HP0-Y30: IMPLEMENTING HP NETWORKING TECHNOLOGIES

HP Networking

Exam preparation guide

Overview

Requirements for successful completion

This guide helps you to study for the Implementing HP Networking Technologies (HP0-Y30) exam. It also gives tips for passing Network Infrastructure AIS 2010 Upgrade (HP2-Z18), the online update exam that some candidates can take instead. You can benefit from this guide whether you are just starting with networking certification, you need to update your existing HP certification, or you have a Cisco background and want to get certified with HP.

To pass these exams, you will need to demonstrate knowledge of basic routing, switching, and wireless technologies, including Virtual LANs (VLANs), spanning tree protocols, link aggregation technologies, basic static and dynamic routing, 802.11 standards—as well as the ability to implement these technologies on HP A-Series and E-Series products.
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Why take this exam?
Passing this exam certifies you as an HP Accredited Integration Specialist (AIS) – Network Infrastructure [2011]. You:

- Can implement HP E-Series wired network solutions for small and mid-market customers
- Can implement HP A-Series wired solutions for large scale networks and the data center
- Have basic knowledge of wireless technologies

HP AIS – Network Infrastructure [2011] certification
There are three paths to achieve this certification, as outlined below. The exams you must pass are dependent upon which achievements you currently hold.

Path 1
If you are just starting with networking certification, you should take the proctored Implementing HP Networking Technologies (HP0-Y30) exam.

Path 2
For those who are already certified by HP or certain other vendors, HP appreciates the time, effort, and money that you have invested in your current certification. If you have one of the certifications listed below, you can take an online exam instead of the proctored exam and obtain the HP AIS – Network Infrastructure [2011] certification more conveniently.

- AIS – HP ProCurve Networking (2008 or later)
- H3CNE
- CCNA – Any track
- CCDA
- 3Com DP
- 3Com IAP

Path 3
If you have already achieved AIS – HP ProCurve Networking (2008 or later) certification, and you take and pass the Migrating to 3Com/H3C Routing and Switching (HP2-Z08) exam (which tests you only on HP A-Series products), you do not need to take either the proctored HP0-Y30 exam or the online HP2-Z18 exam. You will automatically be awarded HP AIS – Network Infrastructure [2011] certification.

Table 1 summarizes the requirements for all three paths.
Table 1: HP AIS – Network Infrastructure [2011] requirements based on current achievement

<table>
<thead>
<tr>
<th>Requirements for HP AIS certification</th>
<th>Path 1</th>
<th>Path 2</th>
<th>Path 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proctored Exam – Implementing HP Networking Technologies (HP0-Y30)</td>
<td>AIS – HP ProCurve Networking (2008 or later) and passing HP2-Z08</td>
<td>H3CNE</td>
<td>3Com DP or IAP</td>
</tr>
<tr>
<td>Online Exam – Network Infrastructure AIS 2010 Upgrade (HP2-Z18)</td>
<td>No test required; you are automatically awarded the certification.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Who should take this exam?

Anyone can take the exams that qualify you for HP AIS [2011] certification, but most successful candidates have one year of real-world experience implementing basic routing and switching technologies and have also prepared for the test in a variety of ways. This study guide describes some of these methods and indicates where you can obtain further preparation.

No matter which exam you are taking, you will find many of the tips in this study guide useful. However, the last sections of this guide provide details about the exams themselves; make sure to read the sections for the exam that applies to you.

Who does not need to take this exam?

If you have AIS – HP ProCurve Networking (2008 or later) certification, you do not need to take either the proctored HP0-Y30 exam or the online HP2-Z18 exam. Instead, you can take the online HP2-Z08 exam, which tests you only on A-Series products.

How to study for the exam

Both the HP0-Y30 and HP2-Z18 exams test you on topics that are covered in the same HP instructor-led training (ILT) and Web-based training (WBT) courses.

The table indicates the training specifically recommended for you based on your current achievements. While it is recommended that you complete this training, the training is neither required nor does it guarantee that you will pass the exam. It is expected that you will also study on your own and draw on your real-world experience.

Read the sections below to further assess your options. Even if you do not intend to complete the recommended ILTs and WBTs, you should examine the topics that they cover because you must demonstrate your mastery of these topics.
Table 2: Recommended training based on current achievement

<table>
<thead>
<tr>
<th>Courses for the HP0-Y30 exam</th>
<th>A1S – HP ProCurve, (2008 or later) and passing HP2-Z08</th>
<th>AIS – HP ProCurve (2008 or later)</th>
<th>H3CNE</th>
<th>New candidates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting Started with HP Switching and Routing, Rev 10.41 or later (WBT)</td>
<td>No training required; you are automatically awarded the certification.</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>HP Access Layer Network Technologies using ProVision Software, Rev 10.41 or later (4-day ILT)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>HP Access Layer Network Technologies using Comware Software, Rev 10.41 or later (2-day ILT)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Getting Started with HP Wireless Networks, Rev 10.41 or later (WBT)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Total days for recommended training</td>
<td>2 days</td>
<td>4 days</td>
<td>6 days</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE**

The **New candidates** column in the table applies to you if you have no certification or certification that is not listed in one of the other columns. In this case, you should take all the recommended training (even if your certification allows you to take the upgrade exam).

**NOTE**

There is also a third HP ILT, *Accelerated HP Access Layer Network Technologies*, which combines the content covered in the two ILTs listed in Table 2 and is completed in just 5 days. More information on all three ILTs—including the recommended qualifications for candidates attending the Accelerated course—is available below. More information is also provided on the WBTs.

**Attend recommended ILTs**

As noted above, three ILTs are available to help you to prepare for this exam. The first two are:

- **HP Access Layer Network Technologies using ProVision Software, Rev 10.41 or later (4 days)**
- **HP Access Layer Network Technologies using Comware Software, Rev. 10.41 or later (2 days)**

You are strongly encouraged to attend these courses, where you will expand your knowledge of networking technologies and gain hands-on experience implementing these technologies on HP equipment.

You may also have the option of taking *Accelerated HP Access Layer Network Technologies, Rev. 11.31 or later* as an alternative to the two ILTs listed above. Qualifications for this course are listed below.

