**Exam questions**

**1. If the default gateway is misconfigured what is the consequences for communication:**

The host can communicate with other hosts on the local networks but is unable to communicate with hosts on the remote network.

**2.Function and features of layers 2 switches?**

**Functions:**

* **Learning Addresses:**

(Learn the MAC addresses of each incoming frames on a port to allow it to be extremely efficient in handling future traffic)

* **Forward/Filter decisions:**

(It matches the MAC address on an incoming frame with the MAC address on the switches Filter table)

* **Loop Avoidance:**

(Help prevent network loops that can occur when multiple connections between switches are created for redundancy purposes.)

**Features:**

* **Data Forwarding:**

(Forward data packets within the same local network based on MAC addresses)

* **MAC Address Learning:**

(Learn the MAC addresses of devices connected to their ports, enabling them to forward data packets` to the intended destinations.)

* **Filtering:**

(Switches forward frames only through ports where the MAC address of the destination device is known, enhancing network efficiency and security.)

**3. Compare OSI and TCP/IP Model?**

**OSI Model**

**Layers:** The OSI model consists of 7 layers: Physical, Data Link, Network, Transport, Session, Presentation, and Application.

**Approach:** Follows a vertical approach.

**Reliability:** Less reliable compared to TCP/IP.

**Advantages:** Offers flexibility and works independently.

**Disadvantages:** Setting up the model can be challenging, fitting new protocols can be difficult.

**TCP/IP Model**

**Layers:** The TCP/IP model comprises 4 layers: Physical, Network, Transport, and Application.

**Approach:** Follows a horizontal approach.

**Reliability:** More reliable than the OSI model.

**Advantages:** Supports many routing protocols, is highly scalable, and lightweight.

**Disadvantages:** Setting up can be a bit difficult, packet delivery is not guaranteed by the transport layer, and vulnerable to attacks.

**4. Network layer function?**

**(directing data…./ provide end devices with unique identifier)**

**Functions:**

* **Network Addressing:**

The network layer adds source and destination addresses to the data packets in the header to identify where the data is being shared on the network.

* **Inter-Networking**:

It handles network connections between multiple devices in the network.

* **Packet Routing:**

selecting the most suitable route from available network channels.

* **Packet Handling**:

This function involves converting data received from upper layers of the OSI model into data packets for transmission over the communication channel.

**5. Protocol’s operating in application layer?**

* HTTP( Facilitates message communications. ) 80.
* FTP ( Handles file transfer activities) 21.
* TFTP (used for file transfer) 69.
* IMAP (used for retrieving emails from a mail server to a client device.) 143.
* DNS. (Resolve domain name into IP addresses) 53

**6. Transport layer function?**

* **Tracking individual conversations:**

(Individual conversations between applications on different hosts.)

* **Segmenting data and reassembling segments:**

(Breaking down large data streams into smaller segments for efficient transmission over the network.)

* **Adds header information:**

(Is crucial for error detection, flow control, and ensuring reliable data transmission.)

* **Uses segmentation and multiplexing:**

(Allows multiple applications to share a single network connection.)

**7.Protocols operating on transport layer:**

* TSP:
* ensures reliable data transmission.
* Provide error detection, and flow control.
* UDP :
* connectionless protocol
* Faster transmission, suitable for real-time applications.

**8.** **Function of DNS:**

* **Resolve the domain name such as ciso.com into IP addresses.**

**9. The loopback address for ipv4:**

* The loopback address for IPv4 is a special address used for internal testing purposes.
* 127.0.0.0 /8 (127.0.0.1 to 127.255.255.254)
* Commonly identified as only 127.0.0.1
* Used on a host to test if TCP/IP is operational.

**10.Class A to E for ipv4:**

**Class A (0.0.0.0/8 to 127.0.0.0/8)**

* (used for large networks)
* (the first octet identifies the network, and the remaining bits identify hosts)

**Class B (128.0.0.0 /16 – 191.255.0.0 /16)**

* (used for medium-sized networks)
* (The first 16 bits identify the network, and the remaining 16 bits identify hosts.)

**Class C (192.0.0.0 /24 – 223.255.255.0 /24)**

* (Used for small size networks)
* (The first 24 bits identify the network, and the remaining 8 bits identify hosts.)

**Class D (224.0.0.0 to 239.0.0.0)**

* (They are reserved for multicast applications)

**Class E (240.0.0.0 – 255.0.0.0)**

* (Reserved for experimental purposes)

**11. Ipv6 multicast:**

* Multicast is used to send a single IPv6 packet to multiple destinations.

**In IPv6, how are multicast addresses represented.**

* With the prefix FF02::

**12.Link local unicast addresses:**

* It can be configured manually using the **ipv6 address.**
* Configuring it manually lets you create an address that is recognizable and easier to remember.

**Configuration:**

* R1(config)# **interface gigabitethernet 0/0/0**
* R1(config-if)# **ipv6 address fe80::1:1 link-local**
* R1(config-if)# **no shutdown**
* R1(config-if)# **exit**

**Link-local Unicast:**

* used for communication within the same network segment.

**13.The purpose of using Ipv6:**

* IPv6 has a much larger 128-bit address space.
* IPv6 also included fixes for IPv4 limitations and other enhancements.
* IPv6 provides increased efficiency and security.
* With an increasing internet population, IPv6 is more suitable to use.

**14. Star Topology functions and features:**

**Star topology Feature:**

* Centralized management
* Scalability
* Reliability
* Easy to expansion
* Security
* Fault tolerance

**Star topology Functions:**

* Data transmission
* Communications
* Switch usage (a switch can replace hub star topology )

**15. What cables are used ethernet network:**

**Ethernet Straight-through:**

* used to connect a host to a network device.

