

The OSI Model

7 Layers of Network Communication

Layer	Name	Function	Protocols/Devices	PDU
7	Application	User interface, network services	HTTP, HTTPS, FTP, DNS, SMTP	Data
6	Presentation	Data formatting, encryption	SSL/TLS, JPEG, ASCII	Data
5	Session	Establish, manage, terminate connections	NetBIOS, RPC, SQL	Data
4	Transport	Reliable delivery, error checking	TCP, UDP	Segment
3	Network	Logical addressing, routing	IP, ICMP, Routers	Packet
2	Data Link	Physical addressing, frame formatting	Ethernet, Switches, MAC	Frame
1	Physical	Bits on the wire, physical connections	Cables, Hubs, NICs	Bits

■ Memory Tricks

Top to Bottom (7→1): 'All People Seem To Need Data Processing'

Bottom to Top (1→7): 'Please Do Not Throw Sausage Pizza Away'

- **A**pplication, **P**resentation, **S**ession, **T**ransport
- **N**etwork, **D**ata Link, **P**hysical

■ Layer Details

Layer 7 - Application

- Where users interact with the network
- Provides network services to applications
- Protocols: HTTP, HTTPS, FTP, DNS, SMTP, POP3, IMAP
- Example: Web browser requesting a webpage

Layer 6 - Presentation

- Data translation and formatting
- Encryption/decryption (SSL/TLS)
- Compression
- Character encoding (ASCII, Unicode)

Layer 5 - Session

- Establishes, manages, terminates sessions
- Synchronization between applications
- Dialog control (half-duplex, full-duplex)
- Examples: NetBIOS, RPC

Layer 4 - Transport

- Reliable data delivery
- TCP (connection-oriented, reliable)
- UDP (connectionless, fast)
- Port numbers (source and destination)
- Segmentation and reassembly

Layer 3 - Network

- Logical addressing (IP addresses)
- Routing between networks
- Devices: Routers, Layer 3 switches
- Protocols: IP, ICMP, OSPF, EIGRP, BGP

Layer 2 - Data Link

- Physical addressing (MAC addresses)
- Frame formatting
- Error detection (CRC)
- Devices: Switches, bridges, NICs
- Protocols: Ethernet, PPP, 802.11 (Wi-Fi)

Layer 1 - Physical

- Bits on the wire
- Physical connections and signaling
- Cables, connectors, voltages
- Devices: Hubs, repeaters, cables
- No protocols, just physical specs

■ Troubleshooting with the OSI Model

Bottom-Up Approach: Start at Physical, work up

1. Check cables and connections (Physical)
2. Verify NIC and switch ports (Data Link)
3. Check IP configuration (Network)
4. Test port connectivity (Transport)
- 5-7. Check application settings (Upper layers)

Top-Down Approach: Start at Application, work down

1. Can you ping the server? If no, go down layers
2. Can you reach by IP but not name? DNS issue (Application)
3. Can't ping gateway? Network layer issue

■ **Exam Tip:** CompTIA loves asking which layer a problem occurs at!