Register for these courses in The Learning Center of your HP Partner Portal, which is the HP Learning Management System for HP customers and partners. You will require an HP Learner ID to register for a class. Note that, while it only takes a few minutes to request the ID, the process of activating it up may take several days. Please obtain this ID and then register for classes at least one week in advance. Costs and scheduling vary according to region.
HP Access Layer Network Technologies using ProVision Software

The HP Access Layer Network Technologies using ProVision Software course introduces network technicians to the HP E-Series switches, E-Series wireless access points (APs), and the technologies that they need to understand to begin configuring and managing these products. The course also introduces HP PCM+, the network management platform for the E-Series products.

Topics covered
In attending this course, you will learn how to:

- Describe the E-Series networking products and technologies
- Configure basic setup parameters
- Configure and verify VLANs
- Configure static routes
- Configure security technologies
- Configure and verify link aggregation
- Configure Spanning Tree
- Describe the HP E-Series wireless products
- Describe PCM+

Format offered
Four-day instructor-led, 50% lecture and 50% lab and classroom activities. The course may be delivered using a remote lab environment.

More information

HP Access Layer Network Technologies using Comware Software

The HP Access Layer Network Technologies using Comware Software course introduces network technicians to the technologies and products in the HP A-Series line of routers and switches.

Topics covered
In attending this course, you will learn how to:

- Describe the A-Series networking products and technologies
- Configure basic setup parameters
- Update software for A-Series switches and routers
- Save and backup configuration files for A-Series switches and routers
- Configure and verify VLANs
- Configure ports for trunk, access, or hybrid mode to support various VLAN configurations
- Configure device-access security features such as passwords, privilege levels, and Secure Shell (SSH)
- Configure and verify link aggregation
- Configure Spanning Tree
- Describe Intelligent Resilient Framework (IRF)
- Configure IP static routes
- Configure Routing Information Protocol (RIP) routing

Format offered
Two-day instructor-led, 50% lecture and 50% lab. The course may be delivered using a remote lab environment.
More information

**Accelerated HP Access Layer Network Technologies**
The Accelerated **HP Access Layer Network Technologies** ILT combines the material presented in the **HP Access Layer Network Technologies using ProVision Software** and **HP Access Layer Network Technologies using Comware Software** ILTs. It is delivered in less time than it would take to attend the ILTs separately.

**Topics covered**
In attending this course, you will learn how to:

- Perform basic configuration and switch setup on HP A-Series and E-Series switches
- Configure Layer 2 technologies such as Spanning Tree Protocol (STP), link aggregation, and VLANs on HP A-Series and E-Series switches
- Configure basic IP Routing such as static routing and RIP on HP A-Series and E-Series switches
- Configure IRF on HP A-Series switches
- Provide mobility solutions for small-to-medium businesses (SMBs) with the E-Series wireless products
- Manage and monitor SMB networks with HP PCM network management software

**Format offered**
Five-day instructor-led, 20% lecture and 80% lab and classroom activities.
The course may be delivered using a remote lab environment.

More information

**Purchase self-study materials**
Rather than attend the ILT, you can prepare for HP certification exams at your convenience, with HP-approved Official Exam Certification Guides.
Learn at your own pace, with self-study guides written by industry experts. Each guide takes you through complex subjects with detailed, step-by-step explanations, diagrams, chapter quizzes and a practice exam.

Remember that simply reading the self-study materials will not give you the hands-on experience provided by labs in the ILT. Both the study guide and exam assumes that you have real-world experience implementing and maintaining SMB level networks.
The same pre-requisite rules, as described in this Exam Preparation Guide, apply if you us the HP-approved Official Exam Certification Guides to prepare for this exam.
To purchase the self-study materials associated with this exam, visit [http://www.hppress.com](http://www.hppress.com).

**Complete recommended WBTs**
HP also recommends that you complete several WBTs, which introduce you to networking technologies and concepts:

- **Getting Started with HP Switching and Routing**, Rev 10.41 or later (a prerequisite for the ILTs described above)
- **Getting Started with HP Wireless Networks**, Rev 10.41 or later

These WBTs are freely available through the Learning Center of your HP Partner Portal. You will need to register for the WBT, which requires an HP Learner ID. Note that, while it only takes a few minutes to request the ID, the process of activating the ID may take several days. Please do not wait until the last minute.
Getting Started with HP Switching and Routing

The Getting Started with HP Switching and Routing WBT helps network technicians understand foundational switching and routing technologies. It also provides an overview of HP A-Series switches, which are designed for data centers and enterprises, and E-Series switches, which are designed for small-to-medium businesses (SMBs). In addition, this WBT describes how each foundational technology is implemented on both A-Series and E-Series switches.

Topics covered
The WBT teaches you about these concepts:

- Layer 2 and Layer 3 switches
- HP-A Series and E-Series switch overview
- Basic setup parameters on HP A-Series and E-Series switches
- Infrastructure device security
- VLANs
- IP routing concepts
- Link aggregation
- Spanning Tree Protocol
- Intelligent Resilient Framework (IRF)

Format offered
The WBT is a five-hour, self-paced course, which features animation and interaction. At the end of the WBT, you take a test to assess what you have learned.

More information
If you are interested, the course datasheet discusses Getting Started with HP Switching and Routing in more detail. It is available at http://h17007.www1.hp.com/us/en/training/certifications/technical/ais-network-infrastructure.aspx.

Getting Started with HP Wireless Networks

The Getting Started with HP Wireless Networks WBT helps network technicians understand the technologies that underlie wireless networks. Specifically, the course focuses on the 802.11 standards used to implement wireless networks and the security options used to protect wireless access and transmissions. In addition, this course introduces network technicians to the HP A-Series wireless products, which are designed for data centers and enterprises, and the E-Series wireless products, which are designed for small-to-medium businesses (SMBs).

Topics covered
The WBT teaches you about these concepts:

- 802.11 standards, including 802.11a/b/g/n, the association process, SSID, BSSID, and 802.11i
- Basic radio technologies, such as data rates, basic rates, and throughput
- Security options, including WEP, WPA/WPA2, 802.1X, Web authentication, MAC authentication
- Standalone, centralized, and optimized WLAN architectures:

Format offered
The WBT is a five-hour, self-paced course, which features animation and interaction. At the end of the WBT, you take a test to assess what you have learned.

