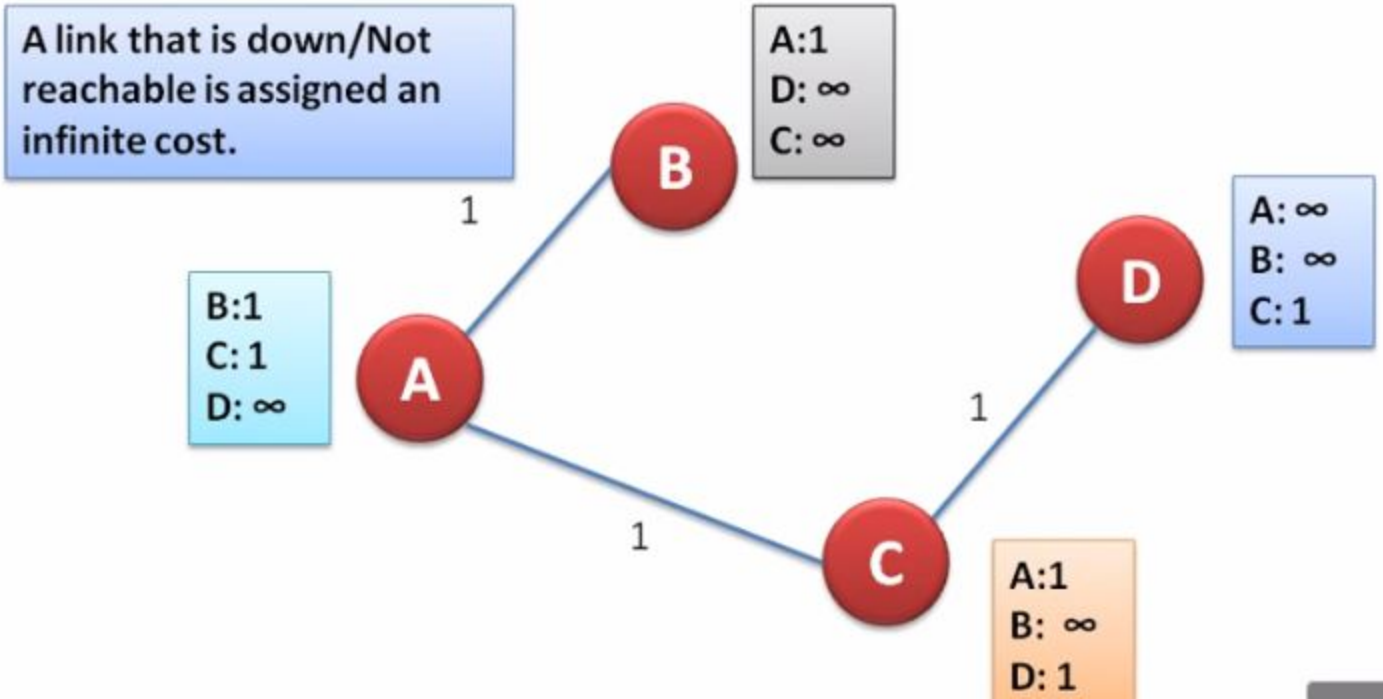
Destination Sequenced Distance Vector(DSDV)

Distance Vector Routing

Each node constructs a one-dimensional array containing the "distances"(costs) to all other nodes and distributes that vector to its immediate neighbors.

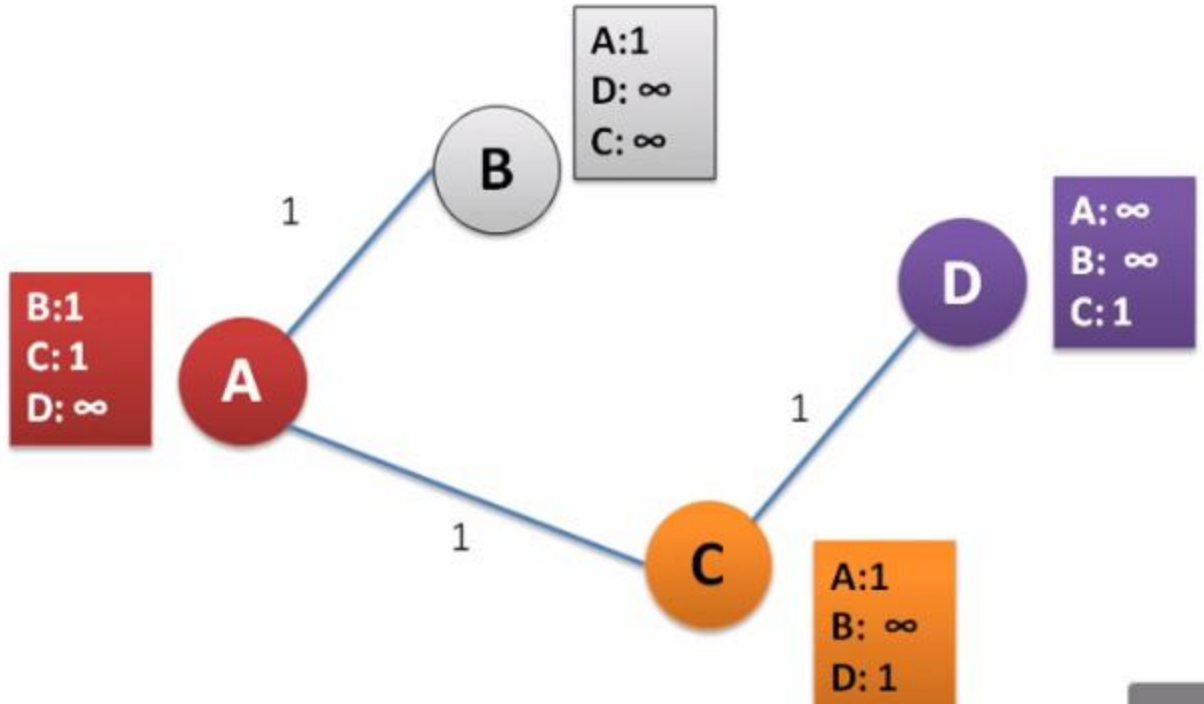
The starting assumption for distance-vector routing is that each node knows the cost of the link to each of its directly connected neighbors.

A link that is down/Not reachable is assigned an infinite cost.

