

HP ASE FlexNetwork Solutions Integrator

OFFICIAL CERTIFICATION STUDY GUIDE

(Exam HP0-Y47)

First Edition

Miriam Allred

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About the Author

Miriam Allred has spent the last nine years configuring, testing, and troubleshooting HP wired and wireless networks. Miriam combines this wide range of technical expertise with pedagogy and instructional design training, allowing her to create technical training courses for both advanced and entry-level networking professionals. Miriam Allred has a master's degree from Cleveland State University and a bachelor's degree from Brigham Young University.

Introduction

This study guide is based on the Deploying HP FlexNetwork Core Technologies course. Although this guide is designed to help you study for the related exam (HP0-Y47), you can also use it to learn about fundamental networking technologies such as VRRP, OSPF, BGP, ACLs, port authentication, and multicast and HP technologies such as HP Intelligent Resilient Framework (IRF) and distributed trunking. If you have a background in using other vendors' equipment, you can use this guide to learn how these technologies are implemented on HP switches.

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Audience

This study guide is designed for networking professionals who want to demonstrate their expertise in managing HP FlexNetwork solutions by passing the HP0-Y47 certification exam. It is also helpful for networking professionals who want to extend their understanding of fundamental networking technologies and protocols and learn how to implement them on HP switches.

Assumed Knowledge

To understand the technologies and protocols covered in this study guide, networking professionals should have a basic understanding of how Ethernet networks function. They should understand IP addressing, virtual local area networks (VLANs), link aggregation, Spanning Tree Protocol (STP), and static IP routing, basic Open Shortest Path First (OSPF) operations, and basic HP IRF operations. General familiarity with the HP Comware and ProVision CLI is also helpful.

Minimum Qualifications

Although anyone can take the HP0-Y47 exam, it is recommended that candidates have some “on the-job” experience. This study guide provides foundational knowledge, but candidates are also expected to have real-world experience implementing the technologies covered in this study guide.

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.

Preparing for Exam HP0-47

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. You may also benefit from completing the hands-on lab activities provided in the instructor-led training.

The HP0-47 exam is designed to test your mastery of the technologies and protocols outlined in this study guide. To pass the certification exam, you must be able to answer multiple-choice questions about how these technologies and protocols function on HP switches. You must also be able to go beyond simply identifying how the technologies and protocols function. You must be able to *apply* what you know to specific network environments. For some questions, you will be given a scenario and asked to answer questions about it. For example, you may need to determine the correct way to implement a technology for a particular network environment, or you may need to evaluate the configuration settings for a network and be able to identify the expected behavior. (However, you are not expected to recall command syntax.) The practice test at the end of this study guide will help you determine if you are prepared to take the actual exam.

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.

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.

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1 HP FlexNetwork Architecture

EXAM OBJECTIVES

In this chapter, you learn to:

- ✓ Describe two-tier and three-tier HP FlexCampus and HP FlexFabric solutions.
 - ✓ Explain the basic hardware architecture of HP switches, in particular, distinguishing between crossbar and CLOS fabrics.
-

ASSUMED KNOWLEDGE

Before studying this chapter, you should be familiar with the FlexNetwork architecture and its components:

- FlexCampus
- FlexFabric
- FlexBranch

INTRODUCTION

This chapter outlines reference topologies for each component of the HP FlexNetwork architecture. It focuses in particular on two-tier (core and access layer) topologies but also presents three-tier topologies, which have been optimized for today's networks.

HP FlexNetwork

The HP FlexNetwork consists of three separate but interlocking components, each designed to meet the needs of a particular enterprise environment (see Figure 1-1):

- FlexCampus solutions provide flexible, unified access for users in an enterprise campus LAN that must support a variety of applications from data to voice to rich media.

- FlexFabric solutions establish a powerful, highly available, resilient, and energy-efficient foundation for enterprise data centers.
- FlexBranch solutions extend a consistent user experience across a company's remote sites with easy-to-deploy solutions.

