CSE 461 19Au Final Review

QUIZ 4

REVIEW

P1. Imagine a link with the following properties:

R = 10mbps

D = 25 ms

10 kb packets

a) What is the effect data rate with W = 1

Ans to a)

10 kb / 2 * 25 ms = 200 kbps

b) What is the appropriate window size to fully utilize the link?

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2B * D = 500 kb

W = 500kb / 10kb = 50 packets

c) Assuming TCP slow start with an initial window size of 1, how many packets does it take to reach the fully utilized capacity?

W = 50, we need 49 packets

SEE slides 144 at
https://courses.cs.washington.edu/courses/cse461/19au/slides/11-transport.pdf

MORE Practice

Considering the TCP Connection Release phase, as the client(active party) sends out the ACK to the server(passive party), will the client close immediately or it will wait for a certain amount of time? Please also explain why?

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ANS: client sides needs to wait for amount of time to ensure its ACK for the FIN from the server side is not lost

Considering DNS Resolution

a) Explain what is Recursive query and what is Iterative query

Recursive query(2 pts):

Iterative query(2 pts):

b) For the purpose of making resolution latency low, what strategy is introduced? (3 pts)

Considering DNS Resolution

a) Explain what is Recursive query and what is Iterative query

Recursive query(2 pts):

Nameserver resolves and returns final answer

Iterative query(2 pts):

Nameserver returns answer or who to contact for answer

b) For the purpose of making resolution latency low, what strategy is introduced? (3 pts)

caching queries/response

Considering following DNS Resource Records, what are their meanings(3 pts)?

Type:	
A	meaning(1pt):
AAAA	meaning(1pt):
NS	meaning(1pt):

Considering following DNS Resource Records, what are their meanings(3 pts)?

Type:

A meaning(1pt): IPv4 address of a host

AAAA meaning(1pt): IPv6 address of a host

NS meaning(1pt): Nameserver of domain or delegated subdomain

Considering web performance (6 pts)

What is the feature of persistent connection? (2 pts):

What is the feature of pipelining produces? (2 pts):

What is the major difference between QUIC/HTTP3.0 and other HTTP versions before? (2pts):

a): Considering web performance (6 pts)

What is the feature of persistent connection? (2 pts):

sequential requests without reset up connection

What is the feature of pipelining produces? (2 pts):

parallel requests within the persistent connection

What is the major difference between QUIC/HTTP3.0 and other HTTP versions before? (2pts):

Using UDP instead of TCP / no connections set up phase

a) Draw a picture of 3 nodes and explain what is hidden terminals problem (2 points)

b) Draw a picture of 4 nodes and explain what is exposed terminals problems (2 points)

c) What is the solution to the hidden/exposed terminals problem? explain how solution works(4 points)

DNS Spoofing

What is DNS Spoofing?

DNS Spoofing

What is DNS Spoofing?

Trick the client into creating a wrong binding!

Example:

Say Alice wants to send a message to Bob. Alice doesn’t know about the ip address of Bob.

She asks the local name server of Bob’s ip address.

Eve listens in the network and forges a fake DNS response to Alice, giving her Eve’s ip address.

Alice now sends traffic to Eve.

DNS Spoofing

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Trick the client into creating a wrong binding!

Any solutions?

DNS Spoofing

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Trick the client into creating a wrong binding!

Any solutions?

TLS and certificates (HTTPS)!

BGP routing

What are the relationships that define this protocol?

BGP routing

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Peers and customers

BGP routing

Who would advertise what to whom?

BGP routing

Who would advertise what to whom?

ISP will announce everything it can reach to its customers.

A Customer will announce its customers to the provider.

ISP will announce its customers to its peers.

BGP routing

Would ISP announce its peers to other peers?

BGP routing

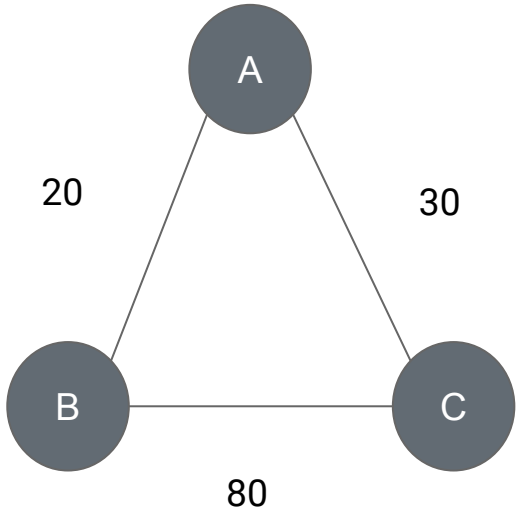
Would ISP announce its peers to other peers?

Routing is not free!