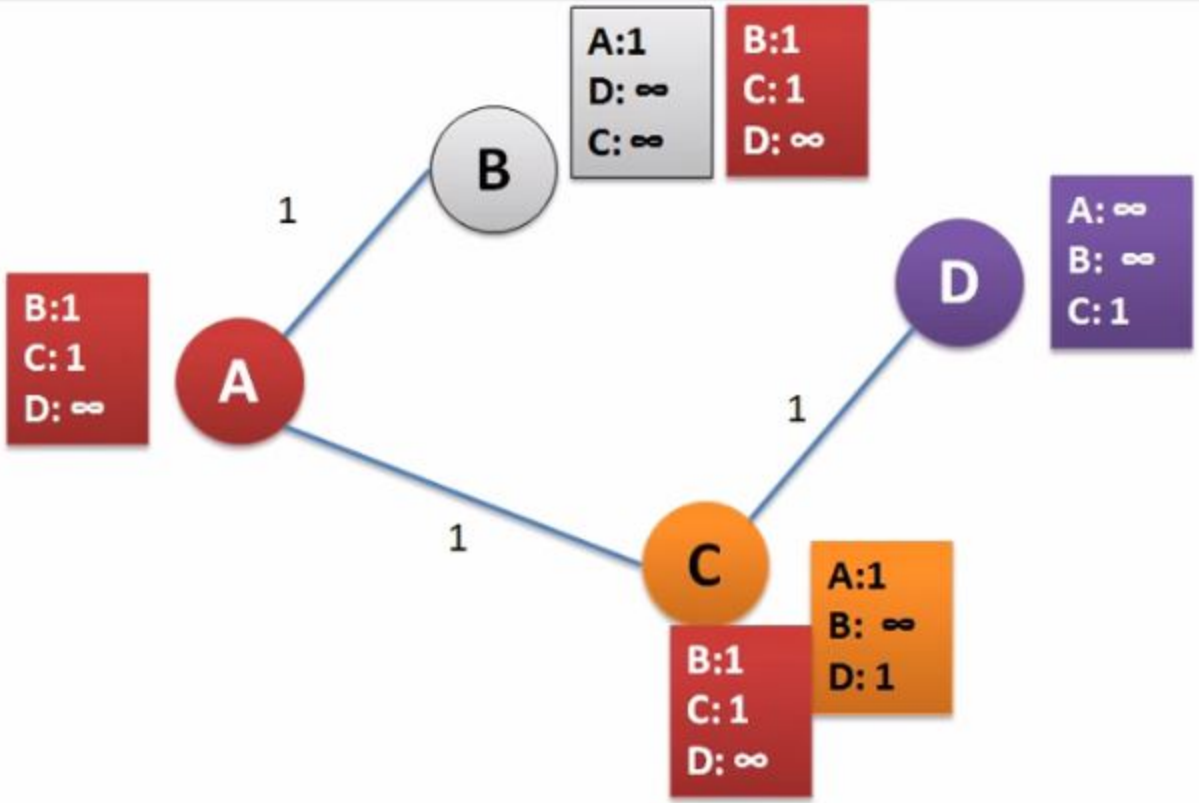


Distance Vector Routing

Each node broadcast their table to it's neighbours.



Distance Vector Routing



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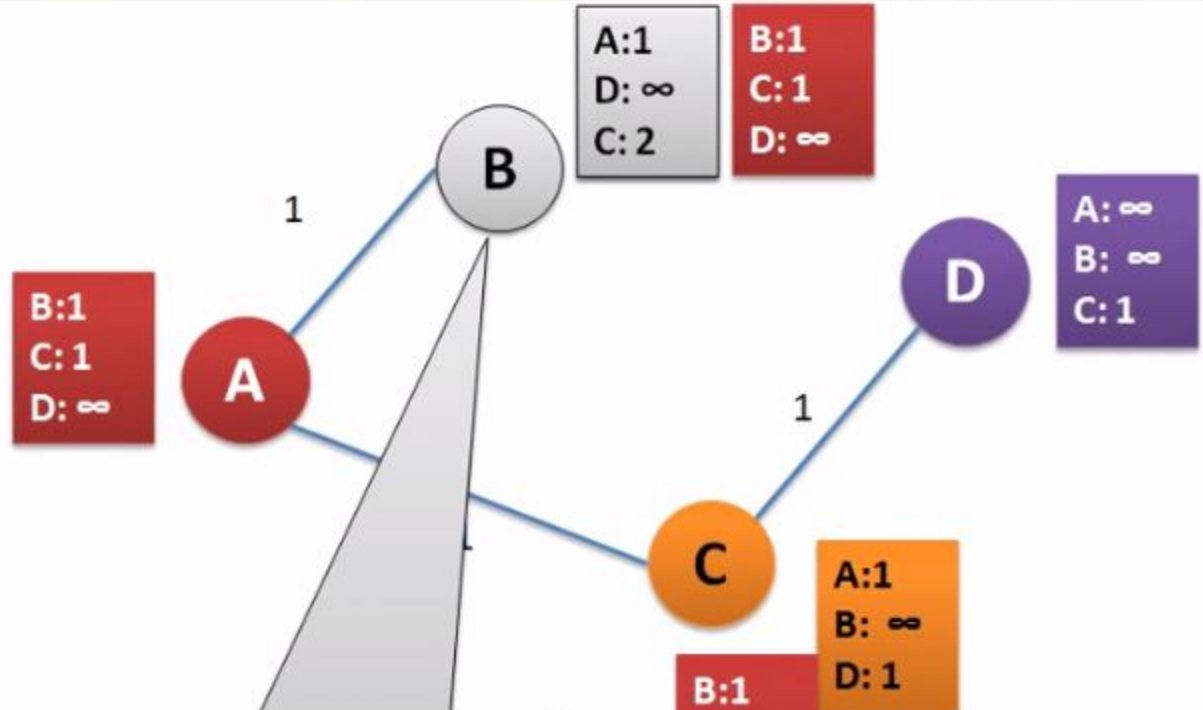
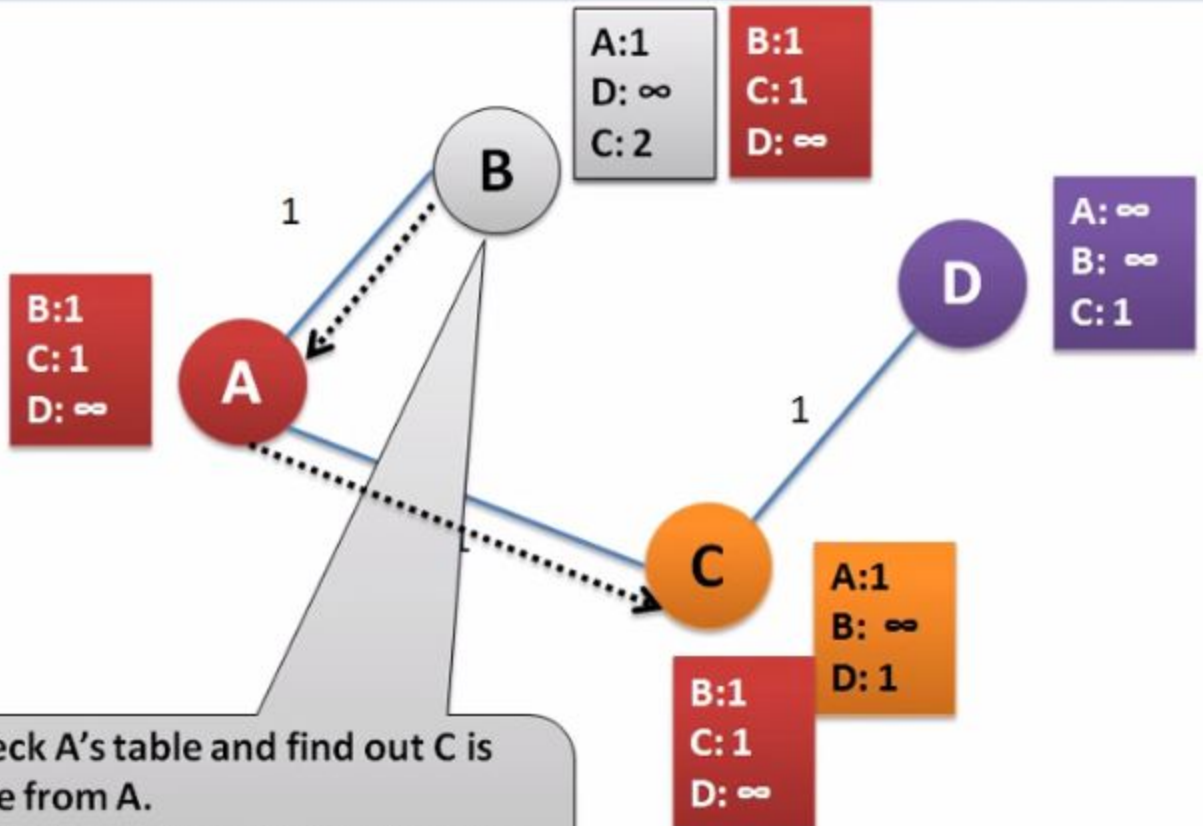