**Ethernet Crossover:**

* Is used to connect a Host-to-Host, Switch-to-Switch, Router-to-Router.

**Rollover:**

* is used to connect host serial port to router or switch console port using an adapter.

**16. Wired ethernet network collision how its handled:**

* **handled through a mechanism called CMSA/CD**

**CSMA/CD collision detection process:**

* Devices transmitting simultaneously will result in a signal collision on the shared media.
* Devices detect the collision.
* Devices wait for a random period of time and retransmit data.

**17.** **Encapsulation process of OSI model:**

PDU is the protocol data unit.

* When the data that need to be transmitted arrives to the transport layer it will be called a segment
* Transport layer will add a TCP header.
* When it gets to the network layer is called a packet.
* Network layer will add an IP header.
* When it gets to the data link layer it will be called a frame.
* Datalink layer will add Ethernet header.
* Until it is a bit stream.

**18. Email protocols:**

* **SMTP (Simple Mail Transfer Protocol):** (port 25)

Used for sending emails from a client to a server or between servers.

* **IMAP (Internet Message Access Protocol):** (port143)

allow users to access their mailboxes, read emails, and manage messages on a server.

* **POP (Post Office Protocol):** (port 110)

Messages are kept in the mail server until they are manually deleted by the email client.

**19. Simple network management protocol SNMP:**

* is an application layer protocol used for the management and monitoring of network-connected devices.

**20. Network security:**

* **Firewall:**

Filtering and controlling network traffic based on predetermined security rules.

* **How does the service password-encryption command enhance password security on Cisco routers and switches?**

It encrypts passwords that are stored in router or switch configuration files.

* **VPN:**

Virtual private network used to secure network.

A tunneling protocol….

* **What is IDS:**

Intrusion detecting system.

**What is the purpose of IDS in network security?**

* Detecting and alerting on suspicious activities or security breaches.

**21. Wireless LAN security?**

* **WPA2-PSK:**

is a network security type where all users share a single password for access.

* **EAP:**

higher security control.

* **WPA:**

 is a wireless security protocol.

**22.Why do you set IP address for a switch?**

Allows remote management to the switch.

**23. What are the advantages of using UTP?**

* does not fill up wiring ducts.
* is easy to install.
* less expensive
* Reduced electromagnetic interference.

**24. Running config, startup config:**

The network administrator wants to save the router configuration so that it will be used automatically the next time that the router reboots. What command should be issued?

**Running config, startup config**

**25. Router #sh ip arp:**

What command can be used to display ARP table on a cisco router?

* Show ip arp

**26. Routing table:**

What type of route is indicated by code C in an IPv4 routing table on cisco router?

* Directly connected route.

**27. using open standard protocol :**

What is an advantage using protocol….open standard?

It encourages competition.

**28. use of no shutdown in cisco:**

What command is used to bring up a disabled router interface?

Router(config-if)# no shutdown

**29. What is the purpose of DHCP?**

* Assign IP addresses to end devices.
* And has a destination port number of 67.

**30. Address resolution protocol (ARP):**

What are the two features of ARP:

* If the host is ready to send a packet to a local destination device and it has it IP address but not it MAC address, it will generate an ARP broadcast.
* If a device receives an ARP request, it responds with an ARP reply.

What are the two problems that caused for large number of ARP requests?

* The ARP request is sent as broadcast.
* All ARP requests messages must be processed.

**31. Function of Mac sublayer:**

provides control for accessing the transmission medium. It is responsible for moving data packets from one network interface card (NIC) to another, across a shared transmission medium.

* Accessing the media
* Data encapsulation

**32. Three-way handshake process in the transport layer:**

Before TCP transmits the data, it will use the three-way handshake to establish a connection.

* **Step 1: the client will send an SYN segment to the server asking for synchronization.**

(This message basically asks the server for connection)

* **Step 2: The server will reply with SYN-ACK (Synchronization and acknowledgement)**

(the server acknowledges the client’s connection request and ask client to open a connection too)

* **Step 3: The client replies with ACK which means yes.**

(A two-way connection is established between them)

**Function :**

* It establishes that the destination device is present on the network.
* It verifies that the destination device is active and accepts requests on destination port number.
* It informs the destination device that the source client wants to establish a communication.

**33. Ethernet Field size:**

Which Frame field is created by source node…...?

Frame check sequence field.

34. Router interfaces (serial, flash):

35. Transmission medium diagrams:

Several different types of cables

Description automatically generated

**Several different types of cables

Description automatically generatedSeveral cables with connectors

Description automatically generated with medium confidence**

**36.Google characteristics of port-based security using mac address:**

Which security measure prevents unauthorized devices from connecting to a network based on their MAC address?

* Port security

**37. How to calculate usable host address:**

What are the total number of usable host addresses you can have /24 network?

* Subnet mask= /24
* 24 ones and followed by 8 zero because the total should be 32.
* 11111111.11111111.11111111.00000000
* The ones are the number of bits that identify a network.
* And zero is the number of bits that identify the host.
* We use the formula h=2^x-2
* The “h” is the number of usable host address, and the x is the number of “0” of the subnet mask.
* h=2^8-2
* h=254

**38. default subnet mask for all classful addressing:**

**39.** **Translate private ipv4 address to public address:**

**40. Ipv6 standards (e.g. how many bits):**

* IPv6 has 128 bits.
* They are expressed in colon hex notation (:)

**41. show ip route**

What is the command used to display IPv4 routing table of a router?

* show ip route