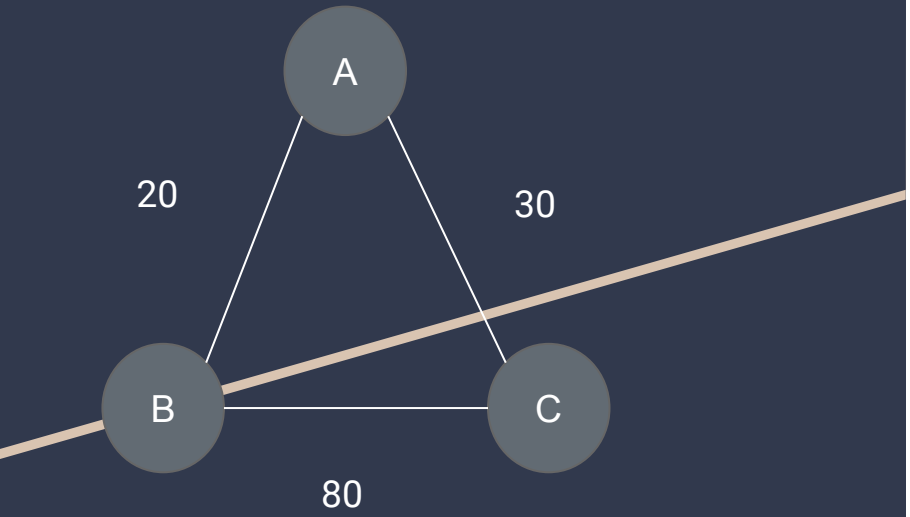
If ISP announce peer A to peer B, when peer B wants to send traffic to peer A, the traffic goes through the ISP, even though the ISP has nothing to do with the traffic!

Distance Vector Routing

Talk to your neighbors about how node A, B, and C establish their routing table using Distance Vector Routing algo? (2 min)



Distance Vector Routing



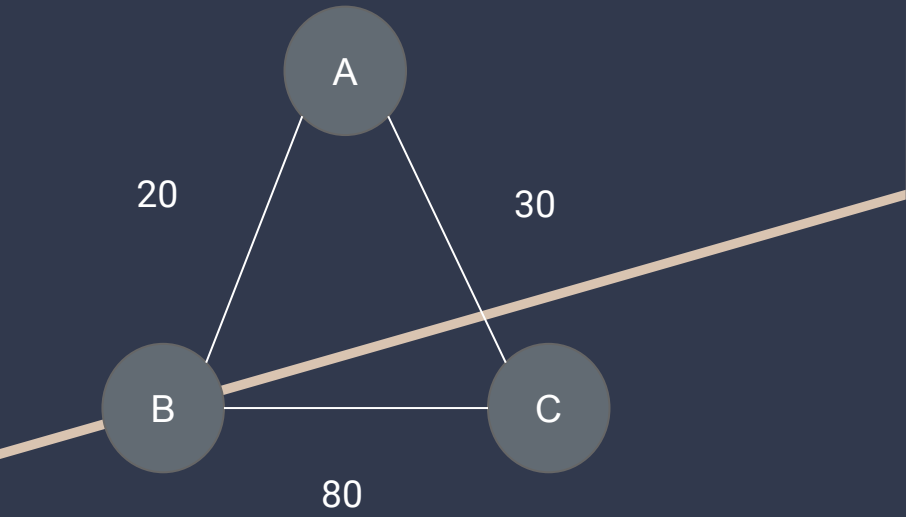
Talk to your neighbors about how node A, B, and C establish their routing table using Distance Vector Routing algo? (2 min)

#1:

A: (B,20), (C,30); B: (A,20), (C,80); C: (A,30), (B,80);

Each node sends it distances to other nodes to each of its neighbors. Each node updates their distance table.

Distance Vector Routing



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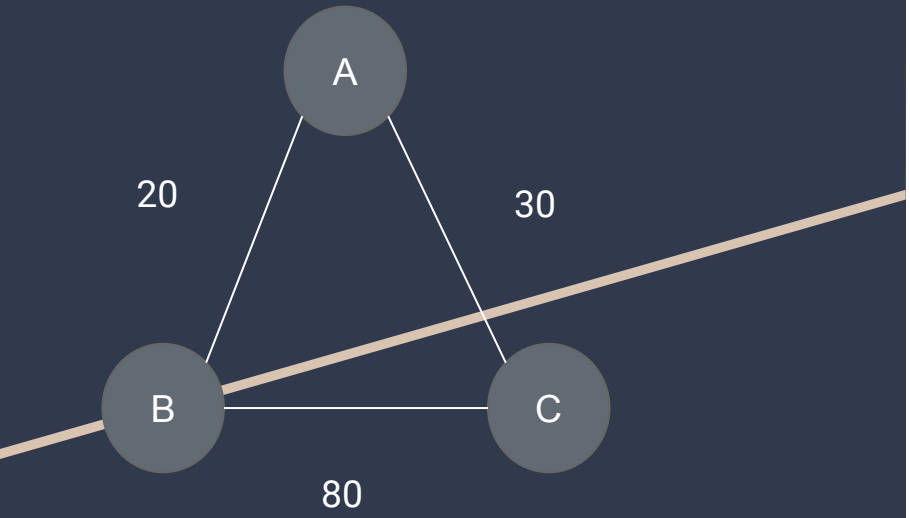
#2:

A: (B,20), (C,30); B: (A,20), (C,50); C: (A,30), (B,50)

Distance Vector Routing



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#2:

A: (B,20), (C,30); B: (A,20), (C,50); C: (A,30), (B,50)

#3:

Nothing changes. Routing table established.

Distance Vector Routing

What are some advantages of Distance Vector Routing?

Distance Vector Routing

What are some advantages of Distance Vector Routing?

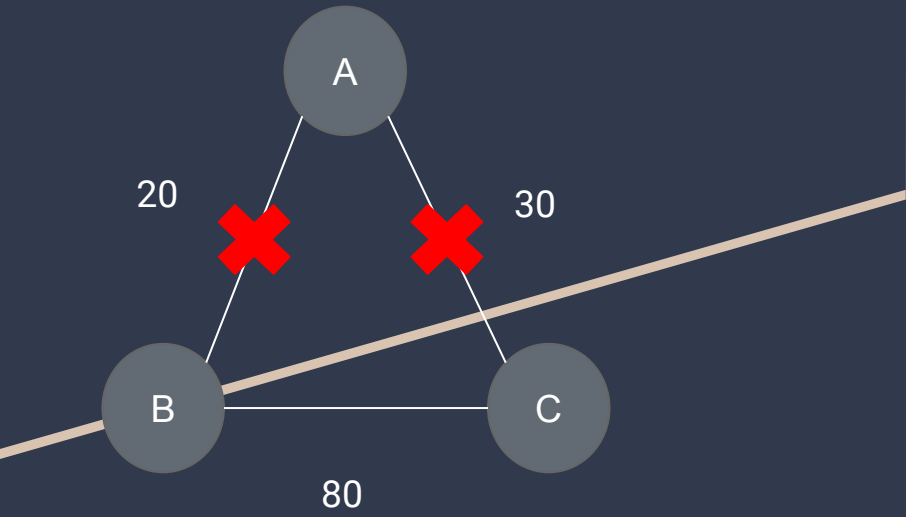
Fewer packets need to be sent. Less bandwidth consumption.

Distance Vector Routing

What is the big problem of Distance Vector Routing?

Talk with your neighbors for 1 min.

Distance Vector Routing



What is the big problem of Distance Vector Routing?

Count-to-infinity problem!

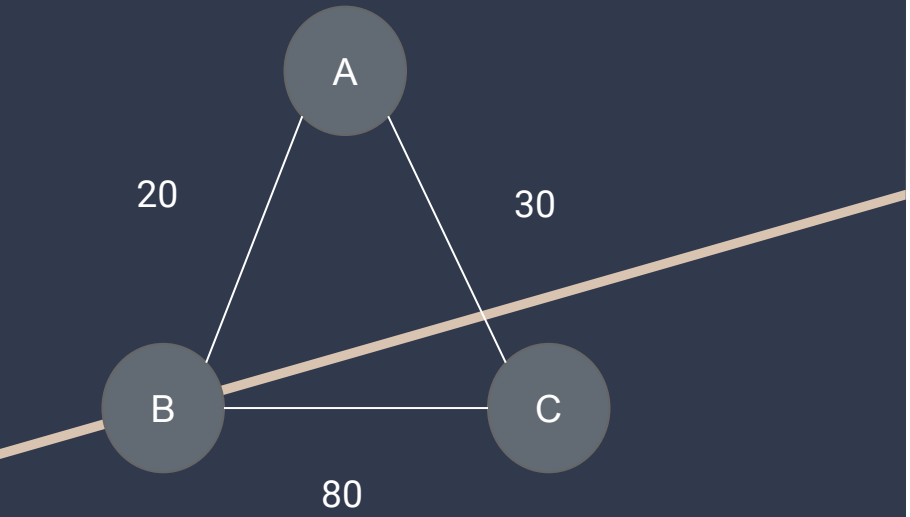
Distance Vector Routing converges slowly. Suppose link AB and AC fail. The cost to node A from node B and C are just going to keep increasing.

Link State Routing

How does Link State Routing work?