B will check A's table and find out C is reachable from A.
Distance between A and C is 1. Distance between B and A is 1 so B can reach C with distance 2.

Distance Vector Routing



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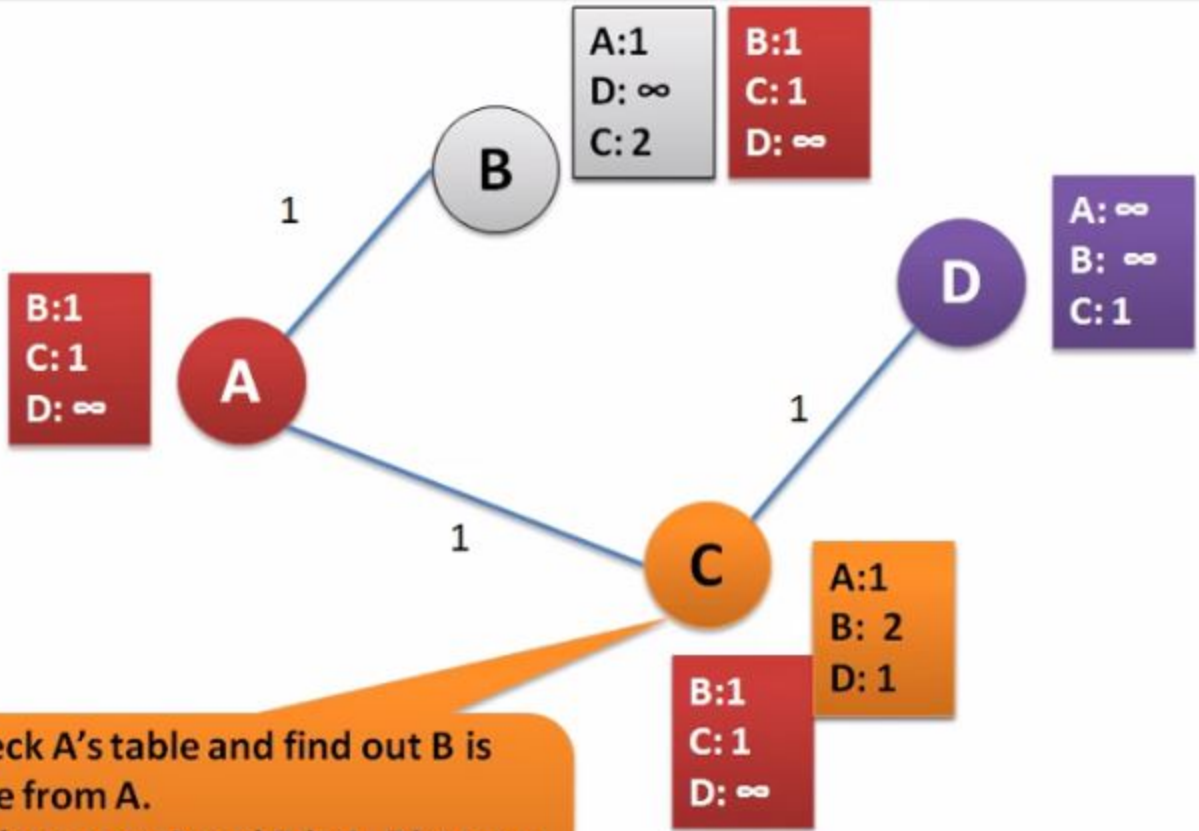

