HP Unified Wired-Wireless Networks and BYOD eBook

Second Edition
(Exam HP2-Z33)

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Section 1.01 Special Acknowledgments

This book is based on the HP Unified Wired-Wireless Networks and BYOD course. HP Press would like to thank the course developers, Tyler McMinn for his work on Unified Wired-Wireless Networks, and Peter Debruyne and Jean-Maurice Merel for their work on BYOD.

Thanks to Debi Pearson and Miriam Allred for their help preparing this eBook for publication.

Section 1.02 Introduction

This study guide helps you prepare for the Implementing HP Unified Wired-Wireless Networks and BYOD exam (HP2-Z33). This elective exam is for candidates who want to acquire the HP ASE - FlexNetwork Architect V2 certification, or the HP ASE - FlexNetwork Integrator V1 certification. In addition to covering topics such as wireless standards, wireless security, guest access, controller high availability and roaming, the exam will also cover topics specific to the bring your own device (BYOD) solution, including different ways of configuring secured guest and corporate user network access via IMC's User Access Manager (UAM).

Section 1.03 HP ExpertOne Certification

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Section 1.04 Audience

This study guide is designed for networking professionals who want to demonstrate their expertise in implementing HP FlexNetwork solutions by passing the HP2-Z33 certification exam. It is specifically targeted at networking professionals who want to extend their knowledge of how to deploy and implement HP Unified Wired and Wireless Networks and the HP Bring Your Own Device (BYOD) solution.

Section 1.05 Assumed Knowledge

To understand the technologies and protocols covered in this study guide, networking professionals should have a basic understanding of how Ethernet wireless networks function. The exam itself with “on the job” experience, and familiarity with BYOD challenges, HP switches, access points, controllers, and IMC’s User Access Manager (UAM) is also helpful.

Section 1.06 Relevant Certifications

After you pass these exams, your achievement may be applicable toward more than one certification. To determine which certifications can be credited with this achievement, log in to The Learning Center and view the certifications listed on the exam’s More Details tab. You might be on your way to achieving additional HP certifications.

Section 1.07 Preparing for Exam HP2-Z33

This self-study guide does not guarantee that you will have all the knowledge you need to pass the exam. It is expected that you will also draw on real-world experience and would benefit from completing the hands-on lab activities provided in the instructor-led training. To pass the certification exam, you should…

Section 1.08 Recommended HP Training

Recommended training to prepare for each exam is accessible from the exam’s page in The

Learning Center. See the exam attachment, “Supporting courses,” to view and register for the courses.

Section 1.09 Obtain Hands-on Experience

You are not required to take the recommended, supported courses, and completion of training does not guarantee that you will pass the exams. HP strongly recommends a combination of training, thorough review of courseware and additional study references, and sufficient on-the-job experience prior to taking an exam.

Section 1.10 Exam Registration

To register for an exam, go to hp.com/certification/learn_more_about_exams.html.

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1 HP FlexNetwork Architecture

EXAM OBJECTIVES

In this chapter, you learn to:

✓ Explain the strategy of controlled versus autonomous AP deployment.

✓ Describe the components of an HP FlexNetwork architecture.

✓ Configure the initial setup steps of an HP 830 Unified Wired-WLAN Switch.

INTRODUCTION

This study guide is designed to help you learn about the standards and technologies that provide the foundation for wireless networks. You will also learn about the components of the HP FlexNetwork Architecture.

Assumed Knowledge

Before studying this chapter, you should know what an access point (AP) is and know how to access one.

Standalone (Autonomous) and Controlled APs

Because wireless access has become both a business and a consumer requirement, access points (APs) are as recognizable as the RJ45 jacks connecting stations to a wired network. As Figure 1-1 shows, APs can operate in one of the following modes:

- **Standalone**—Standalone APs are managed individually through a web browser interface or a command-line interface (CLI). These intelligent APs establish the wired network, enforce security settings (including encrypting and decrypting traffic), and bridge traffic onto the wired network.

  Standalone APs may also be called “autonomous” or “fat” APs.

- **Controlled**—Controlled APs are managed and configured through a WLAN Controller. Like standalone APs, controlled APs establish the wireless network. Depending on the type of AP and the WLAN architecture used, however, controlled APs can provide other functions as well (as you will learn in this lesson).

  A WLAN Controller can control different types of APs.

