HP0-Y32: DESIGNING & TROUBLESHOOTING OPEN STANDARD NETWORKS

HP Networking
Exam preparation guide

Overview

Requirements for successful completion

This guide helps you to study for the Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam. You can benefit from this guide whether you are attempting to expand your existing HP certification or you have an H3C or a Cisco background and want to get certified with HP.

To pass the exam, you will need to demonstrate that you can design networks according to best practices, troubleshoot a wide variety of common networking problems, fix those problems on HP products, and implement open standard technologies in multi-vendor environments. The final requirement means that you must have a degree of competence ensuring that Cisco proprietary protocols interoperate with open standard ones.
# Table of Contents

Why take the exam? .............................................................................................................. 4
HP ASE – Network Infrastructure [2011] certification .......................................................... 4
  Path 1 .................................................................................................................................. 4
  Path 2 .................................................................................................................................. 4
  Path 3 .................................................................................................................................. 4
HP Master ASE – Network Infrastructure [2011] certification ........................................ 5
  Path 1 .................................................................................................................................. 5
  Path 2 .................................................................................................................................. 5
  Path 3 .................................................................................................................................. 6
Who should take this exam? ............................................................................................... 6
How to study for the exam .................................................................................................... 7
Study tips based on your current certification .................................................................. 7
  HP ANS certification ........................................................................................................ 7
  ASE – HP ProCurve certification ................................................................................... 7
  Master ASE – HP ProCurve certification ...................................................................... 8
  H3CSE certification ......................................................................................................... 8
  CCNP – Routing and Switching certification ................................................................. 8
Attend recommended ILTs ................................................................................................. 9
  Troubleshooting HP Networks ..................................................................................... 9
    Topics covered ................................................................................................................ 9
    Format offered ................................................................................................................ 9
    More information ......................................................................................................... 9
  HP Networking Interoperability ................................................................................... 9
    Topics covered ................................................................................................................ 10
    Format offered ................................................................................................................ 10
    More information ......................................................................................................... 10
  Accelerated Interoperability & Troubleshooting HP Networks .................................... 10
    Topics covered ................................................................................................................ 10
    Format offered ................................................................................................................ 10
    More information ......................................................................................................... 10
Purchase self-study materials ........................................................................................... 11
Read the recommended PDF-based course ..................................................................... 11
  Topics covered ................................................................................................................ 11
  Format offered ................................................................................................................ 11
Refer to additional materials ............................................................................................ 11
Obtain hands-on experience .............................................................................................. 12
How to take the Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam ............................................................................................................. 12
  Exam content .................................................................................................................. 12
  Comments on the exam ................................................................................................. 13
Tips for taking HP exams .................................................................................................. 13
Register ............................................................................................................................... 13
Sample questions .............................................................................................................. 13
Conclusion .......................................................................................................................... 18
Appendix: Answers to the sample questions ................................................................ 18
Why take the exam?
Based on your current achievements, passing this test gives you one component toward either:

• HP Accredited Systems Engineer (ASE) – Network Infrastructure [2011] certification
• HP Master Accredited Systems Engineer – Network Infrastructure [2011] certification

HP ASE – Network Infrastructure [2011] certification
This certification attests that you can:

• Design, implement, and troubleshoot secure network solutions for large and complex, multi-vendor campus LAN environments using HP E- and A-Series network technologies
• Design and implement an HP open standards–based network solution, including those that interoperate with non-HP networking solutions

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
This path is designed for networking professionals who have one of the following certifications:

• ASE – HP ProCurve (2006 or later) and HP Enterprise Networking Products Technical Qualification [2010]
• ASE – HP ProCurve Campus LANs [2010] and HP Enterprise Networking Products Technical Qualification [2010]
• HP ASE – Wireless Networks [2011]

If you meet one of these criteria, then passing the HP0-Y32 exam alone gives you the certification. By completing this path, you will also be granted the HP AIS – Network Infrastructure [2011] certification.

Path 2
This path is designed for networking professionals who have one of the following certifications.

• ASE – HP ProCurve (2006 or later)
• ASE – HP ProCurve Campus LANs [2010]
• H3CSE
• CCNP – Routing and Switching

If you meet one of these criteria, you must pass the Implementing HP Network Infrastructure Solutions (HP0-Y43) exam and Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam to earn the certification. If you complete this path, you will also be granted the AIS – Network Infrastructure [2011] certification.

Path 3
If you do not meet the requirements for path 1 or path 2, then you must complete this path, which is designed for new candidates. First, you must achieve the prerequisite certification, HP AIS – Network Infrastructure [2011]. Second, you must pass the following exams:

• Implementing HP Network Infrastructure Solutions (HP0-Y43) exam
• Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam

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

<table>
<thead>
<tr>
<th>Path 1</th>
<th>Path 2</th>
<th>Path 3</th>
</tr>
</thead>
</table>
| HP Enterprise Networking Products Technical Qualification [2010] & either:  
  • ASE – HP ProCurve (2006 or later)  
| HP AIS certification | | |
| Proctored Exam – Implementing HP Network Infrastructure Solutions (HP0-Y43) | | X |
| Proctored Exam – Designing & Troubleshooting Open Standard Networks (HP0-Y32) | X | X |
| | | X |

*Note: CCNP specialties such as Voice, Security, or Wireless do not apply toward HP Network Infrastructure certification.

