Unit 2: Networking

Pearson BTEC HND Level 5 Diploma in Computing and Systems Development (QCF)

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IU 04 Internet Protocol

By the end of this unit ,you will be able to understand the TCPI / IP concepts and how it is used to connect various systems in the Network

Topics in the Instructional Unit

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- TCP
- FTP
- UDP
- TCP/IP suite
- DHCP
- TFTP
- DNS
- HTTP(S)
- ARP
- SIP (VoIP)
- RTP (VoIP)
- SSH
- POP3
- NTP
- IMAP4
- TELNET
- SMTP
- SMNP2/3
- ICMP
- IGMP
- TLS

What is TCP/IP?

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- Because TCP/IP is so central to working with the Internet and intranets, it's essential for you to understand it in detail.
- TCP/IP first came on the scene in 1973. Later, in 1978, it was divided into two distinct protocols: TCP and IP.
- Then, back in 1983, TCP/IP replaced the Network Control Protocol (NCP) and was authorized as the official means of data transport for anything connecting to ARPAnet, the Internet's ancestor that was created by ARPA, the DoD's Advanced Research Projects Agency way back in 1957 in reaction to the Soviet's launching of Sputnik.
- ARPA was soon re-dubbed DARPA, and it was divided into ARPAnet and MILNET (also in 1983); both were finally dissolved in 1990.

TCP/IP History

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- Most of the development work on TCP/IP happened at UC Berkeley in Northern California, where a group of scientists were simultaneously working on the Berkeley version of UNIX, which soon became known as the BSD, or Berkeley Software Distribution series of UNIX versions.
- Of course, because TCP/IP worked so well, it was packaged into subsequent releases of BSD UNIX and offered to other universities and institutions if they bought the distribution tape.
- All of this led to the DoD model….

DoD Model

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The DoD model is basically a condensed version of the OSI model—it's composed of four, instead of seven, layers:

- Process/Application layer
- Host-to-Host layer
- Internet layer
- Network Access layer

- The figure on the next slide shows a comparison of the DoD model and the OSI reference model. As you can see, the two are similar in concept, but each has a different number of layers with different names.
- However, the DoD and OSI are so similar that the layer names are actually interchangeable.

DoD Model

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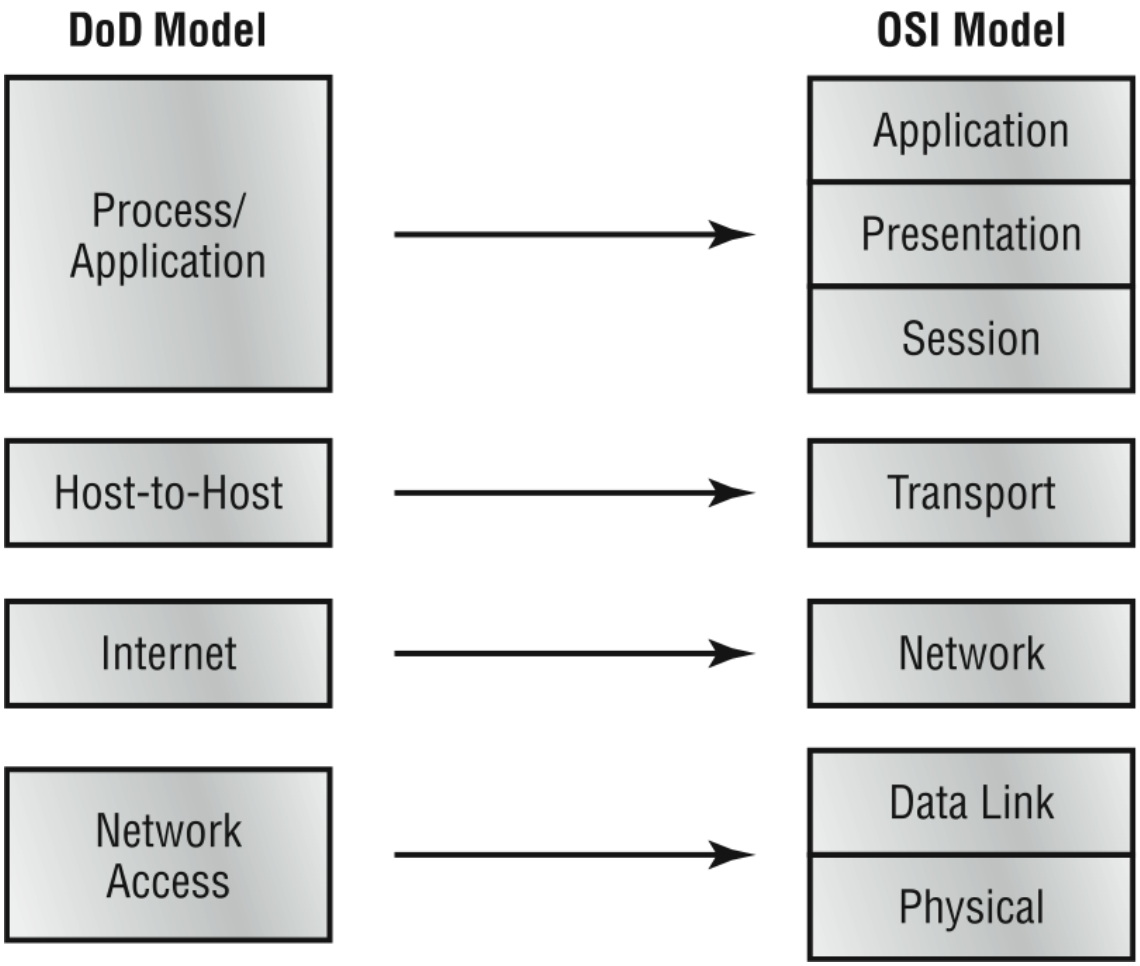

