

# Glossary

## IT Support

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### Terms and definitions from Course 2

#### A

**A record:** The most common resource record, used to point a certain domain name at a certain IPv4 IP address

**ACK flag:** One of the TCP control flags. ACK is short for acknowledge. A value of one in this field means that the acknowledgment number field should be examined

**Acknowledgement number:** The number of the next expected segment in a TCP sequence

**Ad-Hoc network:** A network configuration without supporting network infrastructure. Every device involved with the ad-hoc network communicates with every other device within range, and all nodes help pass along messages

**Address class system:** A system which defines how the global IP address space is split up

**Address Resolution Protocol (ARP):** A protocol used to discover the hardware address of a node with a certain IP address

**Anycast:** A technique that's used to route traffic to different destinations depending on factors like location, congestion, or link health

**Application layer:** The layer that allows network applications to communicate in a way they understand

**Application layer payload:** The entire contents of whatever data applications want to send to each other

**ARP table:** A list of IP addresses and the MAC addresses associated with them

**ASN:** Autonomous System Number is a number assigned to an individual autonomous system

**Asymmetric Digital Subscriber Line (ADSL):** A device that establishes data connections across phone lines and different speeds for uploading and downloading data

**Automatic allocation:** A range of IP addresses is set aside for assignment purposes

## B

**Baud rate:** A measurement of how many bits could be passed across a phone line in a second

**Bit:** The smallest representation of data that a computer can understand

**Bluetooth:** The most common short range wireless network

**Border Gateway Protocol (BGP):** A protocol by which routers share data with each other

**Broadband:** Any connectivity technology that isn't dial-up Internet

**Broadcast:** A type of Ethernet transmission, sent to every single device on a LAN

**Broadcast address:** A special destination used by an Ethernet broadcast composed by all Fs

## C

**Cable categories:** Groups of cables that are made with the same material. Most network cables used today can be split into two categories, copper and fiber

**Cable modem termination system:** Connects lots of different cable connections to an ISP's core network

**Cable modem:** A device that sits at the edge of a consumer's network and connects it to the cable modem termination system

**Cables:** Insulated wires that connect different devices to each other allowing data to be transmitted over them

**Caching and recursive name servers:** They are generally provided by an ISP or your local network, and their purpose is to store domain name lookups for a certain amount of time

**Carrier-Sense Multiple Access with Collision Detection (CSMA/CD):** CSMA/CD is used to determine when the communications channels are clear and when the device is free to transmit data

**Channels:** Individual, smaller sections of the overall frequency band used by a wireless network

**Client:** A device that receives data from a server

**CLOSE:** A connection state that indicates that the connection has been fully terminated, and that no further communication is possible

**CLOSE\_WAIT:** A connection state that indicates that the connection has been closed at the TCP layer, but that the application that opened the socket hasn't released its hold on the socket yet

**Cloud computing:** The concept and technological approach of accessing data, using applications, storing files, etc. from anywhere in the world as long as you have an internet connection

**CNAME:** A resource record used to map one domain to another

**Collision domain:** A network segment where only one device can communicate at a time

**Computer networking:** The full scope of how computers communicate with each other

**Connection-oriented protocol:** A data-transmission protocol that establishes a connection at the transport layer, and uses this to ensure that all data has been properly transmitted

**Connectionless protocol:** A data-transmission protocol that allows data to be exchanged without an established connection at the transport layer. The most common of these is known as UDP, or User Datagram Protocol

**Copper cable categories :** These categories have different physical characteristics like the number of twists in the pair of copper wires. These are defined as names like category (or cat) 5, 5e, or 6, and how quickly data can be sent across them and how resistant they are to outside interference are all related to the way the twisted pairs inside are arranged

**Crosstalk:** Crosstalk is when an electrical pulse on one wire is accidentally detected on another wire

**Cyclical Redundancy Check (CRC):** A mathematical transformation that uses polynomial division to create a number that represents a larger set of data. It is an important concept for data integrity and is used all over computing, not just network transmissions

