

# HPE Digital Learner FlexFabric Content Pack

<b>HPE Content Pack number</b>	CP003
<b>Content Pack length</b>	20 Hours
<b>Content Pack category</b>	Category 1
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The first part of this Content Pack introduces network professionals to the basic features of modern networks through a series of HPE Networking Fundamental concepts short videos. Participants will learn how these technologies are implemented in the HPE Comware 7 platform.

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## Audience

This course is intended for network or systems administrators, network engineers and consultants.

## Content Pack components

This Content Pack consists of the following courses:

- HPE Networking Fundamentals
  - OSI Model
  - Binary
  - Data Flows
  - IP Subnetting
  - IP Addressing
  - TCP and UDP
  - VLANs
  - Routing
  - Spanning Tree

## Content Pack objectives

By the end of the course, you should be able to meet the following objectives:

- Understand some of the HPE Networking Fundamentals key concepts
- Understand and configure some of the HPE FlexFabric Comware Advanced Features

## Recommended learning

Students should possess experience with networking and common LAN protocols.

## Detailed Content Pack outline

<p><b>HPE Networking Fundamentals - OSI Model</b></p> <p>This OSI Model video explains the reasons for using the OSI model and then explains each of the seven layers of the OSI model. It also explains the encapsulation and de-encapsulation process used in the OSI model. The differences between the TCP/IP Model and OSI Model are explained.</p>	<p><b>Outline</b></p> <ul style="list-style-type: none"> <li>• Why the OSI model?</li> <li>• Layers of the OSI model</li> </ul>	<ul style="list-style-type: none"> <li>• How traffic flows between hosts</li> <li>• Sniff the wire using Wireshark</li> </ul>
<p><b>HPE Networking Fundamentals - Binary</b></p> <p>This video explains the basics of binary. Converting a decimal value and IP address to binary and vice versa are explained and demonstrated.</p>	<p><b>Outline</b></p> <ul style="list-style-type: none"> <li>• Why binary?</li> <li>• Overview</li> </ul>	<ul style="list-style-type: none"> <li>• Converting an IP address to binary</li> </ul>
<p><b>HPE Networking Fundamentals - Data Flows</b></p> <p>This video discusses the basics of Ethernet. The video starts with a discussion of unicast, broadcast and multicast. It then continues with explanations of Ethernet 10base2, CSMA/CD, MAC addresses, collision domains, broadcast domains, UTP cabling including categories (Cat 1 to 7a), T568A, T568B, straight through cables, cross over cables, auto crossover (auto MDI/MDIX) and DAC cables. Then the video discusses the flow of data in a network containing hubs, bridges and switches. Detailed examples of frame flow when using the various devices. Next the video discusses the flow of data in a network containing routers. Concepts such as ARP, routing tables are demonstrated and explained.</p>	<p><b>Outline</b></p> <ul style="list-style-type: none"> <li>• Types of communication</li> <li>• CSMA/CD</li> <li>• Hubs</li> <li>• Bridges</li> </ul>	<ul style="list-style-type: none"> <li>• Switches</li> <li>• Routers</li> <li>• Packet flows</li> </ul>
<p><b>HPE Networking Fundamentals - IP Subnetting</b></p> <p>This video explains the reasons for subnetting and then demonstrates two methods to work out the subnet address, first host, last host and broadcast address when given an IP address and subnet mask. The two methods discussed are the binary method and quick method. The video demonstrates how to work out subnets for a given number of hosts or subnets. The formulas <math>2^n</math> and <math>2^n - 2</math> are discussed.</p>	<p><b>Outline</b></p> <ul style="list-style-type: none"> <li>• Subnetting method 1 – Binary method</li> <li>• Subnetting method 2 – Quick method</li> </ul>	<ul style="list-style-type: none"> <li>• How to subdivide a network or subnet when given: <ul style="list-style-type: none"> <li>– A specific number of hosts required</li> <li>– A specific number of subnets required</li> </ul> </li> </ul>
<p><b>HPE Networking Fundamentals - IP Addressing</b></p> <p>This OSI Model video explains the reasons for using the OSI model and then explains each of the seven layers of the OSI model. It also explains the encapsulation and de-encapsulation process used in the OSI model. The differences between the TCP/IP Model and OSI Model are explained.</p>	<p><b>Outline</b></p> <ul style="list-style-type: none"> <li>• Why the OSI model?</li> <li>• Layers of the OSI model</li> </ul>	<ul style="list-style-type: none"> <li>• How traffic flows between hosts</li> <li>• Sniff the wire using Wireshark</li> </ul>
<p><b>HPE Networking Fundamentals - OSI Model</b></p> <p>This video explains the basics of IPv4 addressing. Topics such as network addresses, host addresses, IPv4 address format and address classes (A, B, C) are discussed. It also discusses special IPv6 addresses such as RFC1918 addresses, directed broadcasts, local broadcasts, loopback addresses, link local addresses and more.</p>	<p><b>Outline</b></p> <ul style="list-style-type: none"> <li>• IP Address overview</li> <li>• Address classes</li> </ul>	<ul style="list-style-type: none"> <li>• Special addresses</li> <li>• Network masks</li> </ul>
<p><b>HPE Networking Fundamentals - TCP and UDP</b></p> <p>This video explains the differences between UDP and TCP. Port numbers well known, Registered, Dynamic and Ephemeral are explained. Sockets are also explained. The UDP header is discussed. It also explains TCP options including the TCP 3 way handshake (SYN, ACK), other TCP flags such as RST and FIN, windowing, sequence numbers, acknowledgement numbers, MSS and flow control. Wireshark demonstration used to explain TCP using a real packet capture.</p>	<p><b>Outline</b></p> <ul style="list-style-type: none"> <li>• Comparison</li> <li>• Port numbers</li> <li>• UDP</li> <li>• TCP</li> </ul>	<ul style="list-style-type: none"> <li>• TCP 3 way handshake</li> <li>• Windowing</li> <li>• Sequence numbers</li> </ul>