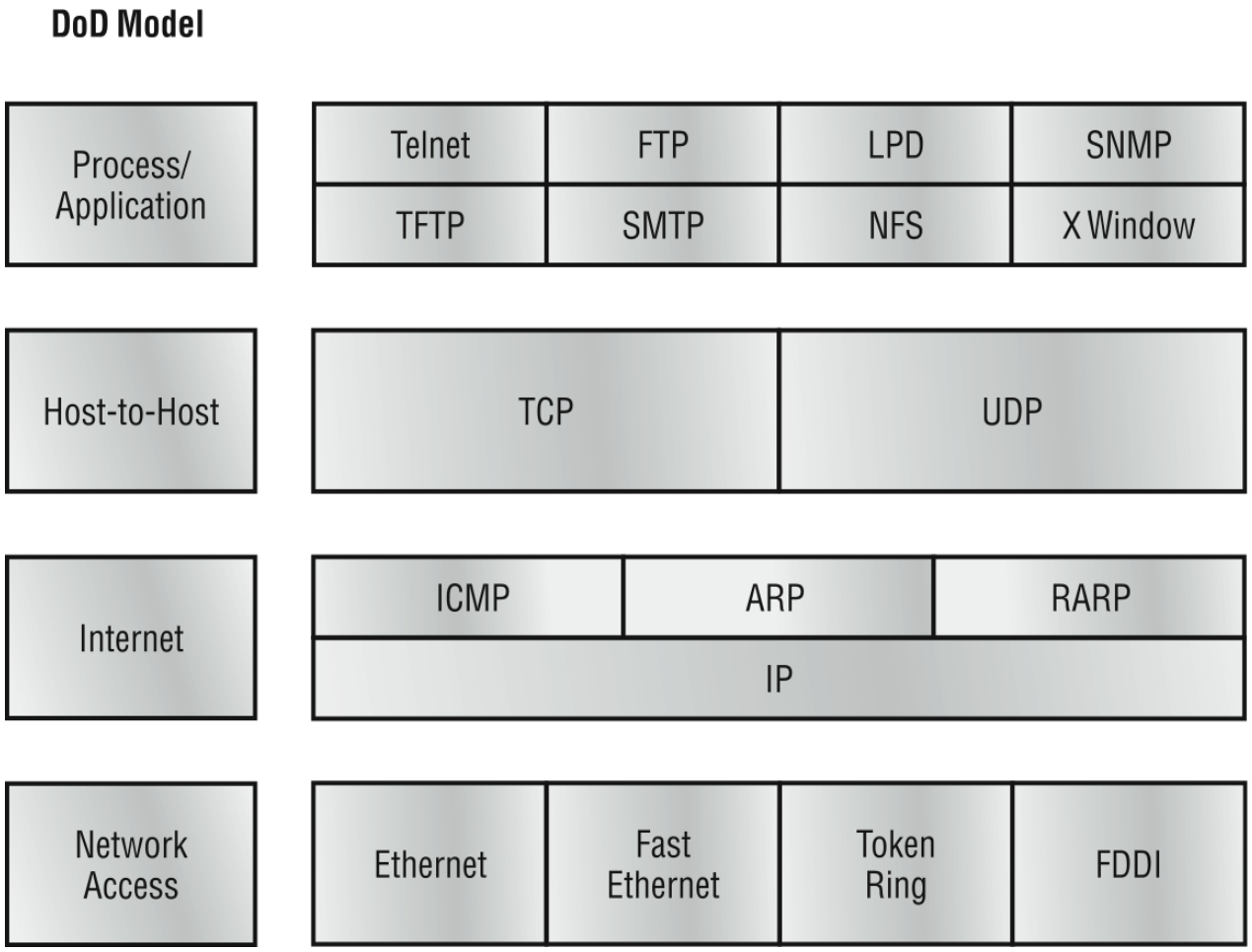
DoD Model
Process/ Application
Telnet
FTP
LPD
SNMP
TFTP
SMTP
NFS
X Window
Host-to-Host
TCP
UDP
Internet
ICMP
ARP
RARP
IP
Network Access
Ethernet
Fast Ethernet
Token Ring
FDDI