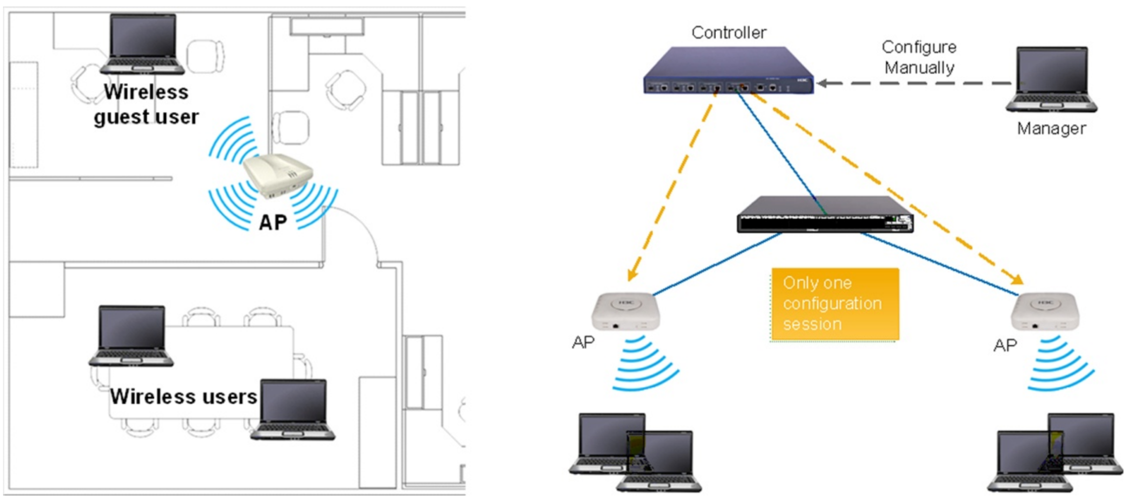

Figure 1-1: Standalone (autonomous) and controlled APs

WLAN Controllers and Controlled APs

WLAN Controllers are used to configure and manage multiple APs, as shown in Figure 1-2. In addition to automating the deployment of APs and the distribution of software updates, controllers allow you to centrally define security, Quality of Service (QoS), and other policies, ensuring that a consistent set of services is delivered throughout the network.

The following can be used as controlled APs:

- **Thin APs**—Thin APs establish the wireless network and forward all traffic to the controller for processing. The controller provides all the intelligence for the wireless network.
- **Fit APs**—Fit APs establish the wireless network but can perform other functions, as dictated by the controller and the WLAN architecture used (as you will learn more about architectures later in this chapter)
- **Fat APs**—Fat APs establish the wireless network and can operate in standalone mode.

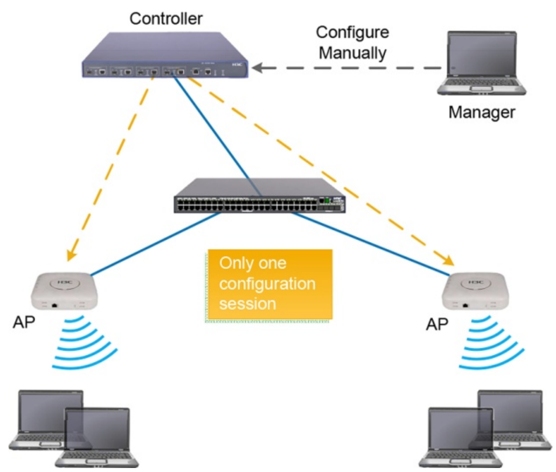

Figure 1-2: WLAN Controllers and controlled APs

Wireless Bridge

A wireless bridge accepts traffic on one interface (frequently an Ethernet interface) and bridges it out a wireless radio—and vice versa. Wireless bridges, also known as Wireless Distribution System (WDS), can be used to connect two networks (see Figure 1-3).

In addition, wireless client bridges are used to provide wireless connectivity for a device that has an Ethernet network adapter, or NIC, but no wireless network adapter.