Talk to your neighbors for 2 mins

Link State Routing



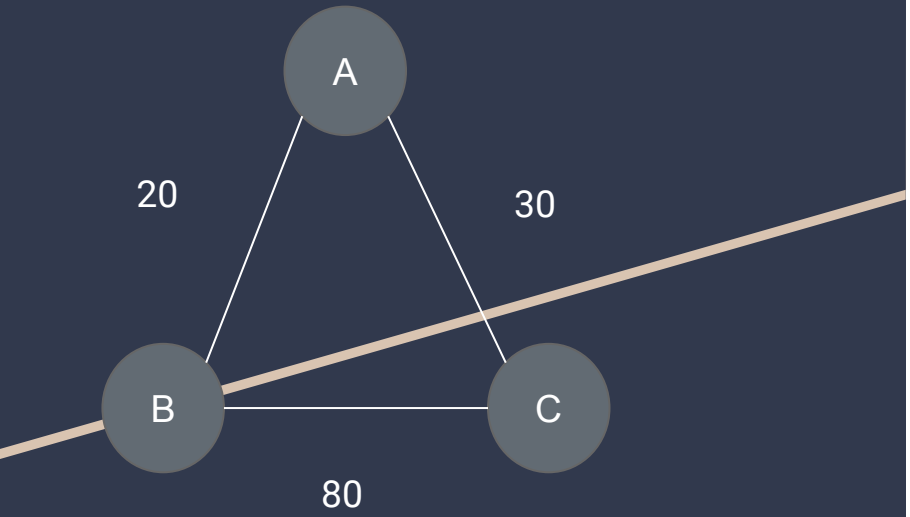
How does Link State Routing work?

Each node send the link to all other nodes.

For example:

node A sends to B and C: (AB,20), (AC,30)

Link State Routing



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Each node use the packets and Dijkstra’s algorithm to create the full topology of the network.

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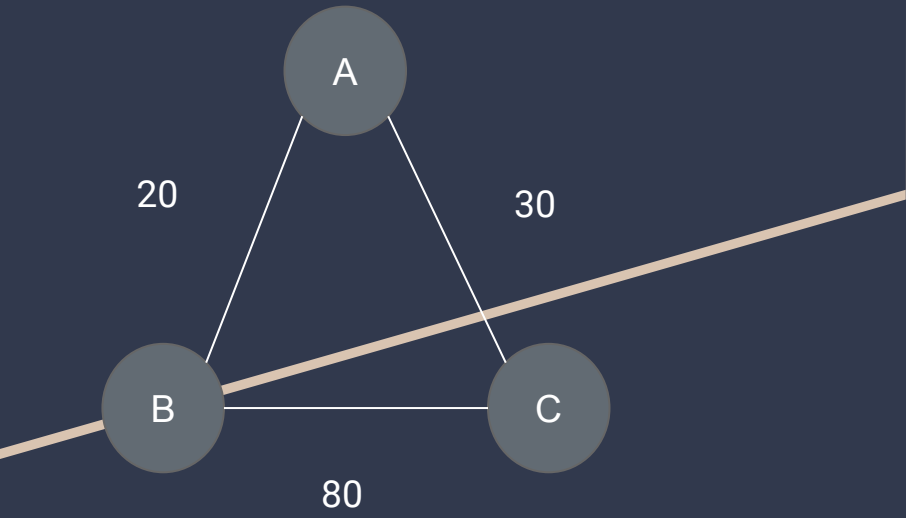

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Each node send the link to all other nodes.

For example:

node A sends to B and C: (AB,20), (AC,30)

Each node use the packets and Dijkstra’s algorithm to create the full topology of the network.

Now each node has the shortest path to each other node.

Link State Routing

What is the advantage of Link State Routing work?

Link State Routing

What is the advantage of Link State Routing work?

Converges fast.

Has a whole understanding of the network.

Link State Routing

What is the problem of Link State Routing work?

Link State Routing

What is the problem of Link State Routing work?

Flooding packets. A huge waste of bandwidth.

Web Performance

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Page Load Time (PLT)

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Page Load Time (PLT)

- First Contentful Paint (FCP)
- First Meaningful Paint (FMP)
- Time to Interactive (TTI)

Web Performance

How did HTTP/2.0 improve upon HTTP/1.0 and HTTP/1.1

Web Performance

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- Stream Multiplexing (multiple HTTP connections concurrently in a single TCP flow)
- Header Compression
- Server Push

Web Performance

How is stream multiplexing different from opening multiple TCP connections?

Web Performance

How is stream multiplexing different from opening multiple TCP connections?

If all HTTP connections are multiplexed into a single TCP flow, load balancing is more effective and you are less prone to congestion

You still retain the benefit of avoiding head-of-line blocking

Web Performance

In what cases might server push fail to give a substantial performance improvement?

Web Performance

In what cases might server push fail to give a substantial performance improvement?

When the size of the data being transferred is significantly larger than the bandwidth delay product of the connection