TCP/IP Protocols (cont.)

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- POP
- IMAP4
- TLS
- SIP
- RTP
- SSH
- HTTP
- HTTPS
- NTP
- NNTP
- LDAP
- IGMP
- DNS
- DHCP

DHCP Client four-step process

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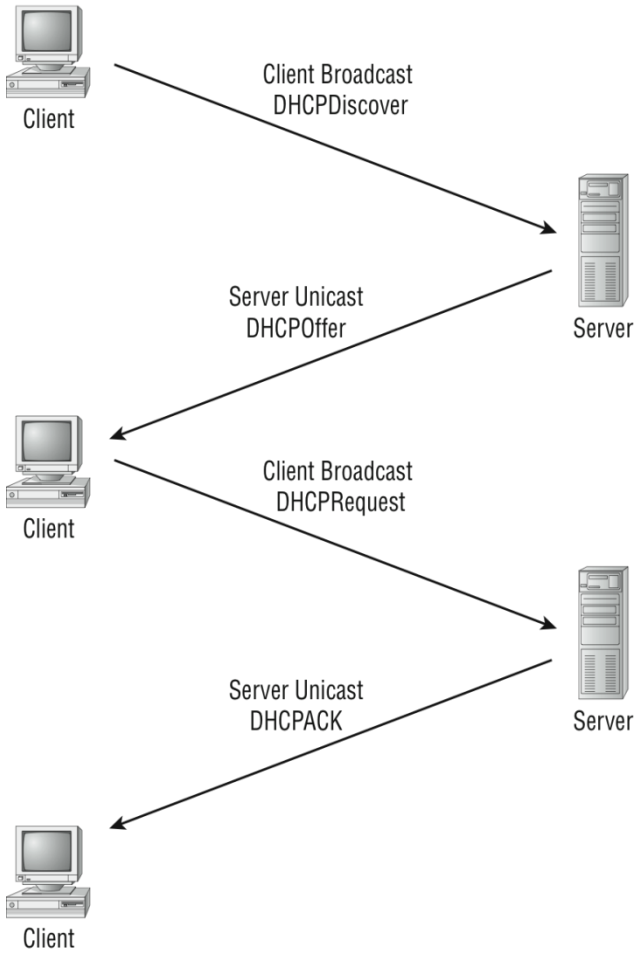