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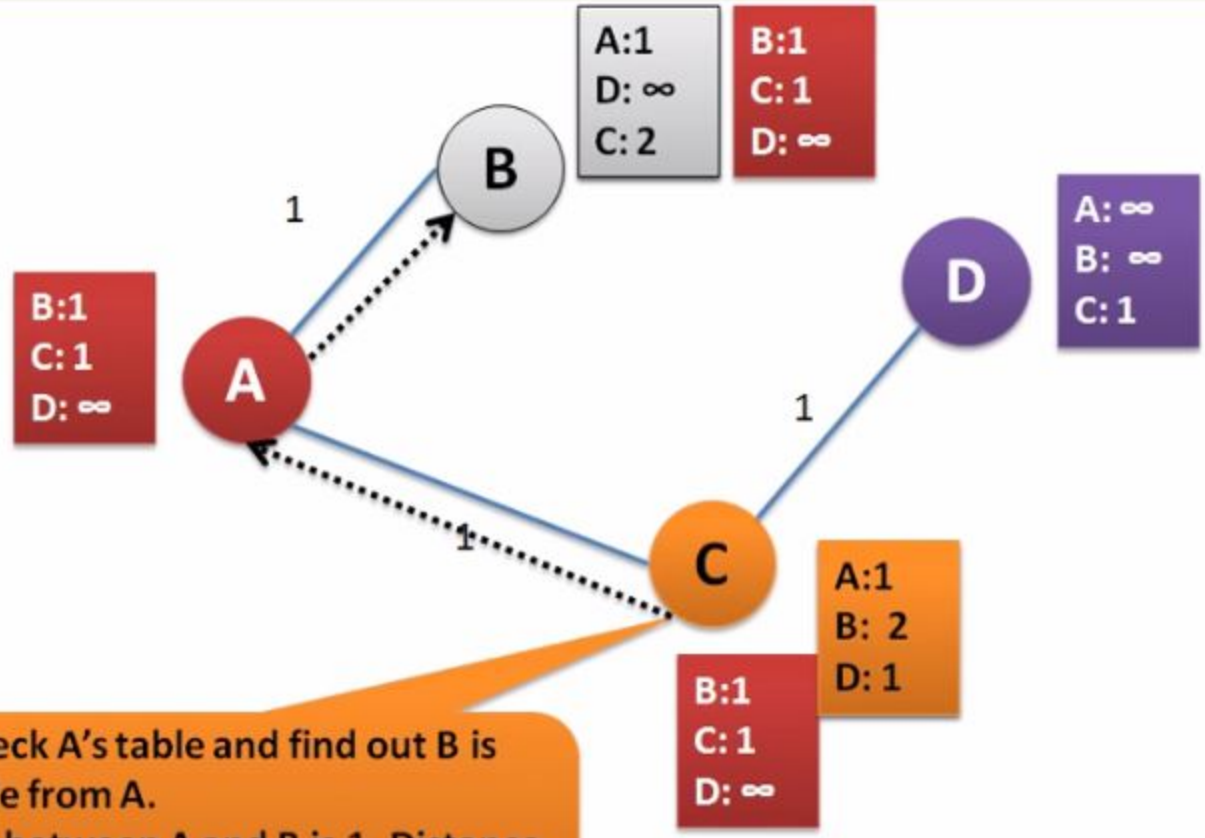
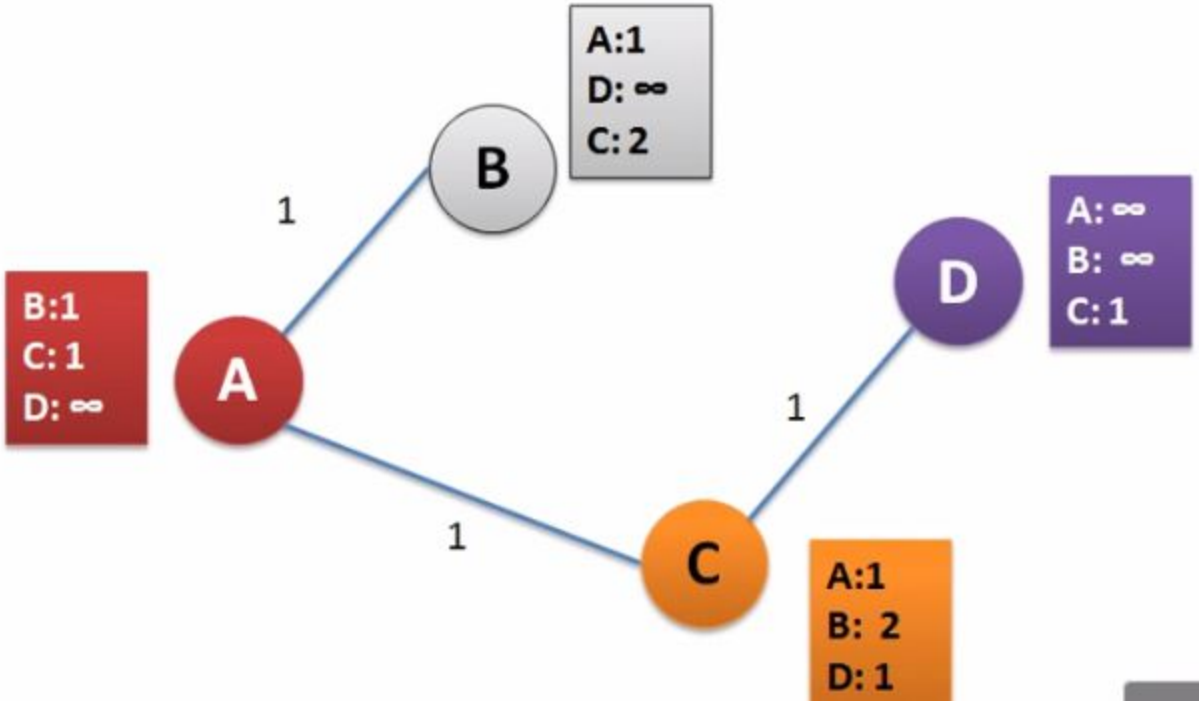


Distance Vector Routing

After A's broadcasting status of routing table. Now we will see Node C broadcasting.