## D

**Datalink layer:** The layer in which the first protocols are introduced. This layer is responsible for defining a common way of interpreting signals, so network devices can communicate

**Data offset field:** The number of the next expected segment in a TCP packet/datagram

**Data packet:** An all-encompassing term that represents any single set of binary data being sent across a network link

**Data payload section:** Has all of the data of the protocols further up the stack of a frame

**Demarcate:** To set the boundaries of something

**Demarcation point:** Where one network or system ends and another one begins

**Demultiplexing:** Taking traffic that's all aimed at the same node and delivering it to the proper receiving service

**Destination MAC address:** The hardware address of the intended recipient that immediately follows the start frame delimiter

**Destination network:** The column in a routing table that contains a row for each network that the router knows about

**Destination port:** The port of the service the TCP packet is intended for

**DHCP:** A technology that assigns an IP address automatically to a new device. It is an application layer protocol that automates the configuration process of hosts on a network

**DHCP discovery:** The process by which a client configured to use DHCP attempts to get network configuration information

**Dial-up:** Uses POTS for data transfer, and gets its name because the connection is established by actually dialing a phone number

**DNS zones:** A portion of space in the Domain Name System (DNS) that is controlled by an authoritative name server

**Domain:** Used to demarcate where control moves from a top-level domain name server to an authoritative name server

**Domain name:** A website name; the part of the URL following www.

**Domain Name System (DNS):** A global and highly distributed network service that resolves strings of letters, such as a website name, into an IP address

**Dotted decimal notation:** A format of using dots to separate numbers in a string, such as in an IP address

**DSL:** Digital subscriber line was able to send much more data across the wire than traditional dial-up technologies by operating at a frequency range that didn't interfere with normal phone calls

**DSLAM:** Digital Subscriber Line Access Multiplexers are devices that connect multiple DSL connections to a high-speed digital communications channel

**Duplex communication:** A form of communication where information can flow in both directions across a cable

**Duration field:** Specifies how long the total frame is

**Dynamic allocation:** A range of IP addresses is set aside for client devices and one of these IPs is issued to these devices when they request one

**Dynamic IP address:** An IP address assigned automatically to a new device through a technology known as Dynamic Host Configuration Protocol

## E

**Error detection:** The ability for a protocol or program to determine that something went wrong

**Error recovery:** The ability for a protocol or program to attempt to fix an error

**ESTABLISHED:** Status indicating that the TCP connection is in working order, and both sides are free to send each other data

**Ethernet:** The protocol most widely used to send data across individual links

**Ethernet frame:** A highly structured collection of information presented in a specific order

**EtherType field:** It follows the Source MAC Address in a dataframe. It's 16 bits long and used to describe the protocol of the contents of the frame

**Exterior gateway:** Protocols that are used for the exchange of information between independent autonomous systems

## F

**Fiber cable:** Fiber optic cables contain individual optical fibers which are tiny tubes made of glass about the width of a human hair. Unlike copper, which uses electrical voltages, fiber cables use pulses of light to represent the ones and zeros of the underlying data

**FIN:** One of the TCP control flags. FIN is short for finish. When this flag is set to one, it means the transmitting computer doesn't have any more data to send and the connection can be closed

**FIN\_WAIT:** A TCP socket state indicating that a FIN has been sent, but the corresponding ACK from the other end hasn't been received yet

**Firewall:** It is a device that blocks or allows traffic based on established rules

**Five layer model:** A model used to explain how network devices communicate. This model has five layers that stack on top of each other: Physical, Data Link, Network, Transport, and Application

**Fixed allocation:** Requires a manually specified list of MAC address and the corresponding IPs

**Flag field:** It is used to indicate if a datagram is allowed to be fragmented, or to indicate that the datagram has already been fragmented

**Flat file:** A collection of records/information that follow a consistent format with rules around stored values. On a host computer, one use is to have a list of network address and host name pairs (a hosts file)

**Flow label field:** 20-bit field that's used in conjunction with the traffic class field for routers to make decisions about the quality of service level for a specific datagram