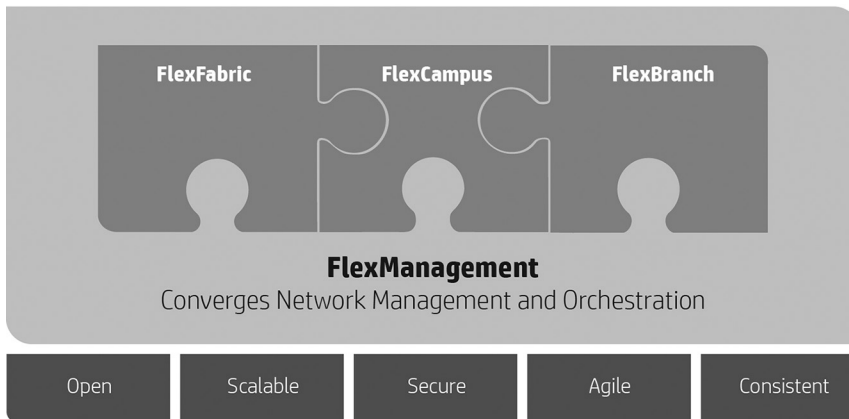


Figure 1-1: FlexNetwork

With HP FlexManagement tools, IT staff members manage all components of the network from a centralized location. FlexManagement helps to simplify and automate tasks, moving the focus of network management away from day-to-day tasks toward meeting business-level needs.

HP FlexCampus two- and three-tier reference architectures

The HP FlexCampus two-tier reference architecture, shown in Figure 1-2, includes a core of two to four HP 10500 modular switches, operating as a single HP Intelligent Resilient Framework (IRF) virtual switch. At the access layer, you can choose from several options. Three options are typically used for an enterprise campus LAN, although you might choose just one of those options:

- HP fixed-form switches in an IRF virtual switch (HP 5500 EI/HI Switch Series)
- HP fixed-form switches in a backplane stack (HP 3800 or HP 2920 Switch Series)
- HP modular switches (HP 5400 zl or HP 8200 zl Switch Series for high availability)

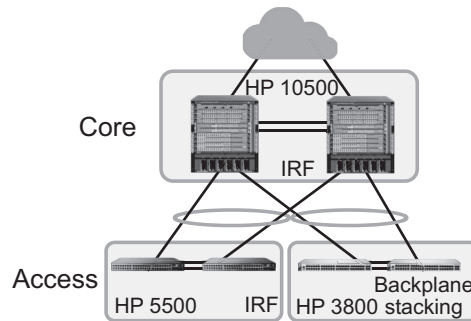


Figure 1-2: FlexCampus two-tier reference architecture



Note

The switch models listed in the “HP FlexCampus two- and three-tier reference architecture” section are typically recommended models for the campus access layer as of the publication of this study guide. For up-to-date information, visit the HP website. Also note that the FlexCampus solutions feature security and wireless components which are not shown, being beyond the scope of this study guide.

HP recommends the two-tier topology whenever the environment supports it. In this study guide, you will learn how technologies such as backplane stacking and IRF work within such a topology.

Sometimes, however, legacy solutions or cabling restraints force you to use a three-tier topology, and HP offers optimized solutions for these cases as well. Figure 1-3 shows a recommended FlexCampus three-tier topology. The added distribution layer consists of several pairs of HP 7500 modular switches. Figure 1-3 shows one pair as an example.

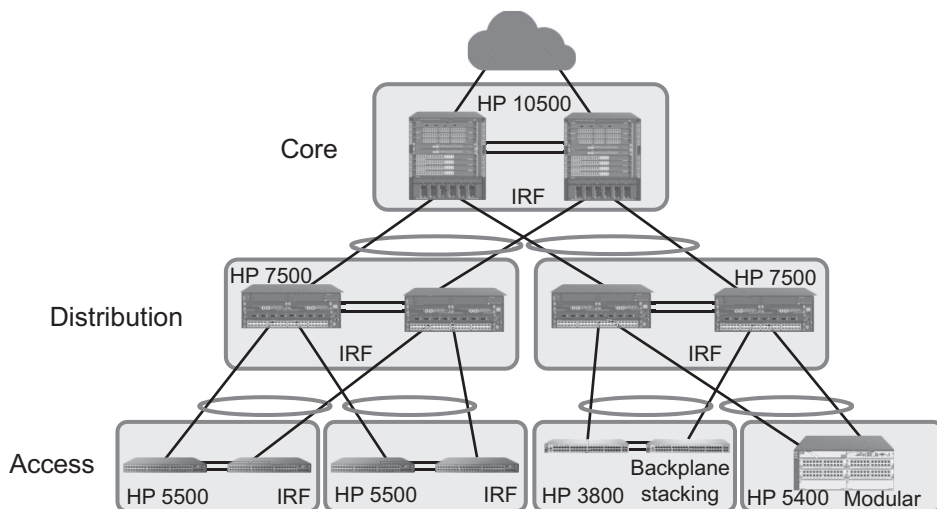


Figure 1-3: FlexCampus three-tier reference architecture

In either the two-tier or three-tier architecture, the switches at each layer can connect to the next layer using aggregated links, due to the use of IRF at the core layer and also at the distribution layer in the three-tier topology. The access layer might use IRF or backplane stacking, but even if the access layer switches do not support these technologies, they can use aggregated links to connect to switches in the upstream IRF virtual switch. These aggregated links are a key feature of the FlexCampus architectures because they eliminate complicated and issue-prone spanning tree designs.

