



Ministry of Higher Education and Scientific Research

Al-Mustaqbal University College Department of

Computer Engineering Techniques

3rd Stage

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The TCP/IP Reference Model

1. **Host-to-network (link) Layer.** (Physical and Data Link Layers)

TCP/IP does not define any specific protocol.

A network in a TCP/IP internetwork can be a local-area network or a wide-area network.

2. **Network (Internet) Layer.**

TCP/IP supports the **Internetworking Protocol (IP)**

IP uses four supporting protocols:

a- **ARP**, b- **RARP**, c- **ICMP**, and d- **IGMP**.

The TCP/IP Reference Model/ Network (Internet) Layer.

Internetworking Protocol (IP)

is the transmission mechanism used by the TCP/IP protocols.

It is an **unreliable** and **connectionless** protocol provides no error checking or tracking.

IP transports data in packets called **datagrams**.

a- ARP (Address Resolution Protocol).

Is used to associate a logical address with a physical address.

Each device on a link is identified by a physical address, usually imprinted on the network interface card (NIC).

Is used to find the physical address of the node when its IP address is known.

The TCP/IP Reference Model/ Network (Internet) Layer.

a- ARP (Address Resolution Protocol).

- Anytime a host or a router needs to find the link-layer address of another host or
- router in its network, it sends an **ARP** request packet.
- The packet includes the link-layer and IP addresses of the sender and the IP address of the receiver.
- only the intended recipient recognizes its IP address and sends back an ARP response packet.

The TCP/IP Reference Model/ Network (Internet) Layer.

b- RARP (Reverse Address Resolution Protocol).

It allows a host to discover its IP address when it knows only its physical address. It is used when a computer is connected to a network for the first time.

c- ICMP (Internet Control Message Protocol).

It is a mechanism used by hosts and gateways to send notification of datagram **problems** back to the sender.

d- IGMP (Internet Group Message Protocol).

It is used to facilitate the simultaneous transmission of a message to a group of receivers.

The TCP/IP Reference Model

3. Transport Layer

Transport layer was represented in TCP/IP by two protocols: TCP and UDP.

UDP and **TCP** are transport level protocols responsible for delivery of a message from a process (running program) to another process.

A new transport layer protocol, **SCTP**, has been devised to meet the needs of some newer applications.

a- The User Datagram Protocol (UDP)

It is a process-to-process protocol that **adds** only **port addresses**, **checksum error control**, and **length information** to the data from the upper layer.

The TCP/IP Reference Model

b- The Transmission Control Protocol (TCP)

TCP is a reliable **connection-oriented** transport protocol.

A connection must be **established** between both ends of a transmission before either can transmit data.

Each segment includes a **sequence number** for reordering.

At the receiving end, TCP collects each datagram as it comes in and reorders the transmission based on sequence numbers.

c- The Stream Control Transmission Protocol (SCTP)

provides support for newer applications such as voice over the Internet.

The TCP/IP Reference Model

4- Application Layer

The application layer in TCP/IP is equivalent to the combined session, presentation, and application layers in the OSI model.

Many protocols are defined at this layer.

Domain Name Service (DNS): DNS protocol is used to **resolve Internet names** to **IP addresses**.

Dynamic Host Configuration Protocol (DHCP): Enables devices on a network to obtain **IP addresses and other information from a DHCP server**. DHCP allows a **host to obtain an IP address dynamically** when it connects to the network.

File Transfer Protocol (FTP): FTP was developed to allow for **file transfers** between a **client and a server**. (FTP) Protocol is used for interactive file transfer between systems.