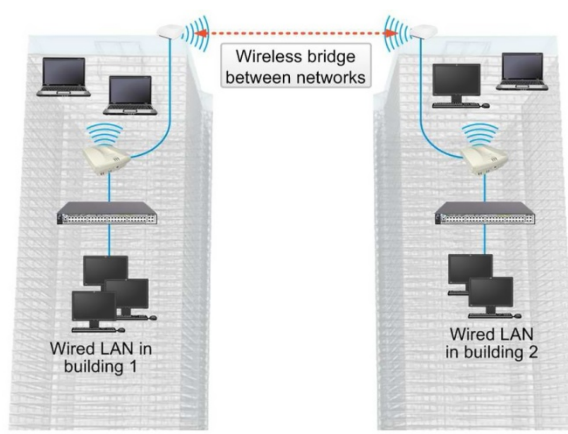

Figure 1-3: Wireless bridge

WLAN Architecture

You can deploy APs and WLAN ACs using one of following WLAN architectures:

- **Standalone**
- **Centralized**
- **Optimized**

The next few sections describe these architectures and explain the environments for which each architecture is best suited.

Standalone WLAN Architecture

The standalone WLAN architecture meets the needs of organizations that require wireless access for a limited number of APs or in a limited geographic area, for example, a single site with less than 12 APs or a scattering of several sites with only a few APs per site.

With this architecture, which is shown in Figure 1-4, you deploy, configure, and manage APs separately. There is no centralized controller.

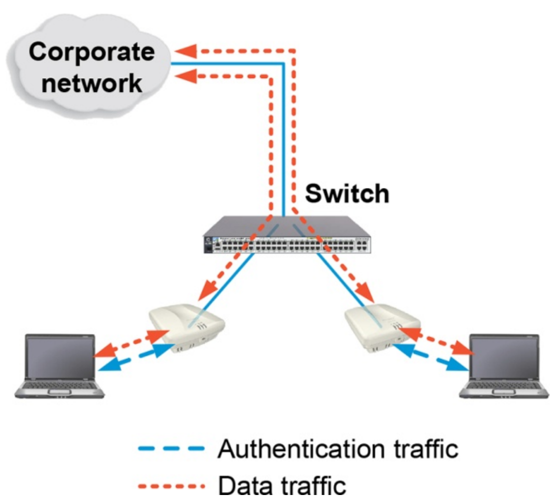

Figure 1-4: Standalone WLAN architectures

When deploying a WLAN for a SOHO (small office-home office), the typical requirements may be less than 6 to 10 APs. Businesses could choose to manage each AP separately using a standalone strategy instead of using a controller. While there is an immediate cost advantage with this solution, there is also a long term loss of centralized management, traffic and radio management, and the ability to easily scale the deployment if the number of required APs grows.

While traffic centralization and real-time radio resource management relies on an WLAN Controller, much of the central management can be handled by utilizing an HP Intelligent Management Center (IMC) with the Wireless Service Management (WSM) module.

Centralized WLAN Architecture

If organizations need to deploy a number of APs, managing them separately can become time consuming and labor intensive. The centralized WLAN architecture was designed to solve these issues. This architecture is shown in Figure 1-5.

In a centralized WLAN architecture, you access and configure the centralized controller, or WLAN Controller. The centralized controller and each thin AP exchange WLAN management traffic and data traffic. This would also be true of a "Fit" AP, where the management still relies on a controller.

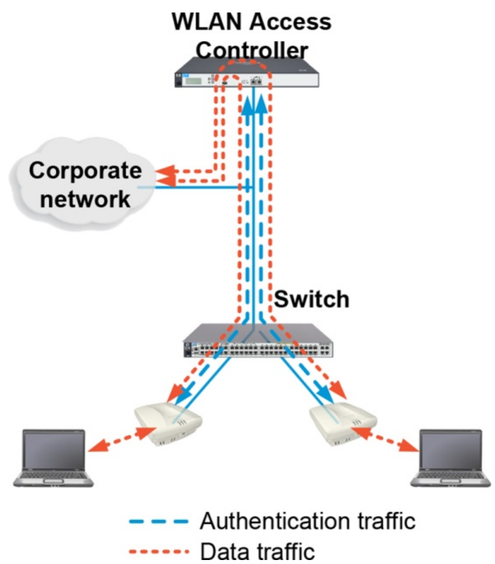

Figure 1-5: Centralized WLAN architecture

In a centralized WLAN architecture, wireless users authenticate through the AP to a central authentication server and user 802.11 data traffic is tunneled to the controller over the 802.3 network then bridged onto the corporate wired network

Even with the simplified network diagram in Figure 1-5, you can begin to see the limitations of the centralized WLAN architecture. Because all wireless data traffic must be forwarded to the controller before it can be distributed to its final destination, the centralized architecture can significantly increase the traffic on, and add latency to, the wired network. As more user traffic is added to the network, particularly if the APs support 802.11n, network performance can be negatively affected.