IRF is generally recommended for the enterprise campus core and the distribution layer. However, for some small to medium businesses, you can create a redundant core using two HP ProVision 8200 zl switches, as shown in Figure 1-4. This study guide explains how to implement core technologies on HP ProVision switches as well as on HP Comware switches.

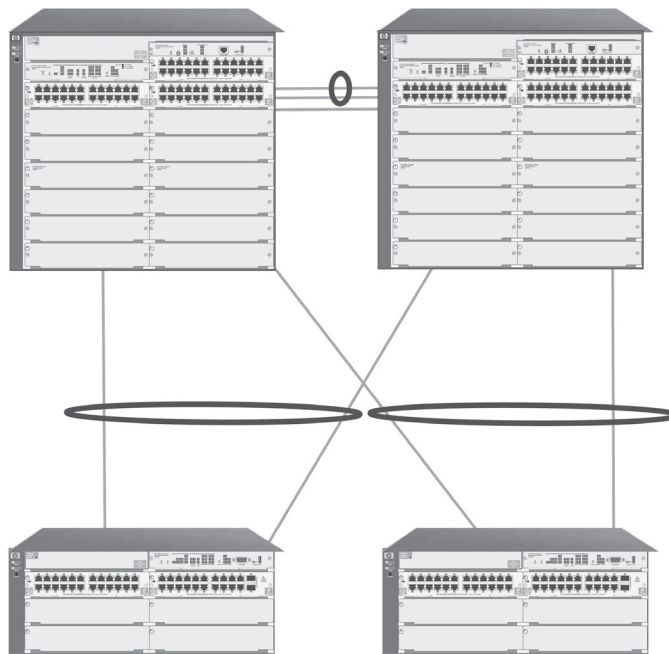


Figure 1-4: FlexCampus architecture for a smaller network

HP FlexFabric reference architectures

You will now examine HP FlexFabric architectures, designed specifically to meet the needs of contemporary data centers, which must host rich media services, anything as a server (XaaS), cloud-based services, big data, high-performance computing, and more.

As Figure 1-5 illustrates, HP 12900 Series switches can be combined in an IRF virtual switch at the core. These switches, with a high density of 10G/40G ports now and 100G ports in the future, provide the high-speed, low-latency, highly available core that forms a solid foundation for an enterprise's services.

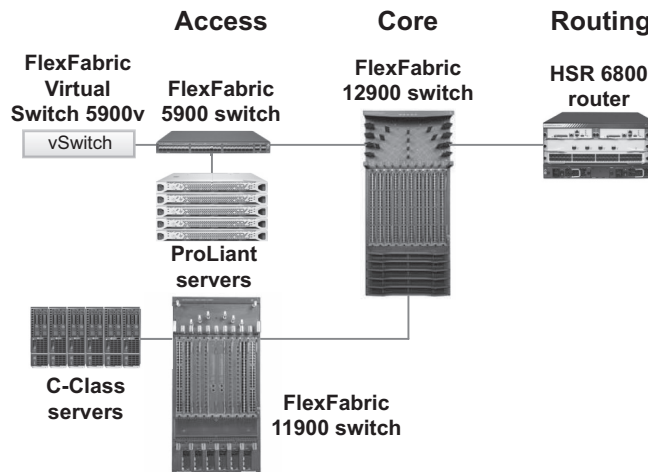


Figure 1-5: FlexFabric reference architecture

To support rack servers, HP provides several choices, including HP 5900 AF Series switches, which operate in redundant IRF virtual switches and support the customer's choice of Gigabit or 10G ports. (You can even install a virtual version of this switch within VMWare hosts.) The HP 11900 Series switches can provide the access layer for blade servers installed in HP C-Series blade enclosures.



Note

The FlexFabric reference architecture includes these switch models as of the publication of this study guide. You should check the HP website for additional options.

Although HP provides three-tier data center solutions for enterprises that must meet legacy requirements or have very large data centers, HP recommends flattening the architecture when possible.

A two-tier topology built on IRF presents several benefits:

- Device-level redundancy all the way to the server access layer, which provides Gigabit or 10G connections, as required by the enterprise
- Fewer hops and lower latency for the server-to-server (east-west) traffic that composes the majority of traffic in contemporary data centers