

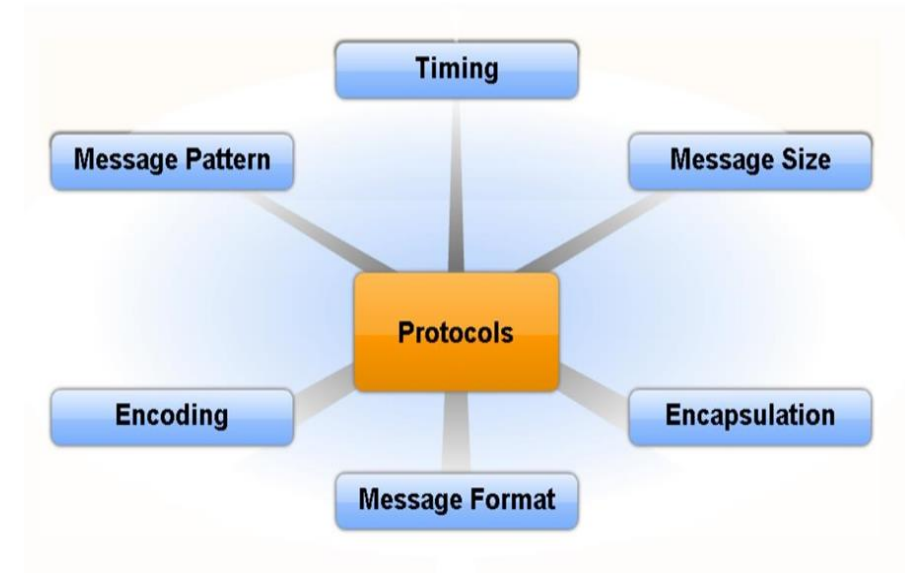
# Protocols and Models

# Protocols

- Protocols are the rules that communications will follow.
- These rules will vary depending on the protocol.

Common computer protocols include for example the following requirements:

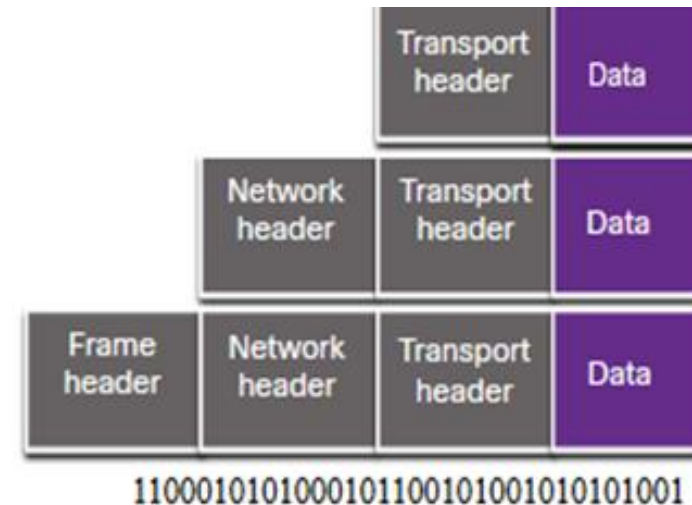
- Message encoding
  - e.g. converting information into another acceptable form for transmission
- Message formatting
  - e.g. how message starts and ends, addresses, tags, etc,
- Message size
  - e.g. maximum and minimum size in bits
- Message timing
  - e.g. response time and flow control
- Message delivery options
  - e.g. unicast, multicast, broadcast
- Message encapsulation
  - connect different parts of message together or connect different protocols together



# Protocols

Multiple protocols are needed when computers communicate with each other

- For example, sending an email requires at least four different protocols
  - SMTP, TCP, IP, LLC/Ethernet
- Each protocol contains its own rules, headers, flags, etc. - known as PDU (Protocol Data Unit)
- Each protocol encapsulated its own PDU to the data



# Protocol Suites

## Protocol Suites

There are several protocol suites.

- **Internet Protocol Suite or TCP/IP**- The most common protocol suite and maintained by the Internet Engineering Task Force (IETF)
- **Open Systems Interconnection (OSI) protocols**- Developed by the International Organization for Standardization (ISO) and the International Telecommunications Union (ITU)
- **AppleTalk**- Proprietary suite release by Apple Inc.
- **Novell NetWare**- Proprietary suite developed by Novell Inc.