**Fragmentation:** The process of taking a single IP datagram and splitting it up into several smaller datagrams

**Fragmentation offset field:** It contains values used by the receiving end to take all the parts of a fragmented packet and put them back together in the correct order

**Frame check sequence:** It is a 4-byte or 32-bit number that represents a checksum value for the entire frame

**Frame control field:** 16 bits long, it contains a number of sub-fields that are used to describe how the frame itself should be processed

**Frequency band:** A certain section of the radio spectrum that's been agreed upon to be used for certain communications

**FTP:** An older method used for transferring files from one computer to another, but you still see it in use today

**FTTB:** Fiber to the building, fiber to the business or even fiber to the basement, since this is generally where cables to buildings physically enter. FTTB is a setup where fiber technologies are used for data delivery to an individual building

**FTTH:** Fiber to the home. This is used in instances where fiber is actually run to each individual residents in a neighborhood or apartment building

**FTTN:** Fiber to the neighborhood. This means that fiber technologies are used to deliver data to a single physical cabinet that serves a certain amount of the population

**FTTP:** Fiber to the premises. FTTH and FTTB may both also be referred to as FTTP

**FTTX:** Stands for fiber to the X, where the X can be one of many things

**Full duplex:** The capacity of devices on either side of a networking link to communicate with each other at the exact same time

**Fully qualified domain name:** When you combine all the parts of a domain together

# H

**Half-duplex:** It means that, while communication is possible in each direction, only one device can be communicating at a time

**Handshake:** A way for two devices to ensure that they're speaking the same protocol and will be able to understand each other

**HDSL:** High Bit-rate Digital Subscriber Lines. These are DSL technologies that provision speeds above 1.544 megabits per second

**Header checksum field:** A checksum of the contents of the entire IP datagram header

**Header length field:** A four bit field that declares how long the entire header is. It is almost always 20 bytes in length when dealing with IPv4

**Hexadecimal:** A way to represent numbers using a numerical base of 16

**Hop limit field:** An 8-bit field that's identical in purpose to the TTL field in an IPv4 header

**Host file:** It is a flat file that contains, on each line, a network address followed by the host name it can be referred to as

**Hub:** It is a physical layer device that broadcasts data to everything computer connected to it

**Hybrid cloud:** Used to describe situations where companies might run things like their most sensitive proprietary technologies on a private cloud or on premise while entrusting their less sensitive servers to a public cloud

**Hypervisor:** A piece of software that runs and manages virtual machines while also offering guests a virtual operating platform that's indistinguishable from actual hardware

# I

**IANA:** The Internet Assigned Numbers Authority, is a non-profit organization that helps manage things like IP address allocation

**ICMP:** Internet control message protocol is used by router or remote hosts to communicate error messages when network problems prevent delivery of IP packets

**ICMP payload:** Piece of the packet which lets the recipient of the message know which of their transmissions caused the error being reported

**Identification field:** It is a 16-bit number that's used to group messages together

**Infrastructure as a Service (IaaS):** A subset of cloud computing where a network and servers are provided for customers to run their services

**Instantiation:** The actual implementation of something defined elsewhere

**Interface:** For a router, the port where a router connects to a network. A router gives and receives data through its interfaces. These are also used as part of the routing table

**Interior gateway:** Interior gateway protocols are used by routers to share information within a single autonomous system

**Internet Protocol (IP):** The most common protocol used in the network layer

**Internet Service Provider (ISP):** A company that provides a consumer an internet connection

**Internetwork:** A collection of networks connected together through routers - the most famous of these being the Internet

**IP datagram:** a highly structured series of fields that are strictly defined

**IP masquerading:** The NAT obscures the sender's IP address from the receiver

**IP options field:** An optional field and is used to set special characteristics for datagrams primarily used for testing purposes

**IPv6 tunnel:** IPv6 tunnel servers on either end of a connection take incoming IPv6 traffic and encapsulate it within traditional IPv4 datagrams

**IPv6 tunnel brokers:** Companies that provide IPv6 tunneling endpoints for you, so you don't have to introduce additional equipment to your network