HP Master ASE – Network Infrastructure [2011] certification

This certification attests that you can design, integrate, and support secure network solutions for large and complex enterprise networks using A-Series network technologies.

There are three paths for achieving this certification. The HP0-Y32 exam is required only for Path 1 (but the other paths are described for your reference).

Path 1

This path is designed for networking professionals who have one of the following certifications.

• Master ASE – HP ProCurve Campus LANs [2010]
• H3CSE
• CCIE – Routing and Switching

In addition to taking the HP0-Y32 exam, you must pass the Migrating & Troubleshooting HP Enterprise Networks (HP0-Y37) exam.

If you have one of these certifications and pass the two required exams, you will be awarded the HP Master ASE – Network Infrastructure [2011] certification as well as the ASE – Network Infrastructure [2011] and AIS – Network Infrastructure [2011] certifications.

Path 2

This path is designed for networking professionals with both of these achievements:

• HP Enterprise Networking Products Technical Qualification [2010]
• HP ASE—Network Infrastructure [2011]

You only need to take the Migrating & Troubleshooting HP Enterprise Networks (HP0-Y37) exam.
Path 3

Other candidates for the HP Master ASE—Network Infrastructure [2011] certification must first complete the HP ASE—Network Infrastructure [2011] certification. They must then pass two exams:

- Deploying HP Enterprise Networks (HP0-Y36) exam
- Migrating & Troubleshooting HP Enterprise Networks (HP0-Y37) exam

Table 2 summarizes these requirements.

Table 2: HP Master ASE—Network Infrastructure [2011] requirements based on current achievement

<table>
<thead>
<tr>
<th>Current achievements</th>
<th>Path 1</th>
<th>Path 2</th>
<th>Path 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP ASE—Network Infrastructure certification</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Proctored Exam—Designing &amp; Troubleshooting Open Standard Networks (HP0-Y32)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Proctored Exam—Deploying HP Enterprise Networks (HP0-Y36)</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Proctored Exam—Migrating &amp; Troubleshooting HP Enterprise Networks (HP0-Y37)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*Note: CCIE specialties such as Voice, Security, or Wireless do not apply toward HP Master ASE—Network Infrastructure certification.

Who should take this exam?


Although anyone can take the exam, most successful candidates have two years of real-world experience implementing or maintaining network infrastructure solutions in a campus LAN or enterprise environment. Successful candidates also prepare for the test in a variety of ways. This guide describes some of these ways and provides references to materials for further preparation.

**NOTE**

Although anyone can take the exam, passing it helps you to achieve certification only if you have one of the achievements listed in Table 1 or Table 2.

If you are a new candidate and want to earn the HP ASE—Network Infrastructure [2011] certification, you need to obtain the HP AIS [2011] certification first. If you want to achieve the HP Master ASE—Network Infrastructure [2011] certification, you will need to earn both the HP AIS [2011] and ASE—Network Infrastructure [2011] certifications.
How to study for the exam

The Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam tests you on topics that are covered in two HP instructor-led training (ILT) courses (7 days total) and a document-based course. All of this training is recommended for all candidates no matter what their current achievements.

Note that there is also a third HP ILT course that combines the content covered in the original two ILTs and is completed in a shorter period of time: 5 days instead of 7. More information on all three courses—including the recommended qualifications for candidates attending the third ILT—is available in this exam preparation guide.

While it is recommended that you complete the available training, the training is neither required nor does it guarantee that you will pass the exam. It is expected that you will study on your own and draw on your real-world experience. Also remember that the exam tests you on design concepts, which are covered in a document-based course and not at the ILTs.

Read the sections below to assess your options. Even if you do not intend to complete the recommended ILTs and document-based course, you should examine the topics that are listed for them in the sections below; the exam will test you on your mastery of these topics.

Study tips based on your current certification

First you might want to choose topics on which to focus based on your current skills:

• HP AIS [2011]
• ASE – HP ProCurve
• Master ASE – HP ProCurve
• H3CSE
• CCNP – Routing and Switching

You can then read about specific study methods.

**HP AIS certification**

The troubleshooting sections of the Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam build on your knowledge of HP A-Series and E-Series products. However, you must be familiar enough with technologies that you can find errors and problems relatively quickly. You might consider taking the HP0-Y43 exam, another requirement for the HP ASE – Network Infrastructure [2011] certification, before this one to ensure that you have the necessary expertise.

Almost half of the questions on the exam deal with interoperability between Cisco protocols and open network standards as implemented on HP products. If you are not familiar with Cisco protocols, you should study Per-VLAN Spanning Tree Protocol Plus (PVST+) and Hot Standby Router Protocol (HSRP) in particular. You might want to learn a bit about these protocols before attending the HP Networking Interoperability ILT, which assumes a basic knowledge of them.

