ethernet interfaces. It can now provide backhaul and access BSSIDs on the same radio.

For detailed provisioning guidelines, caveats, and instructions, see the "Secure Enterprise Mesh" chapter in the *Dell Networking W-Series ArubaOS 6.4.x User Guide*.

Install the APs

Refer to the AP placement map generated by RF Plan to identify the locations in which to physically install your APs. You can either connect the AP directly to a port on the controller, or connect the AP to another switch or router that has Layer-2 or Layer-3 connectivity to the controller. If the Ethernet port on the controller is an 802.3af Power over Ethernet (PoE) port, the AP automatically uses it to power up. If a PoE port is not available, contact your Dell vendor to obtain an AC adapter for the AP.

Once an AP is connected to the network and powered up, it will automatically attempt to locate the controller. You can view a list of all APs connected to the controller by accessing the **Configuration > Wireless > AP Installation** page in the controller WebUI. An AP installed on the network advertises its default SSID. Wireless users can connect to this SSID, but will not have access to the network until you configure authentication policies and user roles for your wireless users. For complete details on authentication policies and user roles, refer to the *Dell Networking W-Series ArubaOS 6.4.x User Guide*.

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Contacting Dell

Table 5 *Contact Information*

Web Site Support	
Main Website	dell.com
Contact Information	dell.com/contactdell
Support Website	dell.com/support
Documentation Website	dell.com/support/manuals

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