Optimized WLAN Architecture

HP uses the optimized WLAN architecture, an architecture that capitalizes on the strengths of the centralized WLAN architecture while overcoming its limitations. With the optimized WLAN architecture, you still have all the benefits of configuring and managing APs from a WLAN Controller. However, you also have much more flexibility in how traffic is distributed onto the wired network and how authentication and access control measures are applied. For each WLAN, you can control how traffic is authenticated and distributed onto the wired network. These options are shown in Figure 1-6.

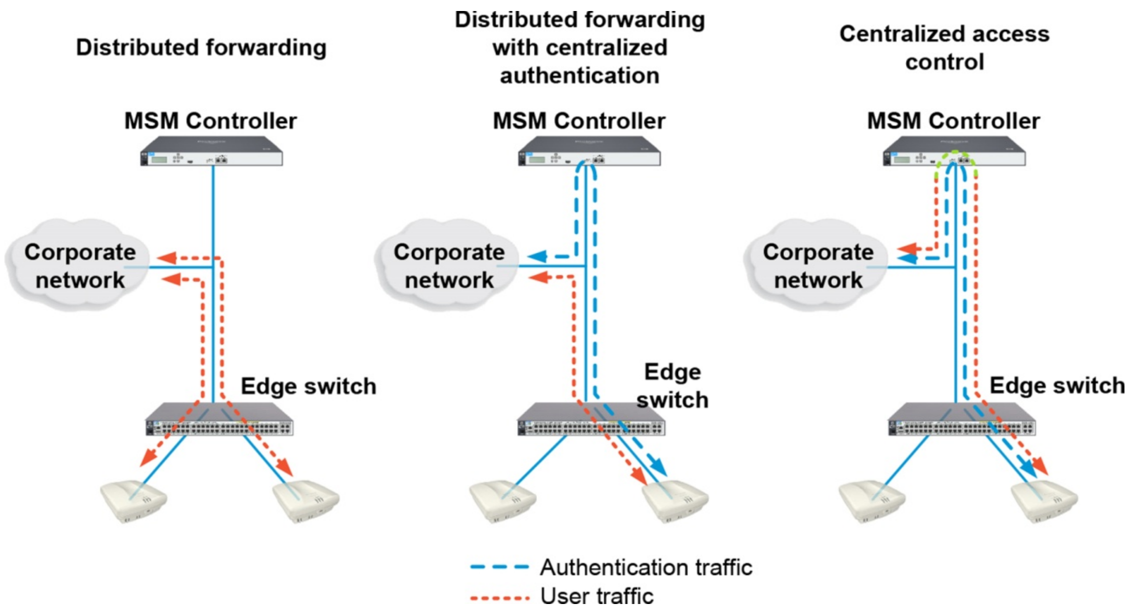

Figure 1-6: Optimized architecture

Distributed Forwarding

With distributed forwarding, users authenticate to the APs if the WLAN requires authentication. Because users authenticate to the AP, the authentication traffic is not shown in Figure 1-6. However, if users access a WLAN that is protected with 802.1X, the APs will send authentication requests to the authentication server, which is probably a network RADIUS server.

After users authenticate and associate to the APs, the APs bridge the users' wireless traffic directly onto the wired network. This creates a more efficient traffic pattern.

Distributed Forwarding with Centralized Authentication

Some organizations may want to have the APs bridge the user wireless traffic directly onto the wired network but have the controller handle authentication requests. The optimized WLAN architecture supports this setup.

This type of setup is well suited for 802.1X authentication in which the AP forwards client authentication requests through the controller to a central RADIUS server. After authentication, the client data is forwarded locally and encrypted as part of enterprise Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA), or WPA2/802.11i.

Centralized Access Control

With centralized access control, the AP forwards both authentication and data traffic to the controller. The controller handles authentication requests, and after users are authenticated, forwards their traffic onto the wired network. Companies may want to use centralized access control for guest wireless traffic. The controller can prevent guests from accessing the private network but allow them to reach the Internet.

HP FlexNetwork Architecture

The goal of the network infrastructure is to establish a physical connection between locations and resources and to determine which protocols or rules will be used to setup, tear-down, and maintain these connections.