## L

**Line coding:** Modulation used for computer networks

**Link-local unicast address:** Allow for local network segment communications and are configured based upon a host's MAC address

**Listen:** It means that a TCP socket is ready and listening for incoming connections

**Local Area Network (LAN):** A single network in which multiple devices are connected

**Loopback address:** An IP address that always points to itself. This type of address is used to test internal pathing through the TCP/IP protocols

## M



**MAC(Media Access Control) address:** A globally unique identifier attached to an individual network interface. It's a 48-bit number normally represented by six groupings of two hexadecimal numbers

**MAC filtering:** Access points are configured to only allow for connections from a specific set of MAC addresses belonging to devices you trust

**Mesh networks:** Like ad-hoc networks, lots of devices communicate with each other device, forming a mesh if you were to draw lines for all the links between all the nodes

**Metered connection:** An internet connection where all data transfer usage is tracked. Cell phone plans that have a limit on data usage per month or that charge based on usage are examples of metered connections

**Modulation:** A way of varying the voltage of a constant electrical charge moving across a standard copper network cable

**Multicast:** A way of addressing groups of hosts all at once

**Multicast frame:** If the least significant bit in the first octet of a destination address is set to one, it means you're dealing with a multicast frame. A multicast frame is similarly set to all devices on the local network signal, and it will be accepted or discarded by each device depending on criteria aside from their own hardware MAC address

**Multiplexing:** It means that nodes on the network have the ability to direct traffic toward many different receiving services

**MX record:** It stands for mail exchange and this resource record is used in order to deliver email to the correct server

## N

**Name resolution:** This process of using DNS to turn a domain name into an IP address

**Network Address Translation (NAT):** A mitigation tool that lets organizations use one public IP address and many private IP addresses within the network

**Network layer:** It's the layer that allows different networks to communicate with each other through devices known as routers. It is responsible for getting data delivered across a collection of networks

**Network port:** The physical connector to be able to connect a device to the network. This may be attached directly to a device on a computer network, or could also be located on a wall or on a patch panel

**Network switch:** It is a level 2 or data link device that can connect to many devices so they can communicate. It can inspect the contents of the Ethernet protocol data being sent around the

network, determine which system the data is intended for and then only send that data to that one system

**Next header field:** Defines what kind of header is immediately after this current one

**Next hop:** The IP address of the next router that should receive data intended for the destination networking question or this could just state the network is directly connected and that there aren't any additional hops needed. Defined as part of the routing table

**Node:** Any device connected to a network. On most networks, each node will typically act as a server or a client

**Non-metered connection:** A connection where your data usage is not tracked or limited, instead you are charged a flat fee for unlimited and unrestricted usage. A Wi-Fi connection is an example of a non-metered connection

**Non-routable address space:** They are ranges of IPs set aside for use by anyone that cannot be routed to

**NS record:** It indicates other name servers that may also be responsible for a particular zone

**NTP servers:** Used to keep all computers on a network synchronized in time

## O

**Octet:** Any number that can be represented by 8 bits

**Optical Network Terminator:** Converts data from protocols the fiber network can understand to those that are more traditional twisted pair copper networks can understand

**Options field:** It is sometimes used for more complicated flow control protocols

**Organizationally Unique Identifier (OUI):** The first three octets of a MAC address

**OSI model:** A model used to define how network devices communicate. This model has seven layers that stack on top of each other: Physical, Data Link, Network, Transport, Session, Presentation, and Application

## P

**Padding field:** A series of zeros used to ensure the header is the correct total size

**Pairing:** When a wireless peripheral connects to a mobile device, and the two devices exchange information, sometimes including a PIN or password, so that they can remember each other

**Patch panel:** A device containing many physical network ports

**Payload:** The actual data being transported, which is everything that isn't a header

**Payload length field:** 16-bit field that defines how long the data payload section of the datagram is

**Physical layer:** It represents the physical devices that interconnect computers

**Platform as a service:** A subset of cloud computing where a platform is provided for customers to run their services

**Point-To-Point VPN:** Establishes a VPN tunnel between two sites but VPN tunneling logic is handled by network devices at either side, so that users don't all have to establish their own connections