TCP Segment

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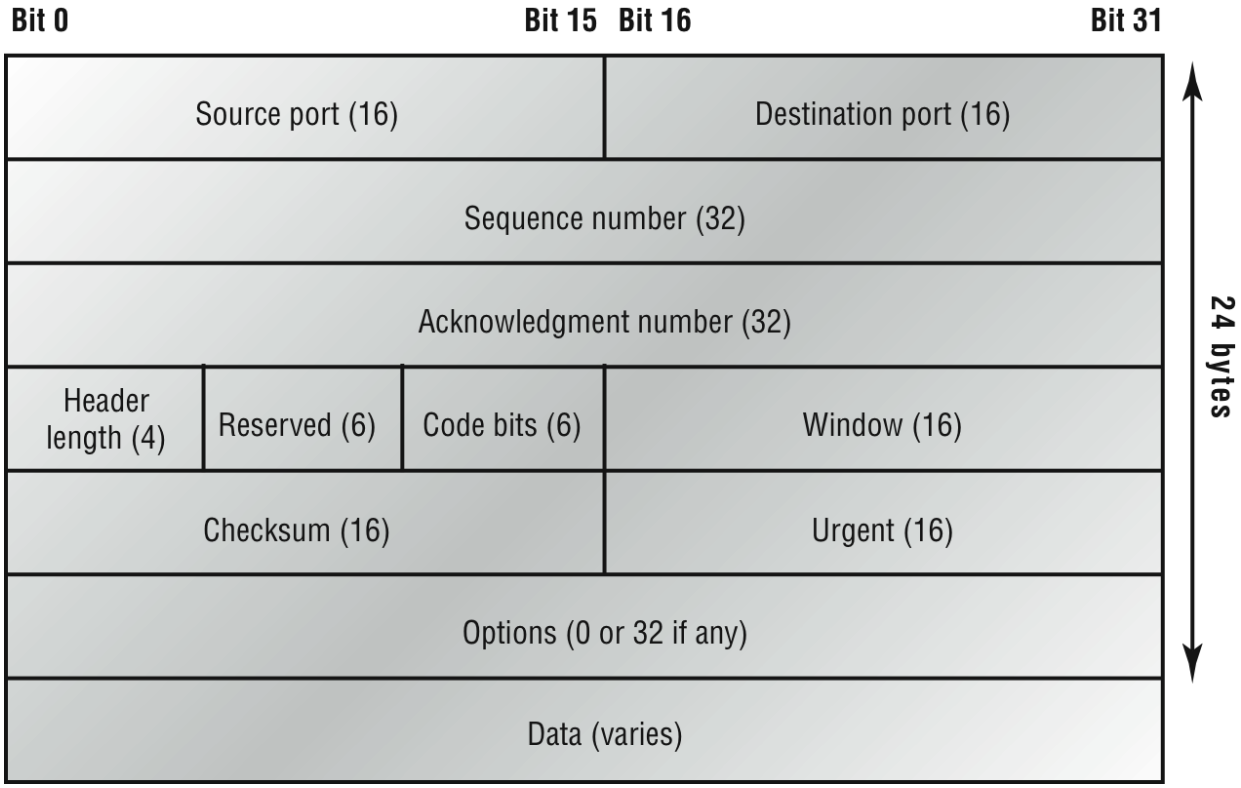

UDP Segment

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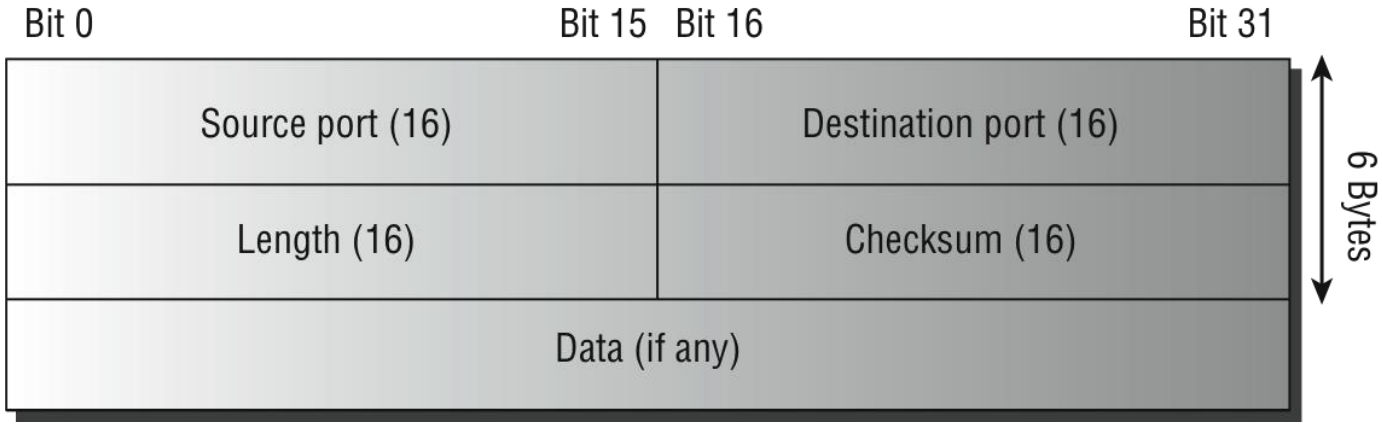