To learn more about ways to prepare for the exam, continue reading, beginning at: Attend recommended ILTs.

**ASE – HP ProCurve certification**

The Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam tests you on troubleshooting both HP A-Series and E-Series products as well as deploying both types of products in heterogeneous environments with Cisco products. You might consider taking the HP0-Y43 exam, another requirement for the HP ASE – Network Infrastructure [2011] certification, before this one to ensure that you have the necessary expertise on A-Series products.

Almost half of the questions on the exam deal with interoperability between Cisco protocols and open network standards as implemented on HP products. If you are not familiar with Cisco protocols, you should study Cisco Discovery Protocol (CDP), Per-VLAN Spanning Tree Protocol Plus (PVST+), and Hot Standby Router Protocol (HSRP) in particular. You might want to learn a bit about these protocols before attending the HP Networking Interoperability ILT, which assumes a basic knowledge of them.

To learn more about ways to prepare for the exam, continue reading, beginning at: Attend recommended ILTs.
Master ASE – HP ProCurve certification

With your current certification, you should understand routing and switching technologies quite well — as well as design and troubleshooting principles. But, although the Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam tests you on your general knowledge of design and troubleshooting practices, it also assesses your ability to troubleshoot HP products in specific — including HP A-Series products. Although you are not required to take the HP0-Y43 exam, if you are not confident in your knowledge of A-Series devices, you might consider taking or purchasing self-study materials for the HP Core/Distribution Network Technologies using Comware Software ILT associated with that exam. (See http://h17007.www1.hp.com/us/en/training/certifications/technical/ase-network-infrastructure.aspx.)

Also note that almost half of the questions on the exam deal with interoperability between Cisco protocols and open network standards as implemented on HP products. If you are not familiar with Cisco protocols, you should study Cisco Discovery Protocol (CDP), Per-VLAN Spanning Tree Protocol Plus (PVST+), and Hot Standby Router Protocol (HSRP) in particular. You might want to learn a bit about these protocols before attending the HP Networking Interoperability ILT, which assumes a basic knowledge of them.

To learn more about ways to prepare for the exam, continue reading, beginning at: Attend recommended ILTs.

H3CSE certification

Your current knowledge of HP A-Series products should be sufficient although you should strongly consider attending the Troubleshooting HP Networks ILT to learn about specific troubleshooting procedures. However, you might need to expand your knowledge of HP E-Series products in order to pass this exam. Depending on the certification that you are seeking, you might not need to take the HP0-Y43 exam. Nonetheless, if you are not confident in your knowledge of (former HP ProCurve) E-Series devices, you might consider taking or purchasing self-study materials for some of the training associated with that exam. (See http://h17007.www1.hp.com/us/en/training/certifications/technical/ase-network-infrastructure.aspx.)

Also note that almost half of the questions on the Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam deal with interoperability between Cisco protocols and open network standards as implemented on HP products. If you are not familiar with Cisco protocols, you should study Cisco Discovery Protocol (CDP), Per-VLAN Spanning Tree Protocol Plus (PVST+), and Hot Standby Router Protocol (HSRP) in particular. You might want to learn a bit about these protocols before attending the HP Networking Interoperability ILT, which assumes a basic knowledge of them.

To learn more about ways to prepare for the exam, continue reading, beginning at: Attend recommended ILTs.

CCNP – Routing and Switching certification

Although the Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam tests you on your general knowledge of design and troubleshooting practices, it also assesses your ability to troubleshoot HP products in specific. You are expected to understand how switching and routing technologies function on HP products, and you will be more successful at the ILTs recommended for this exam if you do. For example, you must be able to examine configurations and find and resolve potential issues. Therefore, even though, depending on the certification that you are seeking, you might not need to take the HP0-Y30 exam, you might consider attending or purchasing self-study materials for some of the training associated with that exam. (See http://learningpartnerconnection.com/coursemanuals.) Otherwise, expect to work a little harder at the Troubleshooting HP Networks ILT.

Also note that the interoperability questions, which make up about half of the exam, test you not only on Cisco protocols such as PVST+ and HSRP, with which you should be familiar, but on how those protocols interoperate with open standard protocols. You might be surprised at some of the implications and should take the HP Networking Interoperability ILT.

To learn more about ways to prepare for the exam, continue reading, beginning at: Attend recommended ILTs.
Attend recommended ILTs

Three ILTs are available to help you to prepare for the Designing & Troubleshooting Open Standard Networks (HP0-Y32) exam. The first two are:

- **Troubleshooting HP Networks, Rev. 10.41 or later (3 days)**
- **HP Networking Interoperability, Rev. 10.41 or later (4 days)**

You are highly encouraged to attend these courses, particularly because they offer a lab environment for experimenting with troubleshooting and multi-vendor solutions, which you might not be able to reproduce on your own.

You may also have the option of taking **Accelerated Interoperability & Troubleshooting HP Networks, Rev. 11.31 or later** as an alternative to **Troubleshooting HP Networks** and **HP Networking Interoperability**. This ILT combines **Troubleshooting HP Networks** and **HP Networking Interoperability** and delivers the material in a compressed timeframe: 5 days instead of 7. Qualifications for this course are listed below.

