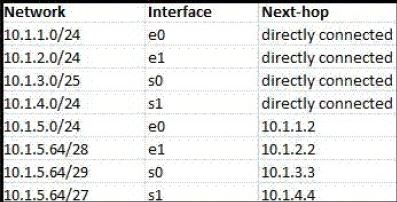
**Question 1:**



According to the routing table, where will the router send a packet destined for 10.1.5.65? Why?

10.1.5.65 belongs to 10.1.5.65/28, /29, 27.

Longest Match = 10.1.5.65/29 also has the most bits

Binary conversion/ next hop = 10.1.3.3

**Question 2:**

Classless Inter-domain Routing (CIDR) receives a packet with address 131.23.151.76. The router’s routing table has the following entries:

Prefix Output Interface Identifier

131.16.0.0/12 3

131.28.0.0/14 5

131.19.0.0/16 2

131.22.0.0/15 1

The identifier of the output interface on which this packet will be forwarded is \_\_\_\_\_\_. Why?

Indentifier is 1.

Because the first entry on the table has a mask of the first 12 bits of network and remaining 20 are host.

Last entries mask is 255.254.0.0

Longest prefix match between 1 and 3 is 1.

**Question 3:**

Consider the following routing table of a router.

| **PREFIX** | **NEXT HOP** |
| --- | --- |
| 192.24.0.0/18 | D |
| 192.24.12.0/22 | B |

Consider the following three IP addresses, what their next hop will be?

1. 192.24.6.0 => D
2. 192.24.14.32 => B
3. 192.24.54.0 => D

Mask first prefix: 11111111.11111111.11000000.00000000

Mask second prefix: 11111111.11111111.11111100.00000000

First IP:

192.24.0.0/18 Subnet 1 = 192.24.0.0 => Next hop = D

Second IP:

192.24.12.0/22 Subnet 1 = 192.24.0.0 Subnet 2 = 192.24.12. => Next hop = B

Third IP:

192.24.54.0. Subnet 1 = 192.24.0.0 Subnet 2 = 192.24.52.0 => Next hop = D

**Question 4:**

Draw an TCP header. Capture packets using wireshark and explain the fields for a particular TCP packet captured. Try to explain the purpose of each field.

Table

Description automatically generated

Source port: This is a 16-bit field that specifies the port number of the sender.

Destination port: This is a 16-bit field that specifies the port number of the receiver.

Sequence number: The sequence number is a 32-bit field that indicates how much data is sent during the TCP session.

Acknowledgment number: This 32-bit field is used by the receiver to request the next TCP segment. This value will be the sequence number incremented by 1.

DO: This is the 4-bit data offset field, also known as the header length. It indicates the length of the TCP header so that we know where the actual data begins.

RSV: These are 3 bits for the reserved field. They are unused and are always set to 0.

Flags: There are 9 bits for flags, we also call them control bits. We use them to establish connections, send data and terminate connections:

URG: Urgent pointer. When this bit is set, the data should be treated as priority over other data.

ACK: Used for the acknowledgment.

PSH: This is the push function. This tells an application that the data should be transmitted immediately and that we don’t want to wait to fill the entire TCP segment.

RST: this resets the connection, when you receive this you have to terminate the connection right away. This is only used when there are unrecoverable errors and it’s not a normal way to finish the TCP connection.

SYN: we use this for the initial three way handshake and it’s used to set the initial sequence number.

FIN: this finish bit is used to end the TCP connection. TCP is full duplex so both parties will have to use the FIN bit to end the connection. This is the normal method how we end an connection.

Window: the 16 bit window field specifies how many bytes the receiver is willing to receive. It is used so the receiver can tell the sender that it would like to receive more data than what it is currently receiving. It does so by specifying the number of bytes beyond the sequence number in the acknowledgment field.

Checksum: 16 bits are used for a checksum to check if the TCP header is OK or not.

Urgent pointer: these 16 bits are used when the URG bit has been set, the urgent pointer is used to indicate where the urgent data ends.

Options: this field is optional and can be anywhere between 0 and 320 bits.

**Question 5:**

Draw an UDP header. Capture packets using wireshark and explain the fields for a particular UDP packet captured. Try to explain the purpose of each field.

Table

Description automatically generated