Key Features of TCP and UDP

TCP	UDP
Sequenced	Unsequenced
Reliable	Unreliable
Connection-oriented	Connectionless
Virtual circuit	No virtual circuit
High overhead	Low overhead
Acknowledgments	No acknowledgment
Windowing flow control	No windowing or flow

Port Number Examples

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Key Protocols That Use TCP and UDP

TCP	UDP
Telnet 23	SNMP 161
SMTP 25	TFTP 69
HTTP 80	DNS 53
FTP 20, 21	BOOTPS/DHCP 67
DNS 53	
HTTPS 443	
SSH 22	
POP3 110	
NTP 123	
IMAP4 143	

IP Header

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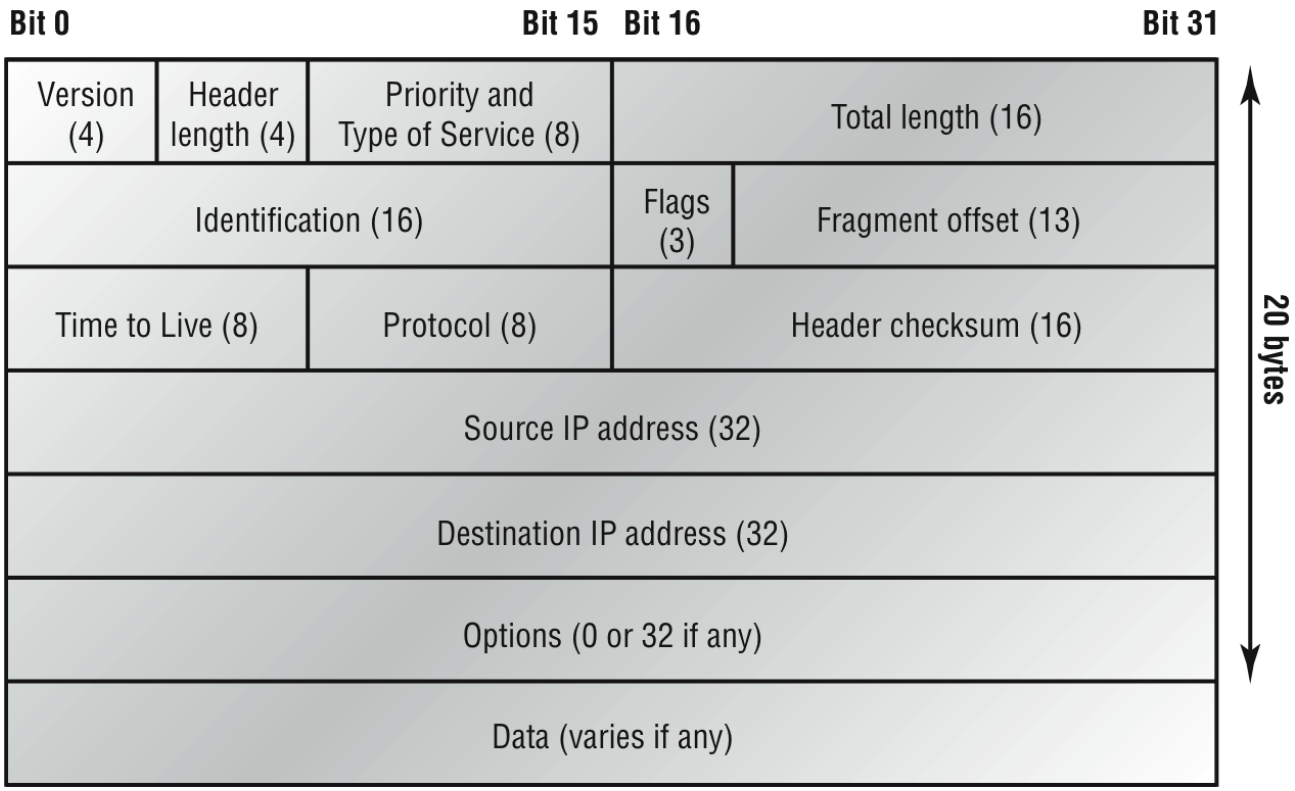