More information
If you are interested, the course datasheet discusses Getting Started with HP Wireless Networks in more detail. It is available at http://h17007.www1.hp.com/us/en/training/certifications/technical/ais-network-infrastructure.aspx.
Refer to additional materials

You might want to refer to some additional materials, particularly if you have not completed the recommended training. HP provides product documentation, which explains how to implement the types of technologies covered in the training. Visit http://www.hp.com/networking/support to search for the appropriate manuals.

Obtain hands-on experience

If possible, practice setting up the technologies covered by the exam (refer to the topics listed for the recommended training) on actual HP equipment. You learn the most by configuring several switches that function together as they would in the real-world, which is the advantage of the safe lab environment provided in the ILTs.

How to take the Implementing HP Networking Technologies (HP0-Y30) exam

Table 3 provides details about the exam. Note that this is a proctored exam, which you must complete at a scheduled time and authorized location. You will not be allowed to take any reference materials with you.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of items</td>
<td>69</td>
</tr>
<tr>
<td>Item types</td>
<td>Multiple choice (single response)</td>
</tr>
<tr>
<td></td>
<td>Multiple choice (multiple responses)</td>
</tr>
<tr>
<td></td>
<td>Drag and drop</td>
</tr>
<tr>
<td>Exam time</td>
<td>2 hours (120 minutes)</td>
</tr>
<tr>
<td>Passing score</td>
<td>71 percent (49 correct answers)</td>
</tr>
<tr>
<td>Additional guidelines</td>
<td>No online or hard copy reference material will be allowed at the testing site.</td>
</tr>
</tbody>
</table>

Exam content

The following testing objectives represent the specific areas of content covered in the exam. Use this outline to guide your study and to check your readiness for the exam. The exam measures your understanding of these areas.

<table>
<thead>
<tr>
<th>HP0-Y30 Section/Objective</th>
<th>Sections/Objectives</th>
</tr>
</thead>
</table>
| 10% Basic E-Series Switch Setup | • Describe the privilege levels available in the E-Series CLI and the options available in each level  
• Use the CLI to assign a hostname to an E-Series switch  
• Describe the port-naming conventions for E-Series stackable and chassis switches  
• Use the CLI to configure port parameters, including friendly names  
• Use the CLI to view LLDP configuration and neighbors table  
• Use the CLI to assign an IP address to a VLAN interface |
| 6% Managing E-Series Switch Software and Configuration Files | • Describe the flash memory architecture of E-Series switches  
• Manage software on E-Series switches  
• Manage configuration files and changes on E-Series switches  
• Examine and interpret the event log |
<table>
<thead>
<tr>
<th>HP0-Y30</th>
<th>Sections/Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>7%</td>
<td>Configuring VLANs and IP Services on E-Series Switches</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure and verify VLANs on E-Series switches to support end users and switch-to-switch links</td>
</tr>
<tr>
<td></td>
<td>- Enable E-Series switches to access and provide IP services such as SNTP, DNS, and DHCP relay</td>
</tr>
<tr>
<td></td>
<td>- Back up configuration files using TFTP</td>
</tr>
<tr>
<td></td>
<td>- Enable remote management over IP networks</td>
</tr>
<tr>
<td>7%</td>
<td>Configuring Device Access Security for E-Series Switches</td>
</tr>
<tr>
<td></td>
<td>- Manage passwords on E-Series switches using the CLI and front-panel buttons</td>
</tr>
<tr>
<td></td>
<td>- Describe requirements for configuring SSH or HTTPS on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Use SFTP to back up a configuration file</td>
</tr>
<tr>
<td></td>
<td>- Define users and passwords to protect access to devices</td>
</tr>
<tr>
<td></td>
<td>- Implement SNMP v1/2 and v3</td>
</tr>
<tr>
<td>6%</td>
<td>Configuring Link Aggregation on E-Series Switches</td>
</tr>
<tr>
<td></td>
<td>- Describe the rules and requirements for link aggregation on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure and verify link aggregation at the E-Series CLI</td>
</tr>
<tr>
<td></td>
<td>- Describe the rules for VLAN membership of aggregated links, including the impact of aggregation configuration on the VLAN configurations of individual ports</td>
</tr>
<tr>
<td></td>
<td>- Describe the load-sharing mechanisms used by aggregated links on E-Series switches</td>
</tr>
<tr>
<td>9%</td>
<td>Configuring Spanning Tree on E-Series Switches</td>
</tr>
<tr>
<td></td>
<td>- Configure and enable RSTP on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Configure bridge priority on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- View Spanning Tree configuration and operation details</td>
</tr>
<tr>
<td></td>
<td>- Configure Spanning Tree to avoid isolating VLANs if a link is blocked</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure MSTP to ensure switches will be part of the correct MST region</td>
</tr>
<tr>
<td></td>
<td>- Verify MSTP configuration</td>
</tr>
<tr>
<td>6%</td>
<td>Configuring IP Routing on E-Series Switches</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure static routes on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Use the CLI to examine and interpret IP route tables</td>
</tr>
<tr>
<td></td>
<td>- Describe the types of dynamic routing protocols commonly deployed in contemporary LANs</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure and verify RIP at the E-Series CLI</td>
</tr>
<tr>
<td>9%</td>
<td>Providing Mobility to SMBs with E-Series Mobility Products</td>
</tr>
<tr>
<td></td>
<td>- Compare and contrast controlled mode and autonomous mode for HP E-Series MultiService Mobility (E-MSM) Access Points (APs)</td>
</tr>
<tr>
<td></td>
<td>- Describe the 802.11 a/b/g/n wireless LAN standards</td>
</tr>
<tr>
<td></td>
<td>- Describe Power over Ethernet (PoE) technologies supported by E-MSM APs and E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Access the Web browser interface to manage an E-Series MSM AP</td>
</tr>
<tr>
<td></td>
<td>- Configure Virtual Service Communities (VSCs) to provide access for different user groups</td>
</tr>
<tr>
<td></td>
<td>- Configure VLANs on autonomous E-MSM APs</td>
</tr>
</tbody>
</table>
### HP0-Y30 Sections/Objectives