You can 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. Please obtain this ID and then register for classes at least one week in advance. Costs and scheduling vary according to region.

**Troubleshooting HP Networks**

The **Troubleshooting HP Networks** course helps networking engineers to improve their troubleshooting skills on both HP A-Series and E-Series switches. The course focuses on troubleshooting methodologies and practices for medium-to-enterprise networks. The **Troubleshooting HP Networks** course is built around the IETF 5 Layer Model and includes a number of labs covering topics like troubleshooting VLANs, spanning tree, OSPF routing, and other Layer-3 issues.

Network engineers will learn how to isolate network problems and find solutions for these problems by methodically analyzing the network problems.

**Topics covered**

In this course, you learn about:

- Troubleshooting methodologies and practices
- Detailed troubleshooting based on the IETF 5 layer module covering
- Layer 1 (Physical Layer) troubleshooting and problem resolution
- Layer 2 (Data Link Layer) troubleshooting and problem resolution
- Layer 3 (Network Layer) troubleshooting and problem resolution
- Layer 4 (Transport Layer) troubleshooting and problem resolution
- Layer 5 (Application Layer) troubleshooting and problem resolution
- Troubleshooting an end-to-end, complex, integrated, multi-protocol network deployment

**Format offered**

Three-day instructor-led, 25% lecture and 75% lab and classroom activities. The course may be delivered using a remote lab environment.

**More information**


**HP Networking Interoperability**

The **HP Networking Interoperability** course helps network engineers design and implement multi-vendor networks that include HP A-Series, HP E-Series, and Cisco switches. The course focuses on the key differences between platforms, such as VLAN configuration, Spanning Tree Protocol (STP), Open Shortest Path First (OSPF), link aggregation, and Network Address Translation (NAT). Network engineers will learn how to identify compatibility problems and evaluate the pros and cons of each possible solution for a given network environment.
Topics covered
In this course, you learn about multi-vendor interoperability in these areas:

- Multiple Spanning Tree Protocol (MSTP)
- Rapid Spanning Tree Protocol (RSTP)
- Differences between Per-VLAN Spanning Tree Plus (PVST+) and MSTP
- Management of HP A-Series, HP E-Series, and Cisco switches
- VLAN configuration on HP A-Series, HP E-Series, and Cisco switches
- Aggregated links between HP switches and Cisco switches
- Network Address Translation (NAT)
- Quality of Service (QoS) for proper traffic prioritization
- Host Standby Router Protocol (HSRP) and Virtual Router Redundancy Protocol (VRRP)

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

More information
If you are interested, the course datasheet discusses HP Networking Interoperability in more detail. It is available at http://h17007.www1.hp.com/us/en/training/certifications/technical/ase-network-infrastructure.aspx.

Accelerated Interoperability & Troubleshooting HP Networks
The Accelerated Interoperability & Troubleshooting HP Networks ILT combines the material presented in both the Troubleshooting HP Networks and HP Networking Interoperability ILTs. It is delivered in less time than it would take to attend both ILTs separately.

NOTE
Given the compressed timeframe, the Accelerated course is designed to train only experienced network administrators in these topics. To attend Accelerated Interoperability & Troubleshooting HP Networks, you should have one of the following active certifications:

- ASE – HP ProCurve (2006 or later)
- CCNP – Routing and Switching
- H3CSE

Topics covered
In this course, you learn about:

- Multi-vendor network design and implementation for networks containing HP A-Series, HP E-Series, and Cisco switches and routers
- Issues that can arise when combining vendor-specific proprietary protocols and industry-standard IEEE-based protocols
- Issues that can arise with LAN switching and in routed, multiple-subnet network deployments
- Troubleshooting methodologies to isolate and correct such issues in complex networks

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
If you are interested, the course datasheet discusses Accelerated Interoperability & Troubleshooting HP Networks in more detail. It is available at http://h17007.www1.hp.com/us/en/training/certifications/technical/ase-network-infrastructure.aspx.
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 in troubleshooting and implementing multi-vendor networks.
To purchase the self-study materials associated with this exam, visit http://www_hppress.com.

Read the recommended PDF-based course
HP also recommends that you read the HP Design Principles PDF. This PDF details a series of recommendations for the design of enterprise-level HP A-Series Networks — topics that the recommended ILTs do not cover and topics on which the exam will test you.
The PDF is freely available through The Learning Center of your HP Partner Portal. You will need to register for the course, which requires an HP Learner ID. Note that, while it only takes a few minutes to request the ID, the process of activating it up may take several days. Please do not wait until the last minute.

Topics covered
In this PDF, you will learn about:

- Port and link design criteria
- VLAN design criteria
- IP gateway design criteria
- WAN links design criteria
- IP routing design criteria
- IP multicast design criteria
- QoS design criteria
- IRF design criteria

Format offered
This is a self-paced training document (PDF).

Refer to additional materials
You might want to refer to some additional materials, particularly if you have not completed the recommended training.