ICMP Example

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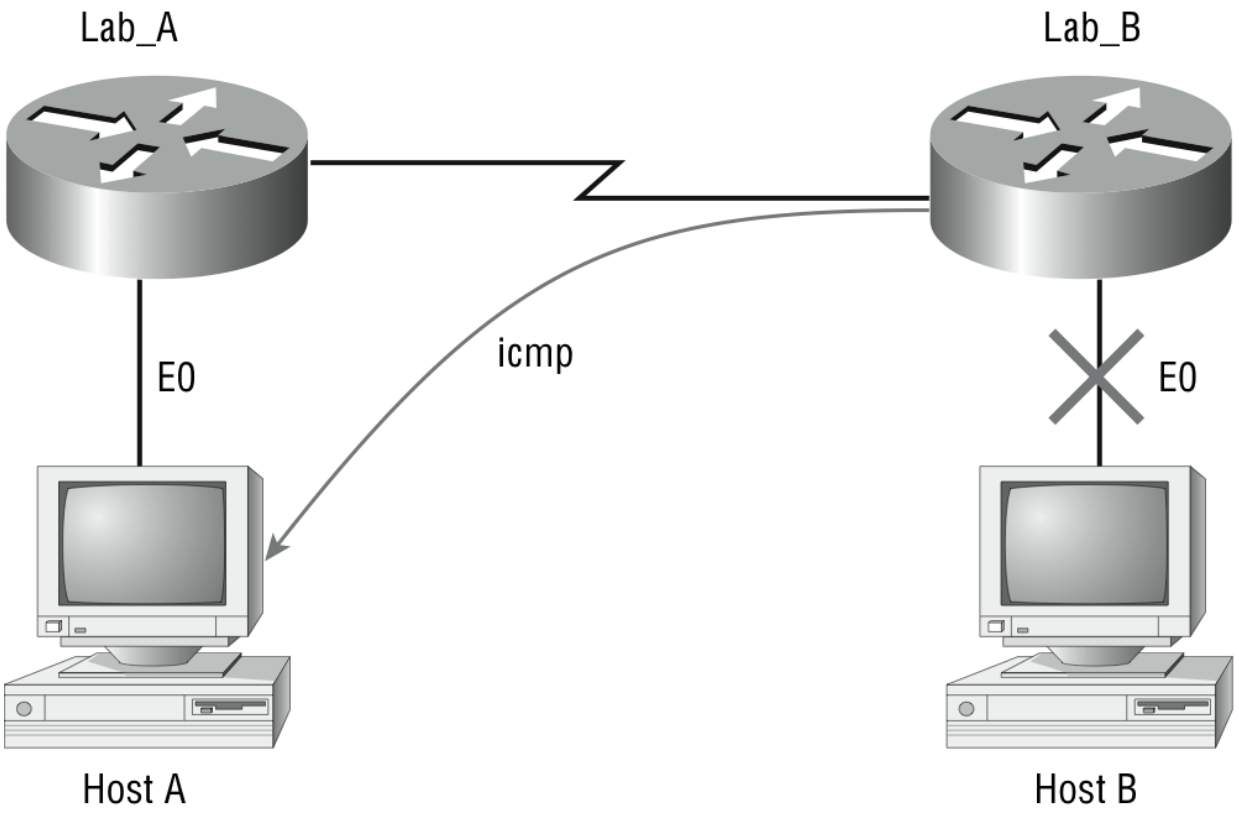
E0 on Lab B is down. Host A is trying to communicate to Host B. What happens?