**Pointer resource record:** It resolves an IP to a name

**Port:** It is a 16-bit number that's used to direct traffic to specific services running on a networked computer

**Port forwarding:** A technique where specific destination ports can be configured to always be delivered to specific nodes

**Port preservation:** A technique where the source port chosen by a client, is the same port used by the router

**Preamble:** The first part of an Ethernet frame, it is 8 bytes or 64 bits long and can itself be split into two sections

**Presentation layer:** It is responsible for making sure that the unencapsulated application layer data is actually able to be understood by the application in question

**Private cloud:** When a company owns the services and the rest of the cloud infrastructure, whether on-site or in a remote data center

**Protocol:** A defined set of standards that computers must follow in order to communicate properly is called a protocol

**Protocol field:** A protocol field is an 8-bit field that contains data about what transport layer protocol is being used

**Proxy service:** A server that acts on behalf of a client in order to access another service

**PSH flag:** One of the TCP control flags. PSH is short for push. This flag means that the transmitting device wants the receiving device to push currently- buffered data to the application on the receiving end as soon as possible

**Public cloud:** The cloud services provided by a third party

**Public DNS servers:** Name servers specifically set up so that anyone can use them for free

## Q

**Quad A (AAAA) record:** It is very similar to an A record except that it returns in IPv6 address instead of an IPv4 address

## R

**Receiving address:** The MAC address of the access point that should receive the frame

**Recursive name servers:** Servers that perform full DNS resolution requests

**Registrar:** An organization responsible for assigning individual domain names to other organizations or individuals

**Reverse lookup zone files:** They let DNS resolvers ask for an IP, and get the FQDN associated with it returned

**Reverse proxy:** A service that might appear to be a single server to external clients, but actually represents many servers living behind it

**Round robin:** It is a concept that involves iterating over a list of items one by one in an orderly fashion

**Router:** A device that knows how to forward data between independent networks

**Routing protocols:** Special protocols the routers use to speak to each other in order to share what information they might have

**RST flag:** One of the TCP control flags. RST is short for reset. This flag means that one of the sides in a TCP connection hasn't been able to properly recover from a series of missing or malformed segments

## S

**Sequence control field:** A field that is 16 bits long and mainly contains a sequence number used to keep track of ordering the frames

**Sequence number:** A 32-bit number that's used to keep track of where in a sequence of TCP segments this one is expected to be

**Server:** A device that provides data to another device that is requesting that data, also known as a client

**Server or Service:** A program running on a computer waiting to be asked for data

**Service type field:** A eight bit field that can be used to specify details about quality of service or QoS technologies

**Session layer:** The network layer responsible for facilitating the communication between actual applications and the transport layer

**Short-range wireless network:** It is what mobile devices uses to connect to their peripherals

**Simplex communication:** A form of data communication that only goes in one direction across a cable

**Socket:** The instantiation of an endpoint in a potential TCP connection

**Software as a Service (SaaS):** A way of licensing the use of software to others while keeping that software centrally hosted and managed

**Source MAC address:** The hardware address of the device that sent the ethernet frame or data packet. In the data packet it follows the destination MAC address

**Source port:** A high numbered port chosen from a special section of ports known as ephemeral ports

**SRV record:** A service record used to define the location of various specific services

**Start Frame Delimiter (SFD):** The last byte in the preamble, that signals to a receiving device that the preamble is over and that the actual frame contents will now follow

**Start of authority:** A declaration of the zone and the name of the name server that is authoritative for it

**Static IP address:** An IP address that must be manually configured on a node

**Subnet mask:** 32-bit numbers that are normally written as four octets of decimal numbers

**Subnetting:** The process of taking a large network and splitting it up into many individual smaller sub networks or subnets

**Symmetric Digital Subscriber Line (SDSL):** A device that establishes data connections across phone lines and has upload and download speeds that are the same

**SYN flag:** One of the TCP flags. SYN stands for synchronize. This flag is used when first establishing a TCP connection and make sure the receiving end knows to examine the sequence number field