TCP/IP	ISO	AppleTalk	Novell Networkware
HTTP DNS DHCP FTP	ACSE ROSE TRSE SESE	AFP	NDS
TCP UDP	TP0 TP1 TP2 TP3 TP4	ATP AEP NBP RTMP	SPX
IPv4 IPv6 ICMPv4 ICMPv6	CONP/CMNS CLNP/CLNS	AARP	IPX
Ethernet    ARP    WLAN			

# Reference Models

## Reference Models

# The Benefits of Using a Layered Model

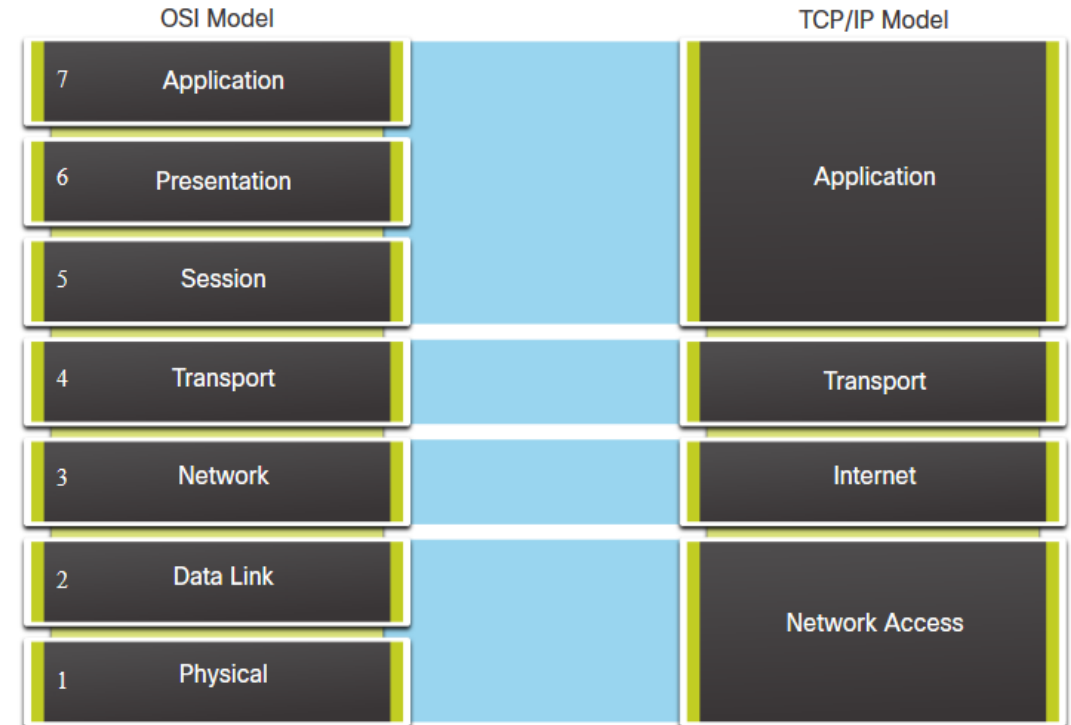
Complex concepts such as how a network operates can be difficult to explain and understand. For this reason, a layered model is used.

the benefits of using a layered model:

- Helps with protocol design, as certain actions need to be performed at a certain level
- Products from different vendors can work together
- Provide a common language to describe networking functions and capabilities

Two layered models describe network operations:

- Open System Interconnection (OSI) Reference Model
- TCP/IP Reference Model



*Note: A networking model is only a representation of a network operation. The model is not the actual network.*

# Reference Models

## The OSI and The TCP/IP Reference Model

OSI Model Layer	Description
7 - Application	Contains protocols used for process-to-process communications.
6 - Presentation	Provides for common representation of the data transferred between application layer services.
5 - Session	Provides services to the presentation layer and to manage data exchange.
4 - Transport	Defines services for segmenting, transferring, and reassembling data, and sessions for communication.
3 - Network	Provides services to exchange data over the network. (routing)
2 - Data Link	Describes methods for exchanging data frames over a common media.
1 - Physical	Describes transmitting a bit stream over a physical connection

TCP/IP Model Layer	Description
Application	Represents data to the user, plus encoding and dialog control.
Transport	Supports communication between various devices, segmenting, transferring, and reassembling data, and sessions for communication.
Internet	Determines the best path through the network.
Network Access	Controls the hardware devices and media that make up the network.

# OSI and TCP/IP Model Comparison