ARP Example

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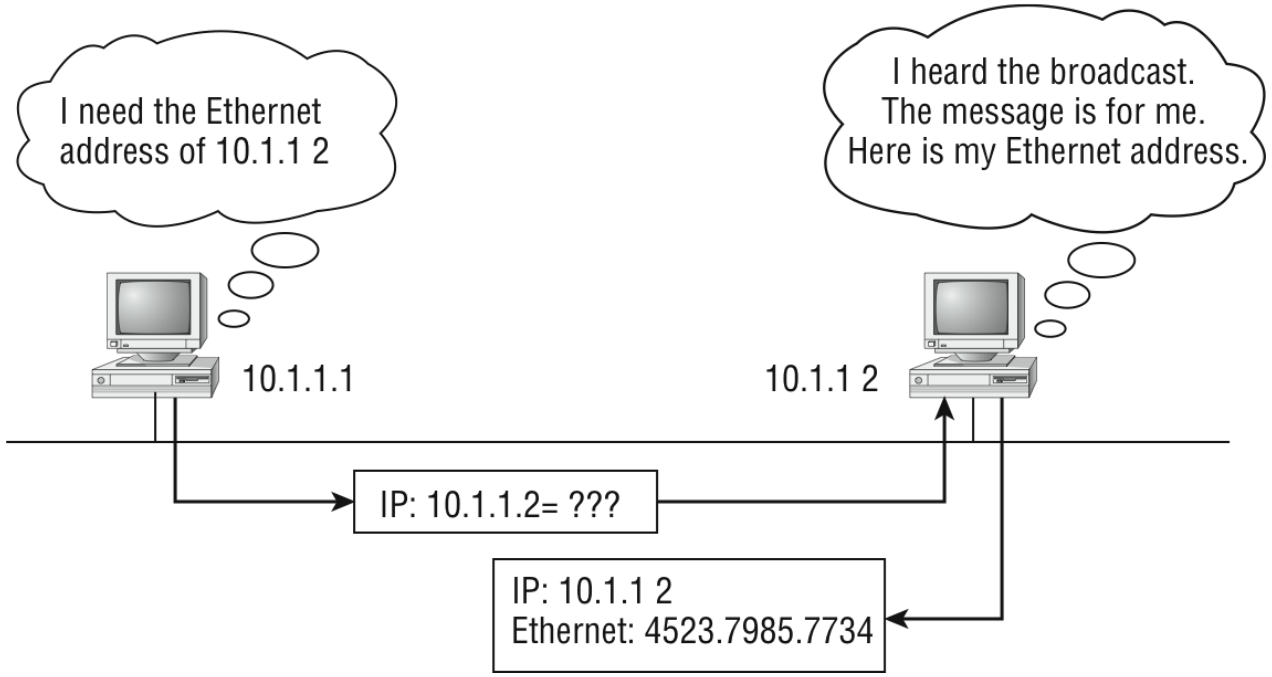

Data Encapsulation

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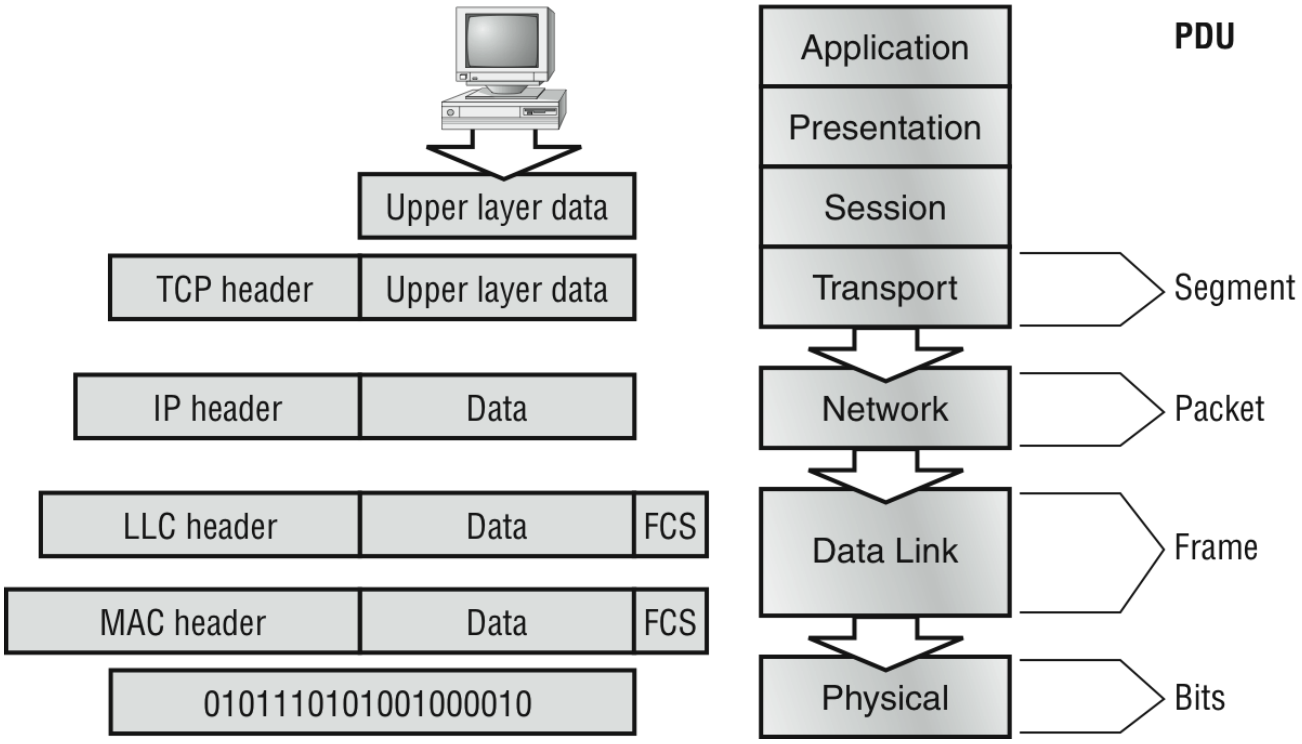