**HPE Networking Fundamentals - VLANs**

This video discusses the basics of VLANs. Concepts such as VLAN advantages, physical versus logical topology, access ports/untagged ports, trunk ports/tagged ports are discussed. Explanations of unicast and broadcast frame flows in a VLAN environment. Configuration of Provision and Comware access ports explained. It also discusses 802.1Q, voice VLANs, inter-VLAN routing and frame flows. Configuration of tagged Provision and trunk Comware ports are explained.

**Outline**

- VLAN overview
- 802.1Q

- VLAN Comware - Provision terminology

**HPE Networking Fundamentals - Routing**

This video discusses the basics of IPv4 routing, including routed and routing protocols, the advantages and disadvantages of static and dynamic routing protocols, route selection criteria, autonomous systems, EGPs, IGPs, distance vector and link state routing protocols, administrative distance or preference, classful and classless routing protocols. It also discusses Distance Vector routing protocols in more detail. Concepts such as clock synchronization, counting to infinity, split horizon, route poisoning, poison reverse, hold down timers and triggered updates are explained. Next it discusses Link State routing protocols. Concepts such as router types (ABR, ASBR, internal, backbone), areas, SPF and topological database are explained.

**Outline**

- Routed vs. routing protocols
- Static vs. dynamic routing protocols

- Distance vector routing protocols
- Link state routing protocols

**HPE Networking Fundamentals - Spanning Tree**

This video explains the reasons for subnetting and then demonstrates two methods to work out the subnet address, first host, last host and broadcast address when given an IP address and subnet mask. The two methods discussed are the binary method and quick method. The video demonstrates how to work out subnets for a given number of hosts or subnets. The formulas  $2n$  and  $2n - 2$  are discussed.

**Outline**

- 802.1D
- PVST / PVST+
- 802.1w / Rapid Spanning Tree (RSTP)

- PVRST+ / RPVST+
- 802.1s / Multiple Spanning Tree (MSTP)

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CP003 B.00, July 2023