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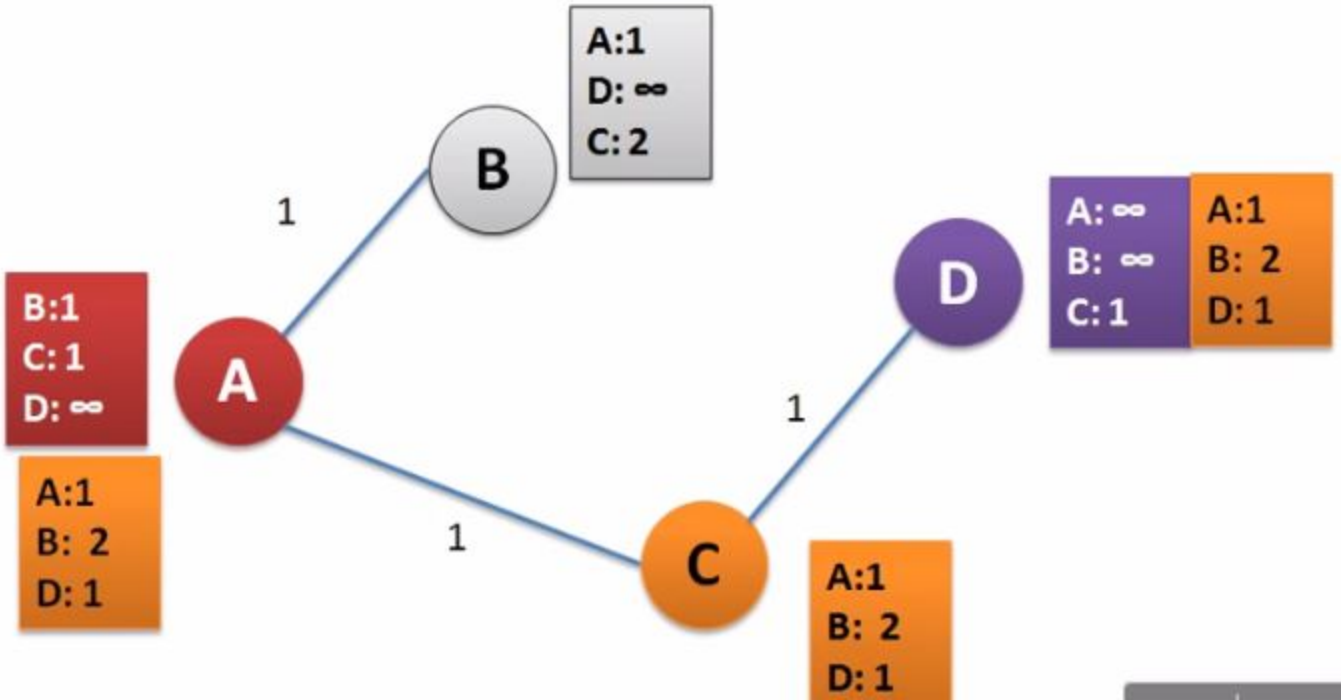
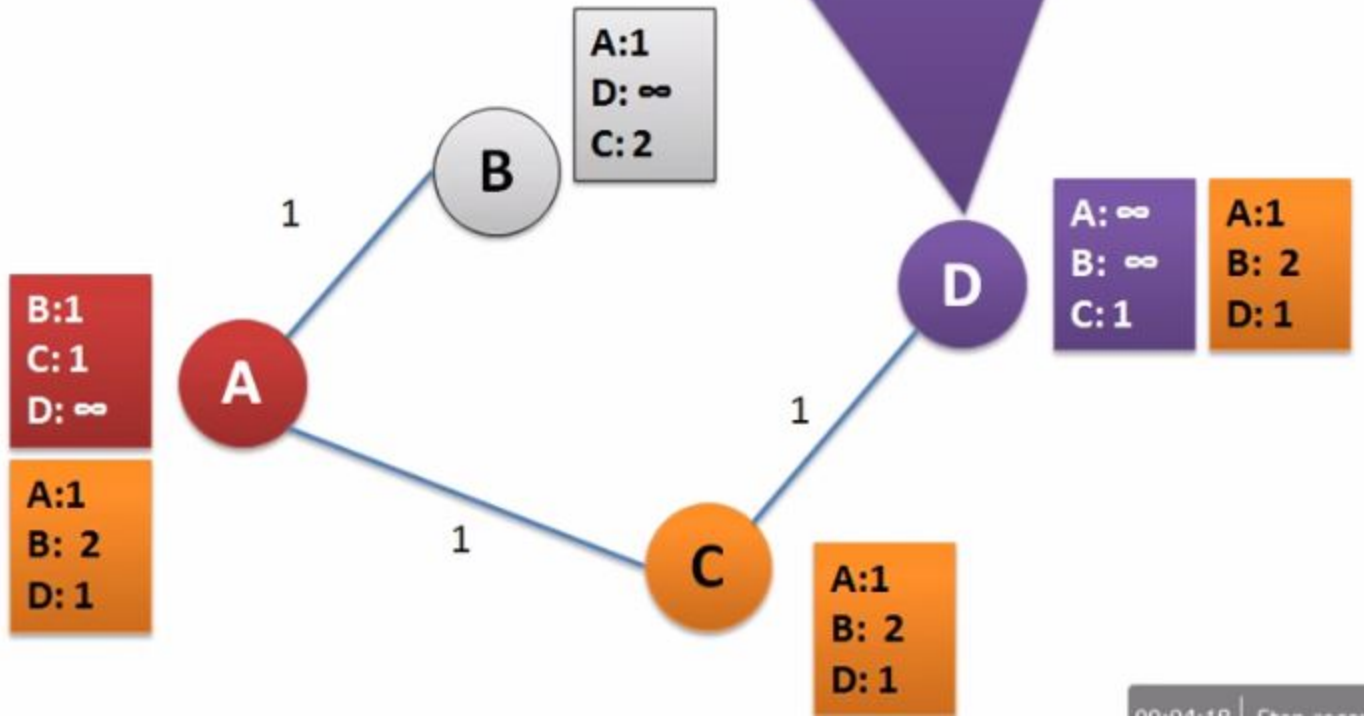


Distance Vector Routing

D will check C's table. C find out B is reachable from C with distance 2. Distance between C and D is 1. So D can reach node B via C with distance 3.

D also find out that it can reach A also via C with distance 2.