<table>
<thead>
<tr>
<th>Sections/Objectives</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing and Monitoring SMB Networks with ProCurve Manager</td>
<td>7%</td>
</tr>
<tr>
<td>- Install HP ProCurve Manager Server and Client</td>
<td></td>
</tr>
<tr>
<td>- Describe differences between PCM and PCM+</td>
<td></td>
</tr>
<tr>
<td>- Describe PCM+ architecture and features</td>
<td></td>
</tr>
<tr>
<td>- Configure PCM+ users to ensure management security while providing all necessary</td>
<td></td>
</tr>
<tr>
<td>rights to management users</td>
<td></td>
</tr>
<tr>
<td>- Use PCM+ to manage device configurations, subnets, and VLANs on E-Series switches</td>
<td></td>
</tr>
<tr>
<td>Introduction to Network Design</td>
<td>2%</td>
</tr>
<tr>
<td>- Analyze network needs and specify appropriate designs using E-Series products and</td>
<td></td>
</tr>
<tr>
<td>technologies</td>
<td></td>
</tr>
<tr>
<td>Basic A-Series Switch and Router Setup</td>
<td>10%</td>
</tr>
<tr>
<td>- Describe the HP Networking A-Series switch and router portfolio</td>
<td></td>
</tr>
<tr>
<td>- Configure and manage A-Series switches over console connections</td>
<td></td>
</tr>
<tr>
<td>- Configure A-Series switches for remote management</td>
<td></td>
</tr>
<tr>
<td>- Configure basic device security on A-Series switches</td>
<td></td>
</tr>
<tr>
<td>- Manage Comware 5 configuration files</td>
<td></td>
</tr>
<tr>
<td>- Upgrade A-Series software</td>
<td></td>
</tr>
<tr>
<td>Configuring VLANs and IP Services on A-Series Switches</td>
<td>6%</td>
</tr>
<tr>
<td>- Define and configure VLANs on A-Series switches</td>
<td></td>
</tr>
<tr>
<td>- Display and interpret the VLAN configurations of A-Series switches</td>
<td></td>
</tr>
<tr>
<td>Configuring Link Aggregation and Spanning Tree on A-Series Switches</td>
<td>9%</td>
</tr>
<tr>
<td>- Describe the link aggregation features of A-Series switches</td>
<td></td>
</tr>
<tr>
<td>- Configure link aggregation on A-Series switches</td>
<td></td>
</tr>
<tr>
<td>- Configure load-sharing modes for link aggregation</td>
<td></td>
</tr>
<tr>
<td>- Configure Spanning Tree Protocols on A-Series switches</td>
<td></td>
</tr>
<tr>
<td>- Analyze and troubleshoot RSTP/MSTP in an enterprise network</td>
<td></td>
</tr>
<tr>
<td>Implementing Intelligent Resilient Framework (IRF)</td>
<td>6%</td>
</tr>
<tr>
<td>- Describe the technologies and concepts that enable IRF</td>
<td></td>
</tr>
<tr>
<td>- Describe the advantages of implementing IRF</td>
<td></td>
</tr>
<tr>
<td>- Configure and verify a two-switch IRF stack</td>
<td></td>
</tr>
</tbody>
</table>

### Comments on the exam

During the exam, participants can make specific comments about the items (i.e., accuracy, appropriateness to audience, etc.). HP welcomes these comments as part of our continuous improvement process.

### Tips for taking the exam

Rather than emphasize simple memorization, HP exams attempt to assess whether you have the knowledge and skills that a networking professional requires on the job. Therefore, some questions feature exhibits or scenarios, which you must interpret. Some questions will test you on concepts, but many will assess whether you have the ability to complete specific tasks. While you do not need to produce exact CLI commands from memory, you might need to recognize commands and select the correct one for completing a task. You must also be able to interpret configurations and indicate that you understand their effect.

As you see, you will have an average of just less than two minutes per question. Some questions will take much less time, and some will require a bit more. If allowed by the systems, you might want to answer the questions about which you are sure first and then move back to the others.

Before you do answer a question, take the time to read the question and all of the options carefully. If the question indicates that it features an exhibit, study the exhibit and reread the question. Make sure to select the answer that correctly responds to the question that is asked—not simply an answer that includes some correct information.
If the question asks for more than one answer, remember to select each correct answer. You do not receive partial credit for a partially correct answer.

**Register**

To register for this exam, visit the HP ExpertOne exam page at:
http://www.hp.com/certification/learn_more_about_exams.html

You will need an HP Learner ID

**How to take the Network Infrastructure AIS 2010 Upgrade (HP2-Z18) exam**

The *Network Infrastructure AIS 2010 Upgrade* (HP2-Z18) exam provides a more convenient option for individuals with a variety of prior achievements to obtain the HP AIS – Network Infrastructure [2011] certification. To see whether you qualify to take this test, check Table 5.

Note that, while you can take this exam more conveniently, the exam itself tests you on all the same knowledge as the HP0-Y30 exam, covering HP A-Series and HP E-Series products, as well as basic routing, switching, and wireless technologies.

*Table 5: HP AIS – Network Infrastructure [2011] requirements based on current achievement*

<table>
<thead>
<tr>
<th>Current achievements</th>
<th>Proctored Exam – Implementing HP Networking Technologies (HP0-Y30)</th>
<th>Online Exam – Network Infrastructure AIS 2010 Upgrade (HP2-Z18)</th>
<th>AIX – HP ProCurve Networking (2008 or later)</th>
<th>AIX – HP ProCurve (2008 or later) and passing HP2-Z08</th>
<th>H3CNE</th>
<th>CCNA – Any track</th>
<th>3Com DP or IAP</th>
<th>New candidates</th>
</tr>
</thead>
<tbody>
<tr>
<td>No test required; you are automatically awarded the certification.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

No matter what your current qualifications, you will take the same exam, which tests both your general knowledge of basic switching and routing technologies as well as your specific ability to implement these technologies on HP products.