**SYN\_RECEIVED:** A TCP socket state that means that a socket previously in a listener state, has received a synchronization request and sent a SYN\_ACK back

**SYN\_SENT:** A TCP socket state that means that a synchronization request has been sent, but the connection hasn't been established yet

# T

**T-Carrier technologies:** Technologies invented to transmit multiple phone calls over a single link. Eventually, they also became common transmission systems to transfer data much faster than any dial-up connection could handle

**TCP checksum:** A mechanism that makes sure that no data is lost or corrupted during a transfer

**TCP segment:** A payload section of an IP datagram made up of a TCP header and a data section

**TCP window:** The range of sequence numbers that might be sent before an acknowledgement is required

**Time-To-Live field (TTL):** An 8-bit field that indicates how many router hops a datagram can traverse before it's thrown away

**Top Level Domain (TLD):** The top level of the DNS or the last part of a domain name. For example, the "com" in www.weather.com

**Total hops:** The total number of devices data passes through to get from its source to its destination. Routers try to choose the shortest path, so fewest hops possible. The routing table is used to keep track of this

**Total length field:** A 16-bit field that indicates the total length of the IP datagram it's attached to

**Traffic class field:** An 8-bit field that defines the type of traffic contained within the IP datagram and allows for different classes of traffic to receive different priorities

**Transmission Control Protocol (TCP):** The data transfer protocol most commonly used in the fourth layer. This protocol requires an established connection between the client and server

**Transmitter address:** The MAC address of whatever has just transmitted the frame

**Transport layer:** The network layer that sorts out which client and server programs are supposed to get the data

**TTL:** The lifetime limit of data given in seconds. This number can be configured by the owner of a domain name for how long a name server is allowed to cache an entry before it should discard it and perform a full resolution again

**Twisted pair cable:** The most common type of cabling used for connecting computing devices. It features pairs of copper wires that are twisted together

**Two-factor authentication:** A technique where more than just a username and password are required to authenticate. Usually, a short-lived numerical token is generated by the user through a specialized piece of hardware or software

**TXT record:** It stands for text and was originally intended to be used only for associating some descriptive text with a domain name for human consumption

**Types of DNS servers:** There are five primary types of DNS servers; caching name servers, recursive name servers, root name servers, TLD name servers, and authoritative name servers

## U

**Unicast transmission:** A unicast transmission is always meant for just one receiving address

**Urgent pointer field:** A field used in conjunction with one of the TCP control flags to point out particular segments that might be more important than others

**URG flag:** One of the TCP control flags. URG is short for urgent. A value of one here indicates that the segment is considered urgent and that the urgent pointer field has more data about this

**User Datagram Protocol (UDP):** A transfer protocol that does not rely on connections. This protocol does not support the concept of an acknowledgement. With UDP, you just set a destination port and send the data packet

## V

**Version field:** First field in an IP header that specifies the version of IP

**Virtual LAN (VLAN):** It is a technique that lets you have multiple logical LANs operating on the same physical equipment

**Virtual Private Network (VPN):** A technology that allows for the extension of a private or local network, to a host that might not work on that same local network

**Virtualization:** A single physical machine called a host runs many individual virtual instances called guests

**VLAN header:** A piece of data that indicates what the frame itself is. In a data packet it is followed by the EtherType

## W

**Wide area network:** Acts like a single network but spans across multiple physical locations. WAN technologies usually require that you contract a link across the Internet with your ISP

**Wi-Fi Protected Access (WPA):** A security program that uses a 128-bit key to protect wireless computer networks, which makes it more difficult to crack than WEP

**Wired Equivalence Privacy (WEP):** An encryption technology that provides a very low level of privacy. WEP should really only be seen as being as safe as sending unencrypted data over a wired connection

**Wireless access point:** A device that bridges the wireless and wired portions of a network

**Wireless LANS (WLANS):** One or more access points act as a bridge between a wireless and a wired network

**Wireless networking:** Networks you connect to through radios and antennas

## Z

**Zone Files:** Simple configuration files that declare all resource records for a particular zone