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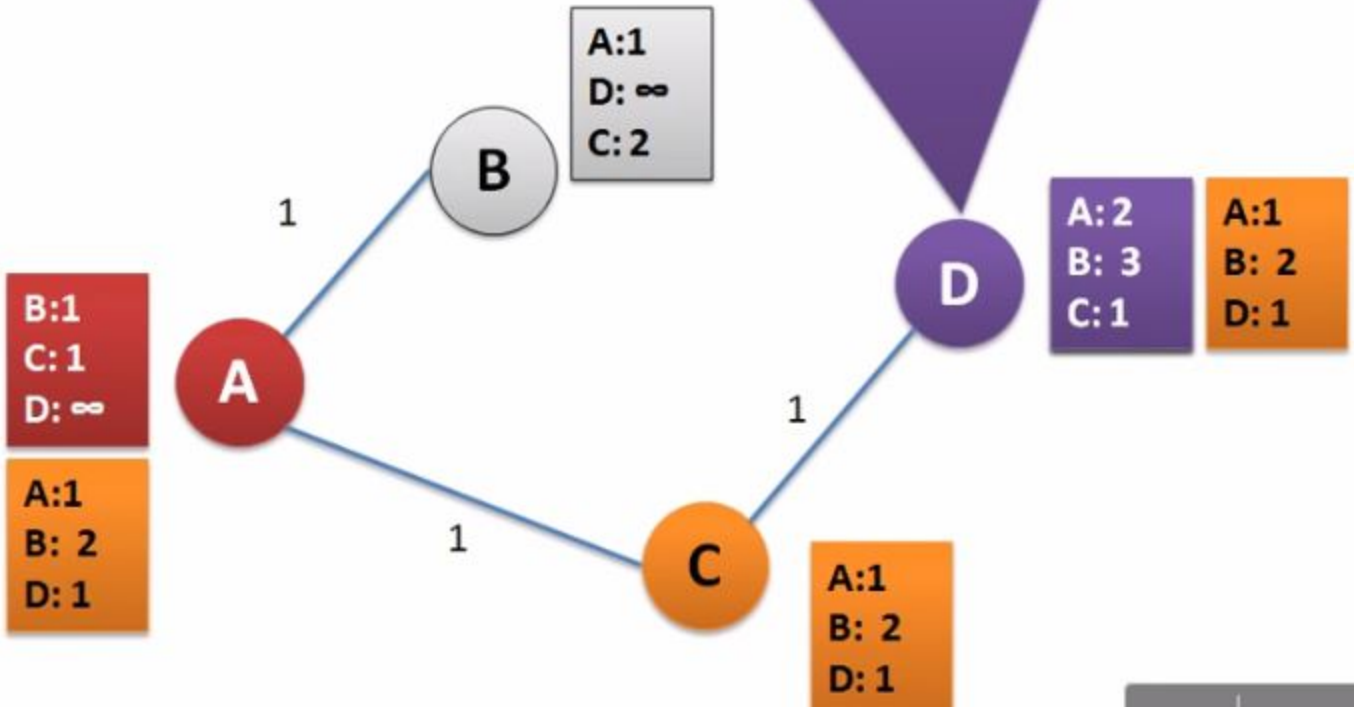
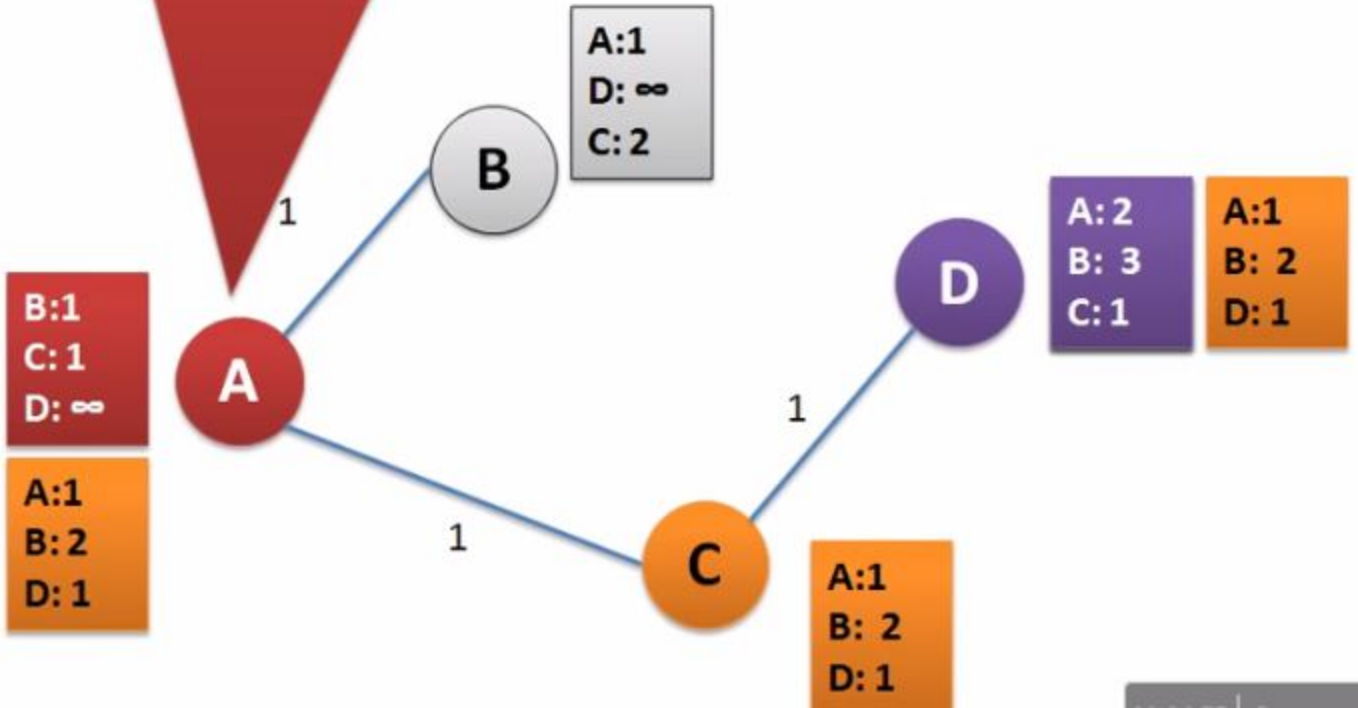


Distance Vector Routing

A will find out path to D via C with distance 2.