You should not find the general knowledge questions too difficult—although you might want to complete the WBTs described earlier to review concepts that you have not studied recently. However, you might need to study the specifics of HP A-Series and E-Series products.
### Table 6: HP2-Z18 exam details

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of items</td>
<td>55</td>
</tr>
<tr>
<td>Item types</td>
<td>Multiple choice (single response)</td>
</tr>
<tr>
<td></td>
<td>Multiple choice (multiple responses)</td>
</tr>
<tr>
<td>Exam time</td>
<td>1 hour 30 minutes (90 minutes)</td>
</tr>
<tr>
<td>Passing score</td>
<td>73 percent (40 correct answers)</td>
</tr>
</tbody>
</table>

### Exam content

The following testing objectives represent the specific areas of content covered in the exam. Use this outline to guide your study and to check your readiness for the exam. The exam measures your understanding of these areas.

### Table 7: HP2-Z18 exam content

<table>
<thead>
<tr>
<th>HP2-Z18</th>
<th>Sections/Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>7%</td>
<td>Basic Switch Setup</td>
</tr>
<tr>
<td></td>
<td>• Describe the privilege levels available in the E-Series CLI and the options available in each level</td>
</tr>
<tr>
<td></td>
<td>• Describe the port-naming conventions for E-Series’ stackable and chassis switches</td>
</tr>
<tr>
<td></td>
<td>• Use the CLI to monitor interface status</td>
</tr>
<tr>
<td></td>
<td>• Use the CLI to view LLDP configuration and neighbors table</td>
</tr>
<tr>
<td>4%</td>
<td>Managing Switch Software and Configuration Files</td>
</tr>
<tr>
<td></td>
<td>• Describe the flash memory architecture of E-Series switches</td>
</tr>
<tr>
<td></td>
<td>• Manage software on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>• Manage configuration files and changes on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>• Examine and interpret the event log</td>
</tr>
<tr>
<td>7%</td>
<td>Configuring VLANS and IP Services</td>
</tr>
<tr>
<td></td>
<td>• Given a network design, configure and verify VLANS on E-Series switches to support end users and switch-to-switch links</td>
</tr>
<tr>
<td></td>
<td>• Enable E-Series switches to access and provide IP services such as SNTP, DNS, and DHCP</td>
</tr>
<tr>
<td>7%</td>
<td>Configuring Device Access Security</td>
</tr>
<tr>
<td></td>
<td>• Manage passwords on E-Series switches using the CLI and front-panel buttons</td>
</tr>
<tr>
<td></td>
<td>• Describe requirements for configuring SSH or HTTPS on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>• Implement SNMP v1/2 and v3</td>
</tr>
<tr>
<td></td>
<td>• Define users and passwords to protect access to devices</td>
</tr>
<tr>
<td>4%</td>
<td>Configuring Link Aggregation</td>
</tr>
<tr>
<td></td>
<td>• Describe the rules and requirements for link aggregation on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>• Given a network design, configure and verify link aggregation at the E-Series CLI</td>
</tr>
<tr>
<td></td>
<td>• Describe the rules for VLAN membership of aggregated links, including the impact of aggregation configuration on the VLAN configurations of individual ports</td>
</tr>
<tr>
<td></td>
<td>• Describe the load-sharing mechanisms used by aggregated links on E-Series switches</td>
</tr>
<tr>
<td>HP2-Z18</td>
<td>Sections/Objectives</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------</td>
</tr>
<tr>
<td>11%</td>
<td>Configuring Spanning Tree</td>
</tr>
<tr>
<td></td>
<td>- Configure and enable RSTP on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Configure bridge priority on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Configure Spanning Tree to avoid isolating VLANs if a link is blocked</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure MSTP to ensure switches will be part of the correct MST region</td>
</tr>
<tr>
<td></td>
<td>- Verify MSTP configuration</td>
</tr>
<tr>
<td>7%</td>
<td>Configuring IP Routing</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure static routes on E-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Use the CLI to examine and interpret IP route tables</td>
</tr>
<tr>
<td></td>
<td>- Describe the types of dynamic routing protocols commonly deployed in contemporary LANs</td>
</tr>
<tr>
<td></td>
<td>- Given a network design, configure and verify RIP at the E-Series CLI</td>
</tr>
<tr>
<td>9%</td>
<td>Providing Mobility to SMBs</td>
</tr>
<tr>
<td></td>
<td>- Compare and contrast Controlled Mode and Autonomous Mode for HP E-Series MultiService Mobility (E-MSM) Access Points (APs)</td>
</tr>
<tr>
<td></td>
<td>- Describe the 802.11 a/b/g/n wireless LAN standards</td>
</tr>
<tr>
<td></td>
<td>- Access the Web browser interface to manage an E-Series MSM AP</td>
</tr>
<tr>
<td></td>
<td>- Configure Virtual Service Communities (VSCs) to provide access for varying user groups</td>
</tr>
<tr>
<td></td>
<td>- Configure VLANs on autonomous E-MSM APs</td>
</tr>
<tr>
<td>7%</td>
<td>Managing and Monitoring SMB Networks with ProCurve Manager</td>
</tr>
<tr>
<td></td>
<td>- Install HP ProCurve Manager Server and Client</td>
</tr>
<tr>
<td></td>
<td>- Describe differences between PCM and PCM+</td>
</tr>
<tr>
<td></td>
<td>- Describe PCM+ architecture and features</td>
</tr>
<tr>
<td></td>
<td>- Use PCM+ to manage device configurations, subnets, and VLANs on E-Series switches</td>
</tr>
<tr>
<td>2%</td>
<td>Introduction to Network Design</td>
</tr>
<tr>
<td></td>
<td>- Identify E-Series switches appropriate for a given environment</td>
</tr>
<tr>
<td>13%</td>
<td>Basic A-Series Switch and Router Setup</td>
</tr>
<tr>
<td></td>
<td>- Describe the HP Networking A-Series switch and router portfolio</td>
</tr>
<tr>
<td></td>
<td>- Establish a console connection with an A-Series switch</td>
</tr>
<tr>
<td></td>
<td>- Configure A-Series switches for remote management</td>
</tr>
<tr>
<td></td>
<td>- Configure basic device security on A-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Manage Comware 5 configuration files</td>
</tr>
<tr>
<td></td>
<td>- Upgrade A-Series software</td>
</tr>
<tr>
<td>7%</td>
<td>Configuring VLANs and IP Services on A-Series Switches</td>
</tr>
<tr>
<td></td>
<td>- Create and configure VLANs</td>
</tr>
<tr>
<td></td>
<td>- Display and interpret information on VLANs</td>
</tr>
<tr>
<td></td>
<td>- Configure IP services on A-Series switches</td>
</tr>
<tr>
<td>7%</td>
<td>Configuring Link Aggregation and Spanning Tree on A-Series Switches</td>
</tr>
<tr>
<td></td>
<td>- Describe the link aggregation features of A-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Configure link aggregation on A-Series switches</td>
</tr>
<tr>
<td></td>
<td>- Configure load-sharing modes for link aggregation</td>
</tr>
<tr>
<td></td>
<td>- Verify and monitor link aggregations using the CLI commands</td>
</tr>
<tr>
<td></td>
<td>- Configure Spanning Tree Protocols on A-Series switches</td>
</tr>
<tr>
<td>HP2-Z18</td>
<td>Sections/Objectives</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6%</td>
<td>Implementing IRF</td>
</tr>
<tr>
<td></td>
<td>- Describe the basic concepts that enable IRF</td>
</tr>
<tr>
<td></td>
<td>- Configure and verify a two-switch IRF stack</td>
</tr>
<tr>
<td>2%</td>
<td>Deploying A-Series Mobility Products</td>
</tr>
<tr>
<td></td>
<td>- Describe the key features of the A-Series wireless products</td>
</tr>
</tbody>
</table>