- HP provides design guides for several solutions, which you can obtain through the My Networking site.
- HP provides white papers on design and interoperability topics. Search the HP networking knowledgebase. For example, this white paper discusses PVST+ and MSTP interoperability: http://h10144.www1.hp.com/NR/rdonlyres/10D845B6-45CC-40E4-986F-F71A5EE6D992/0/InteroperatingwithCiscosRPVSTSpanningTreeProtocolinaHighAvailabilityTopology_Dec_07_WW_E.pdf
- Some HP products also have troubleshooting guides. To find the appropriate manuals, visit http://www.hp.com/networking/support.
Obtain hands-on experience

All HP exams are designed for networking professionals with on-the-job experience, but this exam, in particular, requires such experience. You will find the troubleshooting portions of the exam much more manageable if you have encountered the situations described in a lab or real-world environment. Similarly, you will be expected to understand very well exactly how HP and Cisco switches interoperate, particularly in terms of spanning tree protocols (STP).

If you do not have experience in troubleshooting and managing HP and multi-vendor environments, you should strongly consider taking the ILTs, which provide a safe lab environment for experimenting in these areas.

How to take the Designing & Troubleshooting Open Standard Networks (HP0-Y32) 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>
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</thead>
<tbody>
<tr>
<td>Number of items</td>
<td>70</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>2.5 hours (150 minutes)</td>
</tr>
<tr>
<td>Passing score</td>
<td>67 percent</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-Y32</th>
<th>Sections/Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>44%</td>
<td>Troubleshooting HP Networks</td>
</tr>
<tr>
<td></td>
<td>• Troubleshooting methodologies and practices</td>
</tr>
<tr>
<td></td>
<td>• Physical layer troubleshooting and problem resolution</td>
</tr>
<tr>
<td></td>
<td>• Data Link layer troubleshooting and problem resolution</td>
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<tr>
<td></td>
<td>• Network layer troubleshooting and problem resolution</td>
</tr>
<tr>
<td></td>
<td>• Transport layer troubleshooting and problem resolution</td>
</tr>
<tr>
<td></td>
<td>• Troubleshooting an end-to-end complex, integrated, multi-protocol network</td>
</tr>
<tr>
<td>49%</td>
<td>Networking Interoperability</td>
</tr>
<tr>
<td></td>
<td>• Switch management</td>
</tr>
<tr>
<td></td>
<td>• Link aggregation</td>
</tr>
<tr>
<td></td>
<td>• VLANs</td>
</tr>
<tr>
<td></td>
<td>• Implementing MSTP on Cisco and HP switches</td>
</tr>
<tr>
<td></td>
<td>• Interoperability between PVST+, Rapid PVST+, and MSTP</td>
</tr>
<tr>
<td></td>
<td>• Redundancy without STP</td>
</tr>
<tr>
<td></td>
<td>• Virtual IP Protocols</td>
</tr>
<tr>
<td></td>
<td>• Routing using OSPF</td>
</tr>
<tr>
<td></td>
<td>• Network Address Translation</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 HP exams
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, many test items present a scenario, which outlines a particular network environment or problem. Some test items also include exhibits, which might show:

- Network diagram
- Switch or router configuration
- Output from a display or show command
- A device’s Web browser interface

You will need to use the exhibit to complete the test item successfully. The test includes:

- Multiple choice questions that have a single correct response
- Multiple choice questions that have two or more correct responses
- Drag and drop questions that require you to match items

As Table 3 shows, 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 system you are using to take the exam, you might want to answer the questions about which you are sure first and then move back to the others.

Before you answer a question, take the time to read the entire 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
Sample questions

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

1. Examine the exhibit shown in Figure 1. Rapid Spanning Tree Protocol (RSTP) is running on this network, and a user has added the untagged link indicated in the exhibit.

![Figure 1: Exhibit for question 1](image)

Use the exhibit to determine the issue that occurred when the user added this untagged link and one way to discover this issue.

**NOTE**

In the exam, an item like this one would be presented as a drag and drop question.

Which issue occurs? (Select an answer under **Issues**.)

**Issues**

- a. Users in subnet 2 can no longer reach the Internet.
- b. All subnet 2 traffic is routed through the subnet 1 router.
- c. The STP root bridge for switches in subnet 1 changes.
- d. All subnet 2 routed traffic passes through an edge switch.

What is one way to discover this problem? (Select an answer under **Discovery**.)

**Discovery**

- e. Investigate switches’ syslog information.
- f. View switches’ spanning tree information such as root path cost and blocked versus forwarding ports.
- g. View the IP route tables on the routers and look for discrepancies and missing routes.
- h. View switches’ LLDP information and look for changes in the neighboring information.
2. Examine the exhibit shown in Figure 2. The two routers shown in this exhibit are iBGP peers with each other.

![Figure 2: Exhibit 1 for question 2](image)

The routers are running the configurations displayed below (only portions of their configurations are shown).