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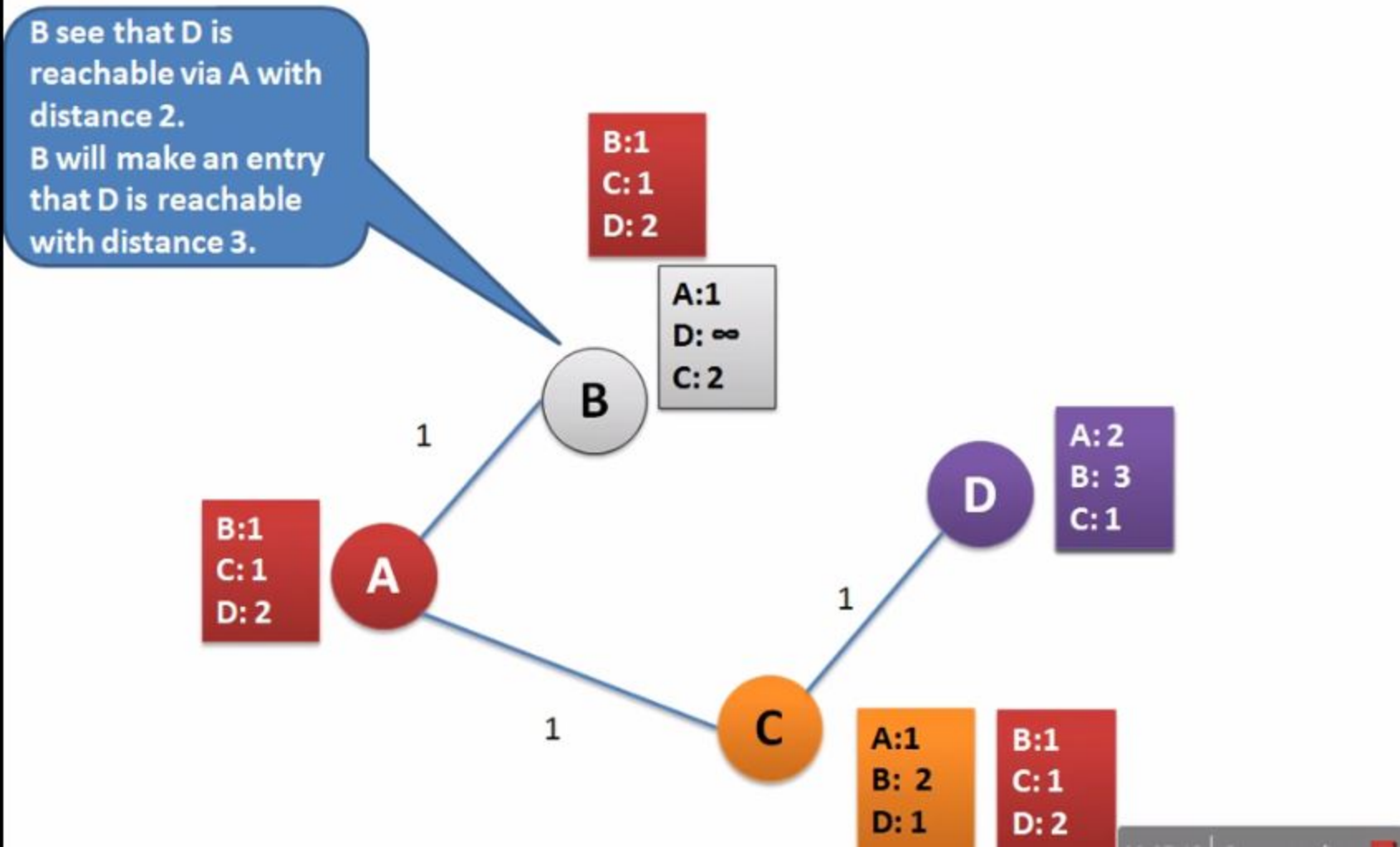