**Comments on the exam**

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**Tips for taking HP exams**

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If the question asks for more than one answer, remember to select each correct answer. You do not receive partial credit for a partially correct answer.

The next several sections give specific study tips for various types of candidates.

**Study tips for those with previous HP ProCurve certification**

If you have HP ProCurve AIS [2010] or earlier certification, the questions on the E-Series products should not be too challenging, and these make up a majority of the exam. However, you will need to expand your knowledge of the HP A-Series products and technologies to pass the exam.

As indicated previously, you should take the HP A-Series Technologies ILT and review the recommended WBTs. You will need to understand how to implement all the technologies that you know on HP E-Series devices on HP A-Series devices. For example, you should understand how VLANs are assigned to ports. You must also be able to demonstrate your ability to navigate an A-Series device’s CLI and to control management access to it using console and virtual (VTY) interfaces. While you do not need to produce exact CLI commands from memory, you might need to recognize commands and select the correct one for completing a task. You must also be able to interpret configurations and indicate that you understand their effect.

Finally, you will need to learn about a new technology, IRF.

These are, of course, only suggestions and examples of topics that you might need to review. You should assess the subjects that you personally need to review.

**Study tips for those with former H3C or 3Com certification**

An H3CNE-certified candidate should take the HP E-Series Technologies ILT and review the recommended WBTs, as indicated previously. A majority of the exam’s questions cover E-Series devices. While many concepts that you know from using the A-Series devices apply to the E-Series devices, you must understand how to implement familiar technologies on HP E-Series devices.

For example, you might want to examine how E-Series devices implement port-based VLAN assignments. You must also be able to navigate an E-Series device’s CLI and manage access to it. While you do not need to produce exact CLI commands from memory, you might need to recognize commands and select the correct one for completing a task. You must also be able to interpret configurations and indicate that you understand their effect.

If you have 3Com DP or IAP certification, you might need to expand your knowledge of both HP A-Series and HP E-Series devices. You should take all of the recommended ILTs.
These are, of course, only suggestions and examples of topics that you might need to review. You should assess the subjects that you personally need to review.

**Study tips for those with Cisco certification**

This HP exam assesses your understanding of basic routing and switching concepts, which should mostly carry over from your Cisco knowledge, as well as your ability to apply those technologies on HP products.

Make sure that you understand differences between how similar technologies are implemented on Cisco and on HP products. For example, on HP E-Series switches, ports are assigned to VLANs in a different manner than on Cisco switches. You will also be expected to understand how Multiple Spanning Tree Protocol (MSTP) works, both conceptually and on HP equipment. Be aware that this protocol is quite different from Cisco’s Per-VLAN Spanning Tree Plus (PVST+). IRF, which is a technology supported by HP A-Series switches, might also be new to you.

While you do not need to produce exact CLI commands from memory, you might need to recognize commands and select the correct one for completing a task. You must also be able to interpret configurations and indicate that you understand their effect. You must demonstrate that you can navigate HP products’ CLIs and follow the proper procedures to configure settings. It is best that you complete the recommended ILTs (in addition to the WBTs) because the ILTs give you hands-on experience with the HP products. Otherwise, you should have on-the-job experience configuring the switching and routing technologies covered in the courses on actual HP A-Series and E-Series products.

These are, of course, only suggestions and examples of topics that you might need to review. You should assess the subjects that you personally need to review.

**Register**

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You will need an HP Learner ID

**Sample questions**

Use the following questions to help to assess whether you are ready to take the HP0-32 or HP2-Z18 exam. An appendix at the end of this guide provides answers and explanations.

1. The HP switches shown in the figure have been configured with the VLANs and port VLAN assignments indicated. The HP E8212 zl switch also has IP routing enabled. Besides these configurations, the switches are operating at default settings. On the E8212 zl switch, what else must you do to enable the switch to act as default gateway for VLAN 10 clients? Select two.
   a. Define the default gateway command on VLAN 10.
   b. Define an IP interface in VLAN 10.
   c. Add a static route to the E5406 zl switch.
   d. Configure port A1 as a routed port in VLAN 10.
   e. Configure port A1 as a tagged member of VLAN 10.
2. You are configuring the VTY 0 interface on an HP A-Series switch. To what do the settings on this interface apply?
   a. Console access to the switch
   b. Telnet access to the switch
   c. The Layer 3 virtual interface for any Layer 2 interface bound to it
   d. Data-link layer settings for the switch’s auxiliary port

3. Two HP A-Series switches, Switch A and Switch B, have been configured in an Intelligent Resilient Framework (IRF) group. Switch A is the current master. You change the stack priority on switch B so that it is higher than Switch A’s priority. Which switch is master?
   a. Switch A
   b. Switch B
   c. Whichever switch has been up for the longest amount of time
   d. Whichever switch has the lower MAC address

4. After configuring Multiple Spanning Tree Protocol (MSTP) on HP switches at a customer site, you learn that users in VLAN 12 can no longer access a server that used to be available. What can explain this problem?
   a. Some of your switches have different MST configurations, which has divided the network into two regions.
   b. VLAN 12 is not tagged on all switch uplinks, and one the links that carried this VLAN has been blocked.
   c. The edge switches to which users in VLAN 12 connect do not support MSTP.
   d. Some of your switches support different versions of spanning tree, so an MST region could not be formed.