**Router 1 configuration**
```
bgp 1
undo synchronization
peer 10.1.1.2 as-number 1
network 10.1.4.1 24
```

**Router 2 configuration**
```
bgp 1
undo synchronization
peer 10.1.1.1 as-number 1
network 10.1.8.1 24
```

![Figure 3: Exhibit 2 for question 2](image)

You have found that the connection flaps sometimes. What are two steps for solving this problem? (Select two.)

a. Assign different AS IDs to the two peers.
b. Specify the peer ID using the IP addresses on the other connection, which will be more stable.
c. Use reachable loopback interfaces for the peer IDs.
d. Redistribute connected routes into BGP.
e. Add the `connect-interface` command to the BGP configurations.

3. A Frame Relay network consists of a single subnet with eight routers. What is the optimal prefix length for this subnet (assume peer to multiple peer [p2mp])?

a. /32
b. /31
c. /30
d. /29
e. /28
4. Examine the exhibit shown in Figure 4. In the network shown in this exhibit, Cisco A and Cisco B implement Rapid Per-VLAN Spanning Tree Plus (RPVST+), and Cisco C implements PVST+ with uplinkfast. You have just replaced another Cisco switch with HP D, which implements Multiple Spanning Tree Protocol (MSTP). All interfaces are at their default path cost value and operate at the same speed. You have enabled the long pathcost method on Cisco switches.

![Figure 4: Exhibit for question 4](image)

You want HP D to work within the Spanning Tree without altering its functionality. You also want HP D to gain the benefits of load balancing. Which two configuration changes will fulfill these requirements? (Select two.)

a. On Cisco B, raise the VLAN 1 cost on the interface that connects to HP D.
b. On Cisco B, lower the VLAN 1 cost on the interface that connects to HP D.
c. On HP D, raise the instance 0 path cost on the interface that connects to Cisco B.
d. On HP D, lower the instance 0 path cost on the interface that connects to Cisco B.
e. On Cisco A and B, lower the cost on the interfaces on which they connect for all VLANs except 1.
f. On Cisco A and B, raise the cost on the interfaces on which they connect for all VLANs except 1.
5. Examine the exhibit in Figure 5. A company is adding a new building. As the network expands, broadcast traffic needs to be limited, so you add a new VLAN for the new building. The routing switch in the original building supports this VLAN and will be the default gateway for devices in both VLANs. Users in the new building can communicate with each other and ping their default gateway. However, they cannot reach servers or the Internet.

What should you do first to determine the cause of the problem?
   a. Request the configuration for the ISP router.
   b. Request a network trace from the ISP.
   c. Request the configurations of all the infrastructure devices.
   d. Get a MAC address and IP address inventory for all of your devices.
   e. Check the firewall settings on the MSR router.

6. Examine the configurations of a Cisco switch and an HP A-Series switch that are connected.

**Cisco configuration**

```
interface Port-channel 1
interface GigabitEthernet 1/20
    channel-group 1 mode on
interface GigabitEthernet 1/21
    channel-group 1 mode on
```

**HP A-Series configuration**

```
system view
Interface Bridge-aggregation 1
Interface gigabitethernet 1/0/1
    Port link-aggregation group 1
Interface gigabitethernet 1/0/2
    Port link-aggregation group 1
```

Which statement is true about the link between the Cisco and the HP A-Series switch?
   a. The switches successfully form a link aggregation on both sides.
   b. The switches cannot form a link aggregation, and the link is down on both sides.
   c. The Cisco switch considers the port channel to be up, but the HP A-Series switch’s bridge aggregation group is down.
   d. The link aggregation is configured in static LACP mode on the Cisco side and dynamic mode on the HP side. The link flaps between up and down.
Conclusion
HP wishes you success in the ExpertONE program and in passing the exam for which you are preparing.

Appendix: Answers to the sample questions
This section provides answers and explanations for the sample questions.

1. Examine the exhibit shown in Figure 1. Rapid Spanning Tree Protocol (RSTP) is running on this network, and a user has added the untagged link indicated in the exhibit.

Use the exhibit to determine the issue that occurred when the user added this untagged link and one way to discover this issue.

NOTE
In the exam, an item like this one would be presented as a drag and drop question.
Which issue occurs? (Select an answer under Issues.)

**Issues**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Users in subnet 2 can no longer reach the Internet.</td>
</tr>
<tr>
<td>b.</td>
<td>All subnet 2 traffic is routed through the subnet 1 router.</td>
</tr>
<tr>
<td>c.</td>
<td>The STP root bridge for switches in subnet 1 changes.</td>
</tr>
<tr>
<td>d.</td>
<td>All subnet 2 routed traffic passes through an edge switch.</td>
</tr>
</tbody>
</table>

What is one way to discover this problem? (Select an answer under Discovery.)