HP FlexNetwork Architecture is a way to describe how HP provides the flexible network infrastructure that allows users seamless, secure access to data resources. The FlexNetwork Architecture defines this infrastructure as it extends from the data center fabric, to the campus network, and to the branch or remote offices.

The HP FlexNetwork Architecture forms a key component of HP Converged Infrastructure (CI). Enterprises can align their networks with their business needs—even while these needs change—by segmenting their networks into the four inter-related modular building blocks that comprise the HP FlexNetwork Architecture (see Figure 1-7):

- **FlexFabric**—FlexFabric is the network infrastructure for data centers. It converges and secures the data center network with compute and storage. It provides high-speed, low-latency, and highly available links for the server-to- server and server-to-storage traffic flows that power modern applications.

- **FlexCampus**—FlexCampus provides the infrastructure for mid-size or enterprise campus LANs. It unifies wired and wireless networks to deliver media- optimized, secure, identity-based access.
- **FlexBranch**—FlexBranch extends the network to remote sites. It unifies and standardizes network functionality and services, promoting seamless access to remote resources and ease of deployment and management.
- **FlexManagement**—FlexManagement spans the other three building blocks. IT staff manage all network segments through a single pane-of-glass management application, HP Intelligent Management Center (IMC).

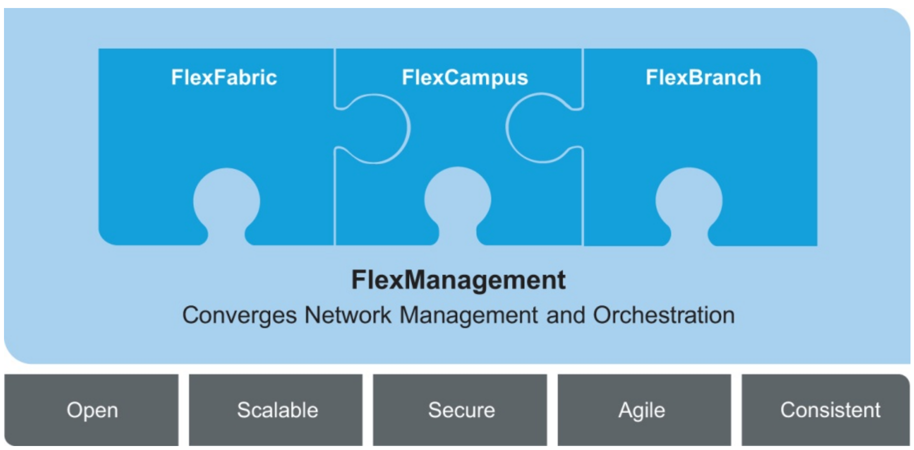

Figure 1-7: FlexNetwork Architecture

The HP FlexNetwork Architecture supports enterprises with more traditional needs but also helps companies as they navigate their evolution to the cloud. Enterprises that deploy private clouds must implement flatter, simpler data center networks to support the bandwidth-intensive, delay-sensitive traffic flows that are associated with cloud computing. Administrators need solutions that help them administer and secure virtual resources and orchestrate on-demand services. HP FlexNetwork Architecture helps enterprises securely deploy and centrally orchestrate video, cloud, and mobile- optimized architectures that scale from the data center to the network edge.

Because the FlexNetwork Architecture is based on open standards, enterprises maintain the freedom to choose the best-in-class solution for their businesses.

FlexNetwork Architecture: FlexFabric

HP FlexFabric is an infrastructure that simplifies the data center infrastructure with converged network, computer, and storage resources across both virtual and physical environments to accommodate cloud computing models. Figure 1-8 shows how FlexFabric relates to the rest of the FlexNetwork architecture.