The TCP/IP Reference Model

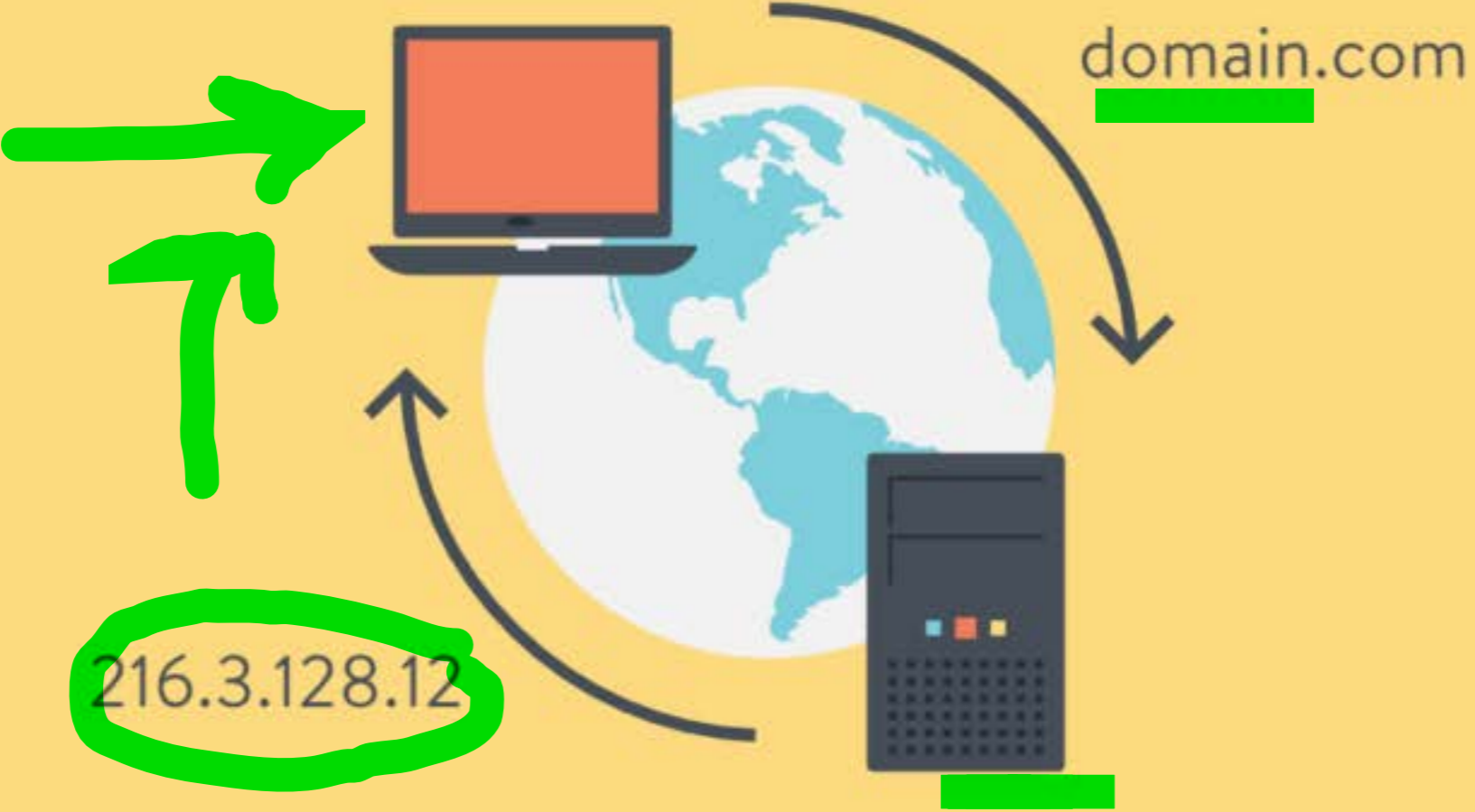
4- Application Layer

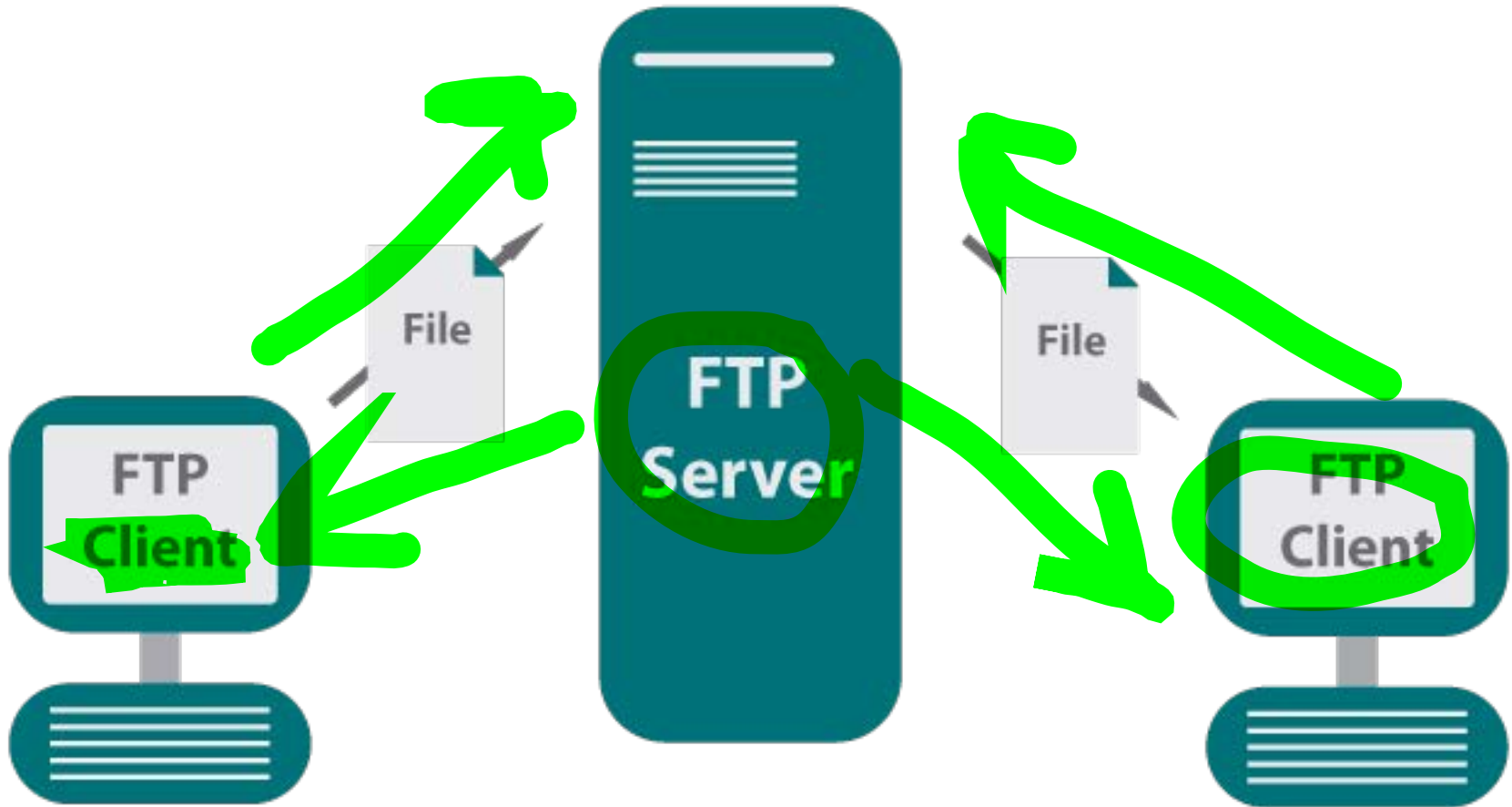
Simple Mail Transfer Protocol (SMTP): is used for the transfer of mail messages and attachments.

Terminal Emulation Protocol (Telnet): is used to provide remote access to servers

Hypertext Transfer Protocol (HTTP): is one of the protocols in the TCP/IP suite, was originally developed to publish and retrieve HTML pages and is now used for distributed, collaborative information systems. and networking devices.

Uniform Resource Locator (URL): When a web address (or URL) is typed into a web browser, the web browser establishes a connection to the web service running on the server using the HTTP protocol.





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Help

ONS

URL: <http://www.internet.com>



Difference between OSI Layer & TCP/IP Layer

TCP/IP	OSI
Refers to transmission control protocol.	Refers to open systems interconnection.
It has 4 layers.	It has 7 layers.
TCP/IP is a Protocols	OSI is a Model
Network Layer in TCP/IP Model provides only Connectionless service.	Network Layer in OSI Model provides both Connection-Oriented & Connection less service.
Combines the session and presentation layer in the application layer.	Has separate session and presentation layer.