5. What is one difference between Routing Information Protocol (RIP) and Open Shortest Path First (OSPF)?
   a. RIP is a distance-vector protocol, and OSPF is a link state protocol.
   b. RIP is a static routing protocol, and OSPF is a dynamic routing protocol.
   c. RIP is enabled by default on HP switches, but OSPF must be enabled manually.
   d. RIP is an interior gateway protocol, and OSPF is an external gateway protocol.
6. You want to configure an IP helper address for VLAN 8 on an HP E8206 zl switch. Given this prompt, E8206#, which command must you enter next to complete this task?
   
   a. ip helper 10.1.10.1 vlan 8
   b. vlan 8
   c. configure
   d. manager

7. An HP A-Series switch has the configuration indicated below. How do you log in with Telnet and obtain administrator-level access?
   
   a. Log in with username, user1, and password, manager.
   b. Log in with the secret password. Then log in again as user 1 with password, manager.
   c. Log in with the secret password.
   d. Log in with the secret password and then enter the super password, super3.

   ```
   system view
   telnet server enable
   super password level 3 simple super3
   local user user1
   set password simple manager
   authentication-attribute level 3
   user-interface vty 0 4
   authentication-mode password
   set authentication password simple secret
   protocol-inbound telnet
   user privilege 1
   ```

   Figure 2: Exhibit for question 7

8. Examine the exhibit. Which topologies are supported by an Intelligent Resilient Framework (IRF) stack? Select two.
   
   a. A
   b. B
   c. C
   d. D
   e. E
9. Which type of AP has no intelligence and always requires a wireless controller?
   a. Managed
   b. Fat
   c. Fit
   d. Thin

10. You are troubleshooting a network with switches that run Multiple Spanning Tree Protocol (MSTP). You have determined that two switches are root in instance 1. What could explain this?
   a. The switches have the same bridge priority for that instance.
   b. The switches map different VLANs to instance 1.
   c. One switch is running MSTP and the other is running Rapid Spanning Tree Protocol (RSTP).
   d. The switches are using the same MST configuration name.

Conclusion
HP wishes you success in the ExpertONE Program and in passing the exam for which you are preparing.

Appendix A: Answers to the sample questions
This section provides answers and explanations for the sample questions for the Implementing HP Networking Technologies (HP0-Y30) exam.

1. The HP switches shown in the figure have been configured with the VLANs and port VLAN assignments indicated. The HP E8212 zl switch also has IP routing enabled. Besides these configurations, the switches are operating at default settings. On the E8212 zl switch, what else must you do to enable the switch to act as default gateway for VLAN 10 clients? Select two.
   a. Define the **default gateway** command on VLAN 10.
   b. Define an IP interface in VLAN 10.
   c. Add a static route to the E5406 zl switch.
   d. Configure port a1 as a routed port in VLAN 10.
e. Configure port a1 as a tagged member of VLAN 10.

![Diagram showing VLAN 10 tagging](image)

**Figure 1: Exhibit for question 1**

**Explanation:** In order to route for a VLAN, the E8212 zl switch must have an IP address on that VLAN (answer b). The VLAN 10 traffic must also be able to reach the switch, so you must tag the port that connects to the E5406 zl switch with VLAN 10 (answer e), matching the VLAN assignment on the other side of the connection.

There is no default gateway command for VLANs. The endpoints’ DHCP configuration (or sometimes static configuration) determines which IP address they use for their default gateway. The switch can perform that function as long as it can route traffic and has an IP address for the VLAN. Therefore, answer a is incorrect.

The E5406 zl switch is not routing traffic, so there is no need to define a route to it, making answer c incorrect. The E8212 zl switch (as well as most other E-Series switches) does not have a concept of routed physical interfaces. Therefore, answer d is incorrect.

2. You are configuring the VTY 0 interface on an HP A-Series switch. To what do the settings on this interface apply?
   - a. Console access to the switch
   - b. Telnet access to the switch
   - c. The Layer 3 virtual interface for any Layer 2 interface bound to it
   - d. Data-link layer settings for the switch’s auxiliary port

**Explanation:** The VTY 0 interface is a virtual user interface that controls management access to the switch, specifically Telnet and SSH access. Therefore, answer b is correct.

Console management access is controlled by the AUX 0 interface, so answer a is incorrect. The VTY 0 interface has no relationship to the switch’s Layer 3 settings nor to auxiliary ports (which the A-Series switches do not have). Therefore, answers c and d are also incorrect.

3. Two HP A-Series switches, Switch A and Switch B, have been configured in an Intelligent Resilient Framework (IRF) group. Switch A is the current master. You change the stack priority on switch B so that it is higher than Switch A’s priority. Which switch is master?
   - a. Whichever switch has been up for the longest amount of time
   - b. Whichever switch has the lower MAC address
   - c. Switch A
   - d. Switch B

**Explanation:**

a. Incorrect. The stack priority is a dynamic value that changes based on the configuration and does not relate to the age of the switch.

b. Incorrect. The MAC address is a static value and does not change based on the configuration.

c. Correct. The master switch is determined by the stack priority in this scenario, and you have changed the priority on Switch B to be higher than that of Switch A, making Switch B the new master.

d. Incorrect. Switch A remains the master due to the higher stack priority even after the change on Switch B.

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Explanation: When conducting an IRF Master election, the HP A-Series switches take the following factors into consideration in this order:

- Current IRF Master
- Highest stack priority
- Longest system uptime
- Lowest MAC address

Because Switch A is the current IRF Master, it remains Master (answer c). The other factors do not come into play.