Protocol Data Units

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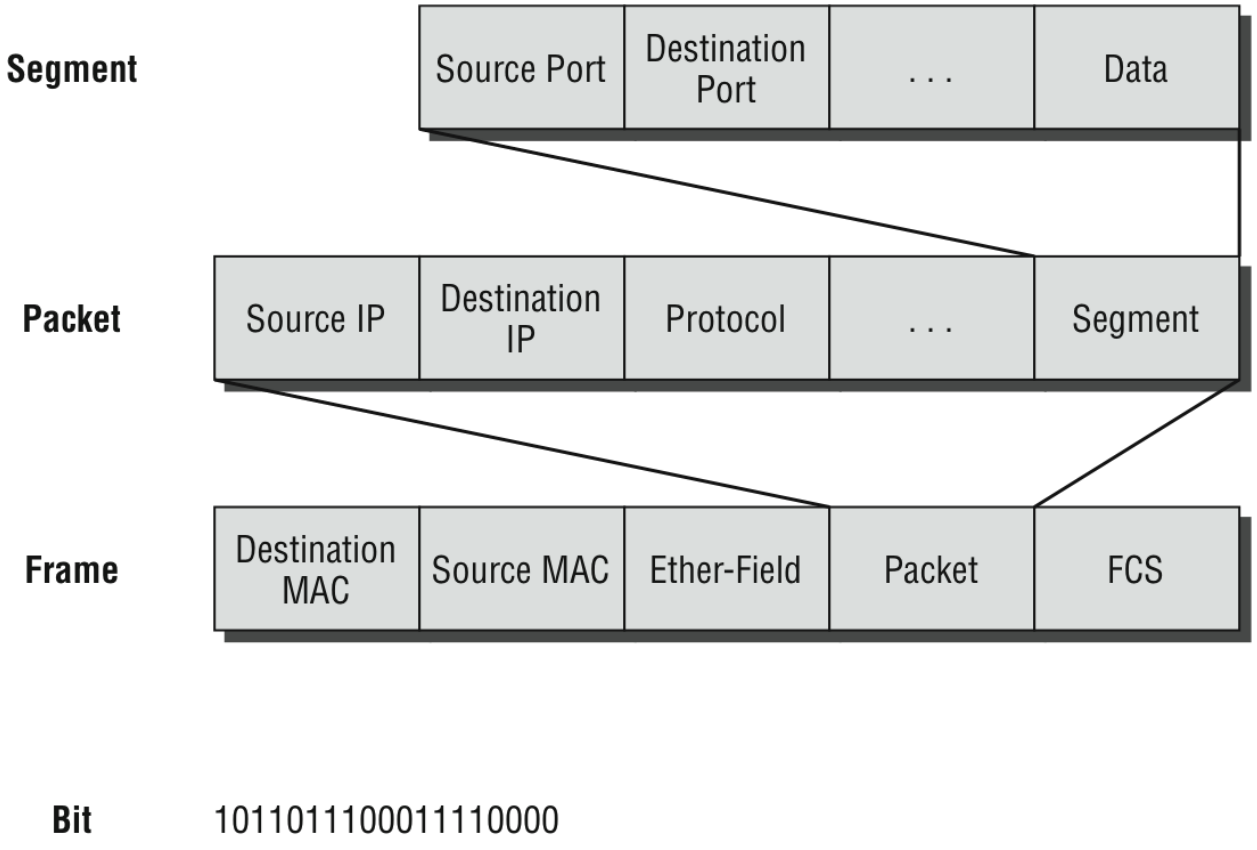

Port Numbers at the Transport Layer

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