**Discovery**

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>e.</td>
<td>Investigate switches’ syslog information.</td>
</tr>
<tr>
<td>f.</td>
<td>View switches’ spanning tree information such as root path cost and blocked versus forwarding ports.</td>
</tr>
<tr>
<td>g.</td>
<td>View the IP route tables on the routers and look for discrepancies and missing routes.</td>
</tr>
<tr>
<td>h.</td>
<td>View switches’ LLDP information and look for changes in the neighboring information.</td>
</tr>
</tbody>
</table>

**Explanation:** To determine the answer to this question, you must first understand how the change affected spanning tree. Before the link was added, each subnet was its own spanning tree with the root indicated in the exhibit (the STP BPDUs do cross the subnet boundaries at the router). Adding the untagged link connects the subnets in a single spanning tree, so a root bridge is elected for the entire network. (The spanning tree protocol is RSTP, so this spanning tree applies to any VLAN.)

The two former roots have the same priority, so the MAC address serves as a tie-breaker. Routing switch A has the lower address, so it becomes root for the entire network.

Once you understand how spanning tree is affected by the change, you can evaluate each possible answer:

**Issues**

- **Answer a** is incorrect because this reconvergence does not prevent subnet 2 users from reaching their default gateway (routing switch B).
- **Answer b** is also incorrect because routing switch B continues to route traffic in subnet 2. The new spanning tree topology simply changes the flow for traffic from devices connected to switch F.
- **Answer d** is correct because the traffic from devices connected to switch F must now pass through switch E to reach routing switch B.

**Discovery**

- **Answer f** is correct because, when you check the spanning tree ports, you could see that the root path and blocked ports have changed.
- **Answer e** is incorrect because a change such as this does not produce a syslog message.
- **Answer g** is incorrect because the new spanning tree topology does not change routes.
- **Answer h** is incorrect because ports blocked by STP continue to receive LLDP information. Therefore, the change in the blocked port will not alter the LLDP database.
2. Examine the exhibit shown in Figure 2. The two routers shown in this exhibit are iBGP peers with each other.

![Image of two routers connected]

*Figure 2: Exhibit 1 for question 2*

The routers are running the configurations displayed below (only portions of their configurations are shown).

**Router 1 configuration**
```plaintext
bgp 1
  undo synchronization
  peer 10.1.1.2 as-number 1
  network 10.1.4.1 24
```

**Router 2 configuration**
```plaintext
bgp 1
  undo synchronization
  peer 10.1.1.1 as-number 1
  network 10.1.8.1 24
```

*Figure 3: Exhibit 2 for question 2*

You have found that the connection flaps sometimes. What are two steps for solving this problem? (Select two.)

- a. Assign different AS IDs to the two peers.
- b. Specify the peer ID using the IP addresses on the other connection, which will be more stable.
- c. Use reachable loopback interfaces for the peer IDs.
- d. Redistribute connected routes into BGP.
- e. Add the `connect-interface` command to the BGP configurations.

**Explanation:** The BGP peers have redundant connections, but they are using the IP address for just one of those connections for their router and peer IDs. If this connection goes down briefly, the BGP connection flaps. To make the BGP connection more stable, you can use a loopback interface for neighbor’s peer ID, answer c. Then, if one of the physical connections goes down, the other can be used automatically. To allow the neighbor to contact the local router at its loopback interface, you must use the BGP configuration `connect-interface` command, answer e.

The other answers do not address this issue:
- Answer a is incorrect because the iBGP peers should have the same AS.
- Answer c is incorrect because the other connection might be as stable as the current one.
- Answer d is incorrect because redistributing connected routes into BGP might be a valid configuration but is not relevant to fixing the problem.
3. A Frame Relay network consists of a single subnet with eight routers. What is the optimal prefix length for this subnet (assume peer to multiple peer [p2mp])?
   a. /32
   b. /31
   c. /30
   d. /29
   e. /28

**Explanation:** The optimal prefix length creates the subnet with the least number of IP addresses that still provides enough IP addresses for the devices in that subnet.

There are several ways that you can use the prefix length to determine the number of IP addresses available in the subnet. One guideline is that the total number of addresses associated with the prefix length is double the total number of addresses in the subnet with a prefix length that is one longer. For example, the /32 prefix length indicates a single IP address, so /31 indicates a subnet with two IP addresses, and /30 indicates a subnet with four IP addresses. However, the actual number of IP addresses available for devices is the total number less two (because the lowest address is reserved for the network address, and the highest address is reserved for the broadcast address).

Thus the /30 subnet has two IP addresses available (four minus two); the /29 subnet has six (eight minus two); and the /28 subnet has 14 (16 minus two).

The network described in the question requires eight IP addresses, which is between six and 14. You must have at least the required number of addresses, so you select the prefix length for the larger network. Answer e (/28) is the correct answer.

4. Examine the exhibit shown in Figure 4. In the network shown in this exhibit, Cisco A and Cisco B implement Rapid Per-VLAN Spanning Tree Plus (RPVST+), and Cisco C implements PVST+ with uplinkfast. You have just replaced another Cisco switch with HP D, which implements Multiple Spanning Tree Protocol (MSTP). All interfaces are at their default path cost value and operate at the same speed. You have enabled the long pathcost method on Cisco switches.

![Figure 4: Exhibit for question 4](image-url)
You want HP D to work within the Spanning Tree without altering its functionality. You also want HP D to gain the benefits of load balancing. Which two configuration changes will fulfill these requirements? (Select two.)