4. After configuring Multiple Spanning Tree Protocol (MSTP) on HP switches at a customer site, you learn that users in VLAN 12 lose all access to a server that used to be available. What can explain this problem?
   a. Some of your switches have different MST configurations, which has divided the network into two regions.
   b. VLAN 12 is not tagged on all switch uplinks, and one of the links that carried this VLAN has been blocked in the VLAN 12 instance.
   c. The edge switches to which users in VLAN 12 connect only support RSTP.
   d. An edge switch was elected as root in VLAN 12’s instance due to improperly configured priorities.

Explanation: When MSTP decides which ports to block in a specific instance, it does not consider which VLANs are active on that port. Therefore, if a switch has two uplinks, and only one of those uplinks supports VLAN 12, problems can occur. If the uplink that supports VLAN 12 is blocked in the VLAN instance, users in that VLAN can no longer reach services that were available before MSTP was implemented. Therefore, answer b is correct.

Answer a does not provide reason enough for the problem. Even if switches are in different MST regions, they can form a common spanning tree (CST), and traffic should be forwarded normally (even if it is not load-balanced correctly). Only if there is another problem with VLAN tagging on links would a problem occur for users in VLAN 12. Therefore, answer a is incorrect.

Similarly, even if the edge switches only supported RSTP, they could participate in the CST. Answer c is incorrect.

Improperly configured priorities could cause an edge switch to be elected as root. However, this problem would not cause VLAN 12 users to have no access to the server. (It might cause congestion.) Therefore, answer d does not answer the question correctly.

5. What is one difference between Routing Information Protocol (RIP) and Open Shortest Path First (OSPF)?
   a. RIP is a static routing protocol, and OSPF is a dynamic routing protocol.
   b. RIP is enabled by default on HP switches, but OSPF must be enabled manually.
   c. RIP is an interior gateway protocol, and OSPF is an external gateway protocol.
   d. RIP is a distance-vector protocol, and OSPF is a link state protocol.

Explanation: Answer d includes correct information about RIP and OSPF.

Answer a is incorrect because RIP is also a dynamic routing protocol. Both RIP and OSPF must be enabled on HP switches, so answer b is incorrect. OSPF is also an interior gateway protocol, so answer c is incorrect.

6. You want to configure an IP helper address for VLAN 8 on an HP E8206 zl switch. Given this prompt, E8206#, which command must you enter next to complete this task?
   a. ip helper 10.1.10.1 vlan 8
   b. vlan 8
   c. configure
   d. manager
**Explanation:** To enter the command that configures a helper address for a VLAN, you must be in the VLAN interface configuration context. From the prompt, you can determine that the switch is in the enable mode context. The next step for reaching the VLAN interface configuration context is moving to the global configuration context. The command for doing so is configure (answer c).

7. An HP A-Series switch has the following configuration:

```plaintext
system view
telnet server enable
super password level 3 simple super3
local user user1
   set password simple manager
   authentication-attribute level 3
user-interface vty 0 4
   authentication-mode password
   set authentication password simple secret
   protocol-inbound telnet
user privilege 1
```

How do you log in with Telnet and obtain administrator-level access?

a. Log in with username, user1, and password, manager.

b. Log in with the secret password. Then log in again as user 1 with password, manager.

c. Log in with the secret password.

d. Log in with the secret password and then enter the super password, super3.

**Explanation:** Telnet access is controlled by the VTY 0 to 4 interfaces. From the configuration, you know that the authentication mode for logging in to one of these interfaces is password authentication. For this reason, you know that you cannot log in via Telnet using a local username. Therefore, answer a is incorrect.

Instead you must use the password indicated for the interface in the configuration (secret). You cannot log in again, so answer b is also incorrect.

The configuration also indicates that you have monitor only access when you log in with Telnet (user privilege 1). Therefore, answer c is incorrect.

To obtain, administrator level access, you must use the super password for level 3 after you log in with Telnet (answer d).

8. Examine the exhibit. Which topologies are supported by an Intelligent Resilient Framework (IRF) stack? Select two.

a. A

b. B

c. C

d. D

e. E
Explanation: The pictures illustrate the following topologies:

- A = Daisy chain
- B = Tree
- C = Mesh
- D = Ring
- E = Star

The only topologies supported by IRF are daisy chain and ring topologies (answers a and d).
9. Which type of AP has no intelligence and always requires a wireless controller?
   a. Managed
   b. Fat
   c. Fit
   d. Thin

   **Explanation**: A managed AP is any AP that you can manage through a controller or management interface. Some managed APs do not require a wireless controller, so answer a is incorrect.

   A fat AP is a standalone AP that provides all of the intelligence for the wireless services, so answer b is incorrect.

   A fit AP does require a wireless controller, but it provides some intelligence of its own; it can forward traffic. Therefore, answer c is incorrect.

   But a thin AP has no intelligence and always requires a controller for all functions; answer d is correct.

10. You are troubleshooting a network with switches that run Multiple Spanning Tree Protocol (MSTP). You have determined that two switches are root in instance 1. What could explain this?
   a. The switches have the same bridge priority for that instance.
   b. The switches map different VLANs to instance 1.
   c. One switch is running MSTP and the other is running Rapid Spanning Tree Protocol (RSTP).
   d. The switches are using the same MST configuration name.

   **Explanation**: When two switches implementing MSTP are the root in the same instance, you know that the switches are in different MST regions. You must find a setting that prevents the switches from being in the same region.

   To be in the same region, the switches’ MST configurations must match exactly. One of the settings that must match is the VLAN to instance mapping. Therefore, mapping different VLANs to instance 1 would cause two switches to be in different regions. Answer b is correct.

   Two switches in the same region are allowed to have the same priority in an instance; the switches’ MAC addresses serve as a tie breaker in electing a root. Therefore, answer a is incorrect.

   If a switch runs RSTP in an environment with MSTP switches, the RSTP switch is part of the common spanning tree (CST) as are the switches in the MST region (which appear to the RSTP switch as a single RSTP switch). It is true that the RSTP switch is not part of the MST region, but the RSTP switch could not be root in instance 1 because RSTP does not recognize instances. Therefore, answer c is incorrect.

   All switches in the MST region must have the same MST configuration name, so answer d is incorrect.