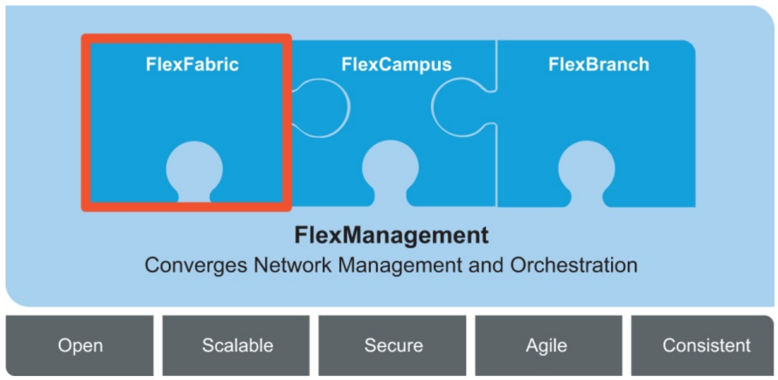

Figure 1-8: FlexFabric

Routers, switches, and routing switches (sometimes known as *Layer 3* or *L3* switches) form the physical infrastructure used to transport data packets through a network. Like roads, bridges, train tracks, and jet fuel, transportation infrastructure is taken for granted until something goes wrong or is in short supply. Modern Ethernet networks have become flexible and able to shift to alleviate bottlenecks and accommodate changing traffic demands by providing the following:

- Traffic segmentation into virtual LANs (VLANs), allowing smaller broadcast domains
- Shared buffered uplinks
- Applied security at the access port
- Loop prevention mechanism to dynamically recover downed links in a redundant design

FlexNetwork Architecture: FlexCampus

A campus is defined as one or more buildings within a limited geographical area. A campus network is defined as a network made up of a group of LANs that are connected by a cabling infrastructure that is owned or is leased by the enterprise and is based on Ethernet technologies. The difference between a building in a campus LAN and a branch office is that a branch office is connected to the rest of the infrastructure by a WAN technology. The FlexCampus architecture is the HP networking design for a campus LAN. Figure 1-9 shows how FlexCampus relates to the rest of the FlexNetwork architecture.

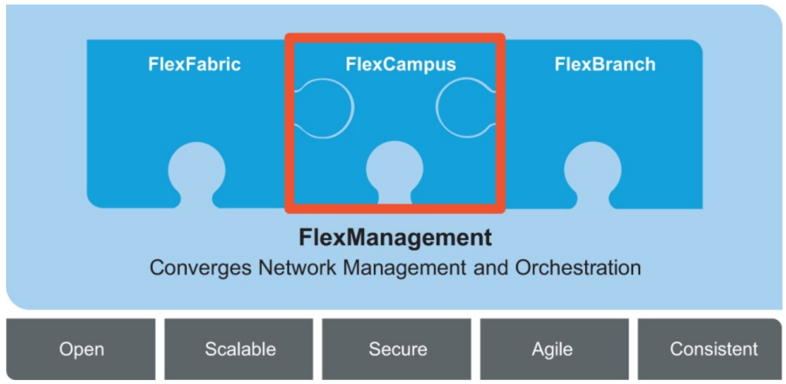

Figure 1-9: FlexCampus

The HP 830 Unified Wired-WLAN Switch Series are part of the HP Networking Mobility enterprise solution. This product set provides edge-to-core unified access and consistent WLAN services to small/medium branch offices for enterprises that are deploying the HP 10500/7500 20G Unified Wired-WLAN Module at their central (or main) office.

FlexNetwork Architecture: FlexBranch

The FlexBranch solution converges network functionality with services, enabling branch office employees to enjoy the same fast and reliable access to data and applications as workers at the main office. Figure 1-10 shows how FlexBranch relates to the rest of the FlexNetwork architecture.

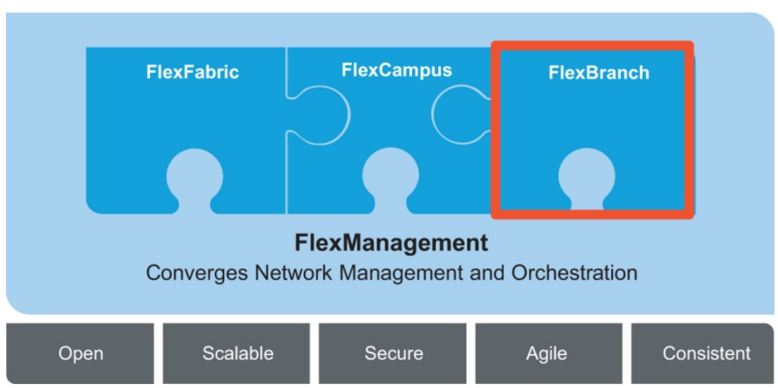

Figure 1-10: FlexBranch

This superior user experience includes the use of data, voice, video, and other unified communications and collaboration (UC&C) tools.

- **HP Multi-Service Routers (MSRs)**—These routers deliver services to branch offices over a variety of WAN connectivity options, including T1/E1, ADSL-2, and 3G. The WAN link