- a. On Cisco B, raise the VLAN 1 cost on the interface that connects to HP D.
- b. On Cisco B, lower the VLAN 1 cost on the interface that connects to HP D.
- c. On HP D, raise the instance 0 path cost on the interface that connects to Cisco B.
- d. On HP D, lower the instance 0 path cost on the interface that connects to Cisco B.
- e. On Cisco A and B, lower the cost on the interfaces on which they connect for all VLANs except 1.
- f. On Cisco A and B, raise the cost on the interfaces on which they connect for all VLANs except 1.

**Explanation:** The Cisco RPVST+ switches interoperate with the MSTP switch using RSTP on VLAN 1. The MSTP switch, however, behaves as if it is running only RSTP on the links to the Cisco switches; blocked links are blocked on all VLANs. Therefore, you have to ensure that the MSTP switch does not block a link on its side; otherwise, load balancing of traffic for different VLANs on different links cannot occur.

To prevent the HP switch from blocking the link, you must ensure that it offers a lower path cost (on instance 0) to the VLAN 1 root than Cisco B does. The actions in either answer a or answer d fulfill this requirement. However, answer a would cause the blocked port on the link between Cisco C and Cisco B to move to Cisco B’s side as well, disrupting Cisco C’s UplinkFast feature. The question indicated that the solution must not interfere with current functionality, so answer a is incorrect and d is correct.

To find the other correct answer, you must continue to consider how MSTP and RPVST+ will interoperate. Because the HP switch is not blocking any of its ports, it will forward RPVST+ BPDUs on other VLANs that are tagged on the port (it does not recognize the BPDUs and treats them like any other traffic). Therefore, Cisco B and Cisco A act as if they are directly connected on two links in all VLANs except 1. They will block one of the links in each VLAN as redundant. If you do not take action, the actual direct link might be blocked. This new topology might affect the current functionality by causing congestion as traffic is passed through the edge switch. The lower the cost, the more preferred the port. Therefore, you must lower the cost on the ports in the direct link (in all VLANs except 1) to ensure that the direct link remains open in those VLANs. Answer e is the other correct answer.

5. Examine the exhibit in Figure 5. A company is adding a new building. As the network expands, broadcast traffic needs to be limited, so you add a new VLAN for the new building. The routing switch in the original building supports this VLAN and will be the default gateway for devices in both VLANs. Users in the new building can communicate with each other and ping their default gateway. However, they cannot reach servers or the Internet.
What should you do first to determine the cause of the problem?

a. Request the configuration for the ISP router.
b. Request a network trace from the ISP.
c. Request the configurations of all the infrastructure devices.
d. Get a MAC address and IP address inventory for all of your devices.
e. Check the firewall settings on the MSR router.

**Explanation:** Because the VLAN 4 users can reach VLAN 4 addresses but not others, you might have a routing problem. Therefore, answer d, which involves a complete inventory, is not the best place to start. Because the VLAN 4 users can reach neither VLAN 2 nor the Internet, the problem probably occurs before the ISP router. Therefore, you should not begin by bothering the ISP for configurations and network traces. Answers a and b are incorrect.

The routing switch is acting as the only router between VLAN 4 and VLAN 2. Because this traffic is being blocked, the problem is probably on the routing switch and not the MSR router (which is not involved in routing that traffic). Therefore, answer e is incorrect.

The most likely cause of this problem is that the VLAN is incorrectly tagged on the link between the switches (preventing the traffic from reaching the routing switch) or that the routing switch is misconfigured. The best way to begin troubleshooting is to examine these devices configurations. Answer c is correct.

6. Examine the configurations of a Cisco switch and an HP A-Series switch that are connected.

**Cisco configuration**

```
interface Port-channel 1
interface GigabitEthernet 1/20
  channel-group 1 mode on
interface GigabitEthernet 1/21
  channel-group 1 mode on
```

**HP A-Series configuration**

```
system view
Interface Bridge-aggregation 1
Interface gigabitethernet 1/0/1
  Port link-aggregation group 1
Interface gigabitethernet 1/0/2
  Port link-aggregation group 1
```

*Figure 6: Exhibit for question 6*

Which statement is true about the link between the Cisco and the HP A-Series switch?

a. The switches successfully form a link aggregation on both sides.
b. The switches cannot form a link aggregation, and the link is down on both sides.
c. The Cisco switch considers the port channel to be up, but the HP A-Series switch’s bridge aggregation group is down.
d. The link aggregation is configured in static LACP mode on the Cisco side and dynamic mode on the HP side. The link flaps between up and down.
**Explanation:** The Cisco switch configuration indicates a port channel with two links using the static link aggregation method (mode on). The A-Series configuration shows a bridge aggregation group, also with two links and also using the static link aggregation method. A static link aggregation on a Cisco switch is fully compatible with a static link aggregation on an HP switch, so the link aggregation forms successfully. Answer a is correct.

All of the other answers indicate problems with the link, so they are incorrect.