CS 168 Introduction to the Internet
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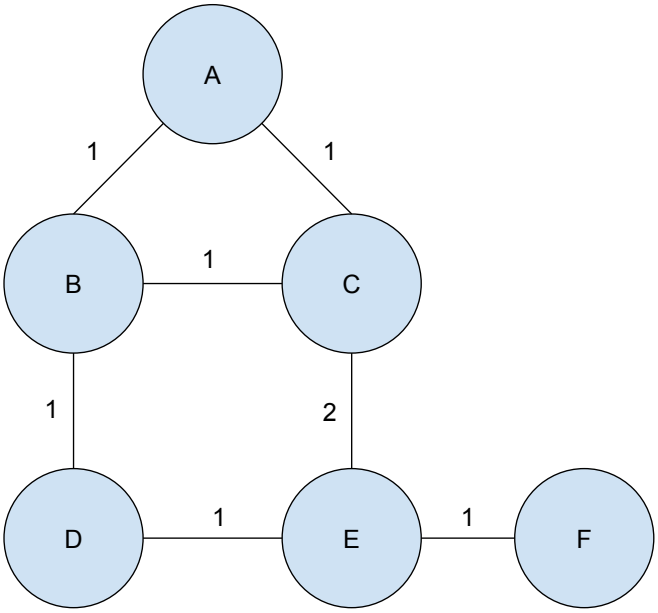
Discussion 5: Reliable Transport and IP

1 Review: Poisonous Routes

Consider the network topology below:



For this problem, assume that for initial convergence, full updates are sent, and afterwards partial updates are used to recover from failures.

(1) After routing converges, what does A's vector table look like?

	A	B	C	D	E	F
A	0					
B		0				
C			0			

(2) Suppose the links BC, BD and DE go down. What will A's table look like after routing converges?

	A	B	C	D	E	F
A	0					
B		0				
C			0			

(3) Was poison reverse, route poisoning, or both used in the last step? Why?

(4) Suppose the BD and DE links comes back up, routing converges, but then the CE link fails. What does A's table look like after routing converges again?

	A	B	C	D	E	F
A	0					
B		0				
C			0			

(5) Was poison reverse, route poisoning, or both used in the last step? Why?

2 Reliable Transport

Bob thinks that using ACKs on every packet is very wasteful, and wants to design a transport protocol that is reliable but uses very few ACKs. He comes up with a scheme that he believes provides reliability but only sends at most $log(n)$ ACKs, where n is the number of packets. The protocol is as follows:

- Let P_i be the i^{th} packet. When the receiver sees *any* of the packets in the set

  $$\{P_{2^i} | 1 \leq i \leq \lfloor log_2 n \rfloor\} \cup \{P_n\}$$

  it sends back an ACK for that packet.

- The sender will send packets $(P_{2^{i-1}}, P_{2^i}]$ in order (i starts at 0), and wait for the last packet to be ACKed. If the sender does not hear back after some time, it sends this window of packets again until the last packet is ACKed. Then, i is incremented and sends the next window of packets. One can think of this as a window that starts at packet 1, with size 1. Whenever the last packet in a window is ACKed, the window size is doubled and the sender moves to the next set of packets. This process repeats until P_n is ACKed.

(1) Is this transport protocol reliable? Why or why not?

(2) If you said the protocol was not reliable, what is a modification that you could make in order to fix that? Try and make the smallest change possible.

(3) Given that the protocol is reliable (or it wasn't and you apply your fix from the last part), does it actually save any bandwidth? Why or why not?

3 IP Headers

IPv4 and IPv6 have very different headers. In particular, IPv6 dropped many of the fields that IPv4 headers had. Why did IPv6 drop the following fields from it's header?

Checksum:

Header Length:

Fragmentation:

IPv6 also hosts much larger address fields (128 bits). Is that enough bits, or might some future IPvN need to expand these fields further?