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Sprint 3 Deliverables

IP Questions

1. IP assumes that once the datagram is transmitted to a local network/lower-level link that the local network could handle transmission based off of the forwarding table that the network has stored. This idea reflects the scalability of IP because it allows any network to transmit a datagram to any other network over the Internet.
2. IP's *best-effort* service model can be boiled down into two parts: the addressing scheme and the datagram model for data delivery. The addressing scheme part of the model allows for the identification of nodes/hosts/systems in the internetwork for ease of delivery. The data delivery part of the model provides a connectionless datagram that will be transmitted to the correct destination. The reason it is called the best-effort service model is because while it has an optimal scheme for transmitting to a destination, there is no guarantee that the packet you want to transmit will actually arrive at the destination; the network will do what it can to get the packet to the destination, however that sometimes is not enough.
3. The Internet Protocol needs to use IP addresses because networks independent of each other do not have the physical address information of each other; networks only have the MAC addresses over hosts that are in their own network. On a global scale, in order to have interactions between networks, there needs to be a defining IP address unique to the network such that another network can transmit to it. From there, the destination network handles the translation from the IP address to the physical MAC address.
4. We as know from the classless network prefix 128.96.16/20:

   128.96.16/20 => 10000000 01100000 00010000 XXXXXXXX

   20 is the length of the prefix, or network number. Therefore, the first 20 bits of the IP are dedicated to the prefix while the other 12 bits are dedicated to the host.

   128.96.16/20 => 10000000 01100000 0001 [0000 XXXXXXXX] -> host part

   If 12 bits are dedicated to the host part, the maximum number of hosts would be 2^12, or 4096, hosts.

Dijkstra

Dijkstra's Algorithm for Node A to other Nodes		
Node	**Shortest Path**	**Path Length**
B	A=>B	3
C	A=>B=>C	9
D	A=>D	5
E	A=>B=>E	11
F	A=>B=>E=>F	13

RIP

Table Before Routing Algorithm						
	A	B	C	D	E	F
A	0	3	∞	5	∞	∞
B	3	0	6	∞	8	∞
C	∞	6	0	∞	∞	∞
D	5	∞	∞	0	7	∞
E	∞	8	∞	7	0	2
F	∞	∞	∞	∞	2	0

First Round of Messages						
	A	B	C	D	E	F
A	**0**	**3**	9	**5**	11	∞
B	**3**	**0**	**6**	8	**8**	10
C	9	**6**	**0**	∞	14	∞
D	**5**	8	∞	**0**	**7**	9
E	11	**8**	14	**7**	**0**	**2**
F	∞	10	∞	9	**2**	**0**

Second Round of Messages						
	A	B	C	D	E	F
A	**0**	**3**	**9**	**5**	**11**	13
B	**3**	**0**	**6**	**8**	**8**	**10**
C	**9**	**6**	**0**	14	**14**	16
D	**5**	**8**	14	**0**	**7**	**9**
E	**11**	**8**	**14**	**7**	**0**	**2**
F	13	**10**	16	**9**	**2**	**0**

Bolded numbers are elements that are the same from the previous iteration. Highlighted numbers are elements that have just changed.

SDN

The control plane is a function of switches in Software Defined Networking (SDN) that make routing decisions and enforce network policies. Control plane decisions are usually made by top-level master controllers running on software. The data plane is another function of switches in SDN that receive and forward packets along its connected links. Data plane operations are usually carried out by relatively unintelligent switches in hardware. We want to separate the data plane and the control plane in order to decouple the processing of packets from how decisions about the packets are made, which would allow for a master node to have a global view and make policies decisions for the entire network. The advantages of SDN are that you do not have to have heavy processing or complex hardware for the switches, which make it cheaper and more efficient to add onto the network. Additionally, there is a single point of administration in the master node, which allows for more streamlined policy decisions.