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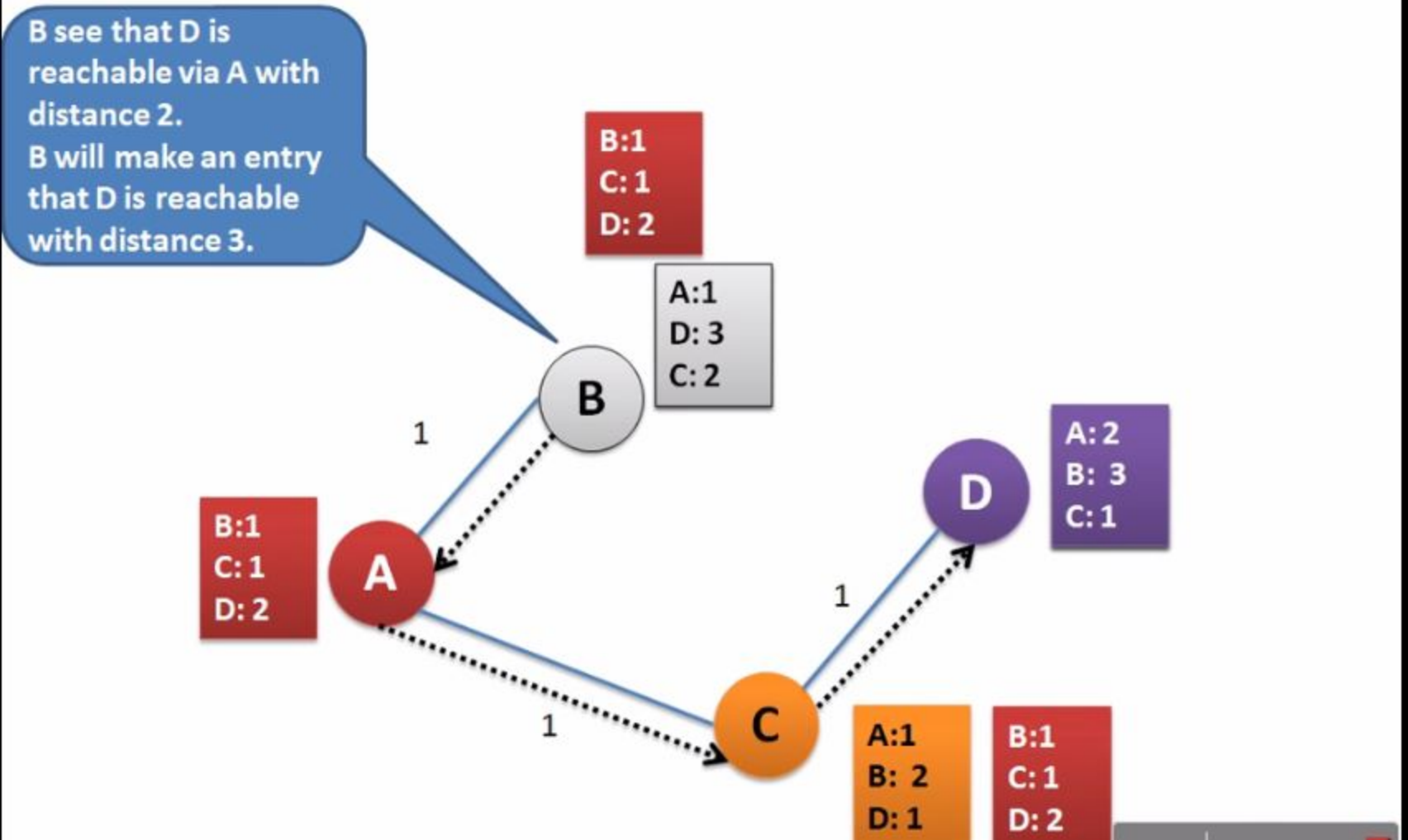
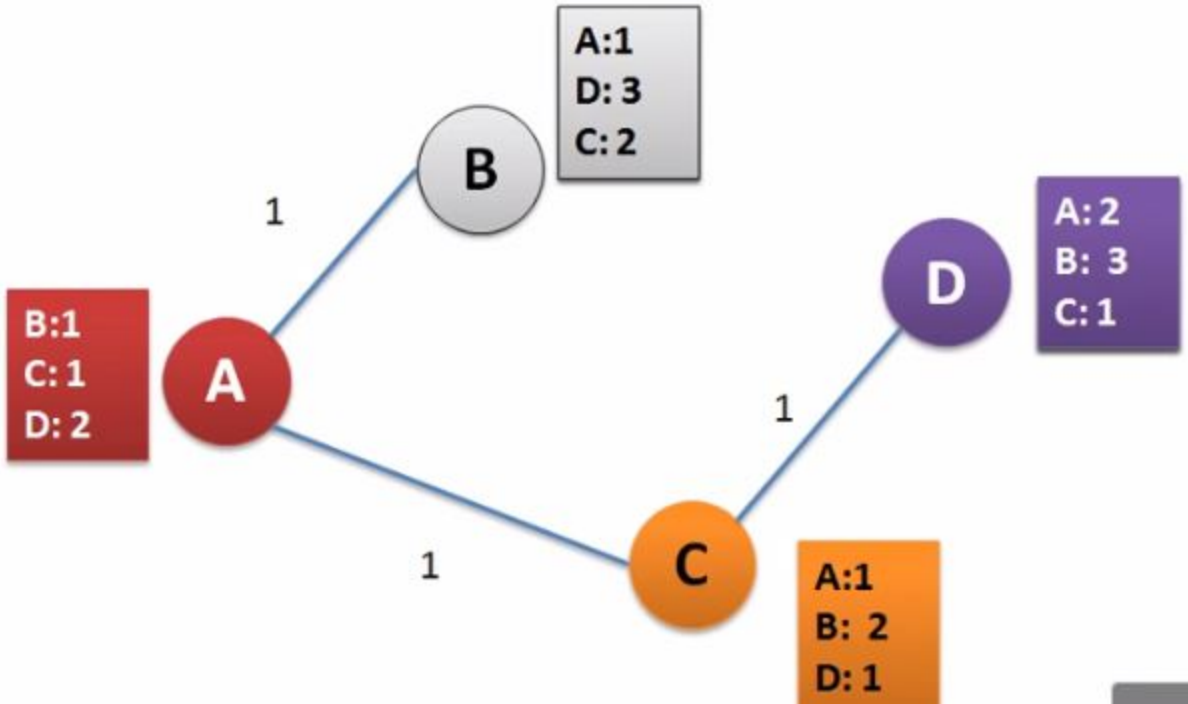
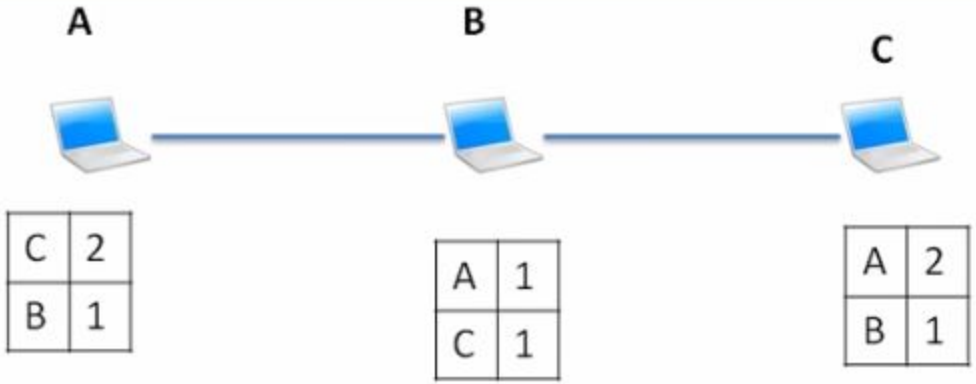


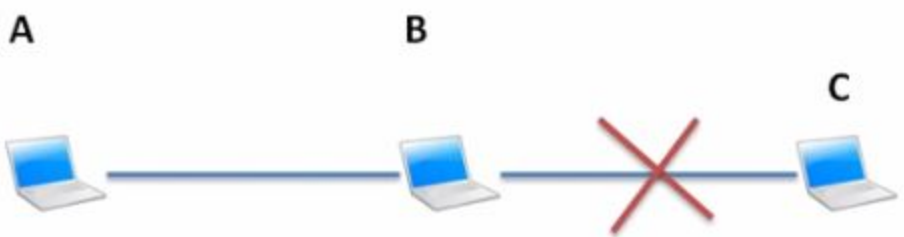
Distance Vector Routing

Each node also need to store direction. i.e. Node B can reach Node D via A. Node B has to store this information.



Distance Vector Routing-Count to infinity problem





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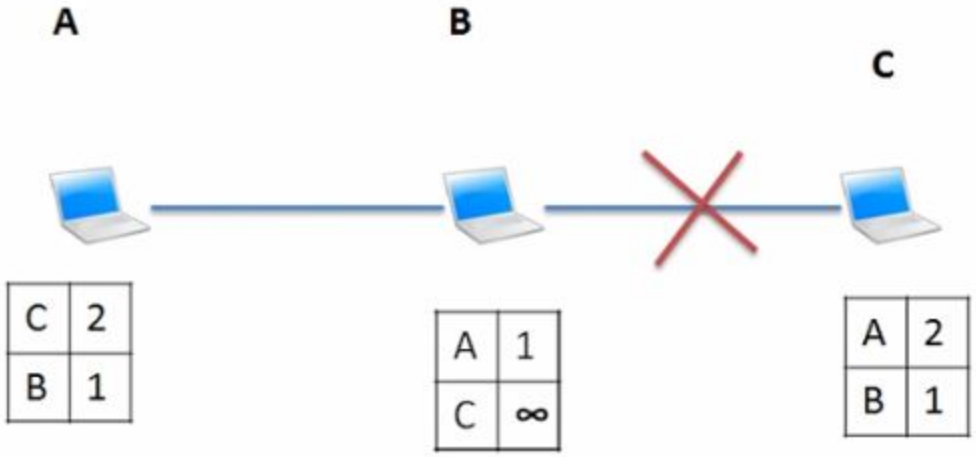
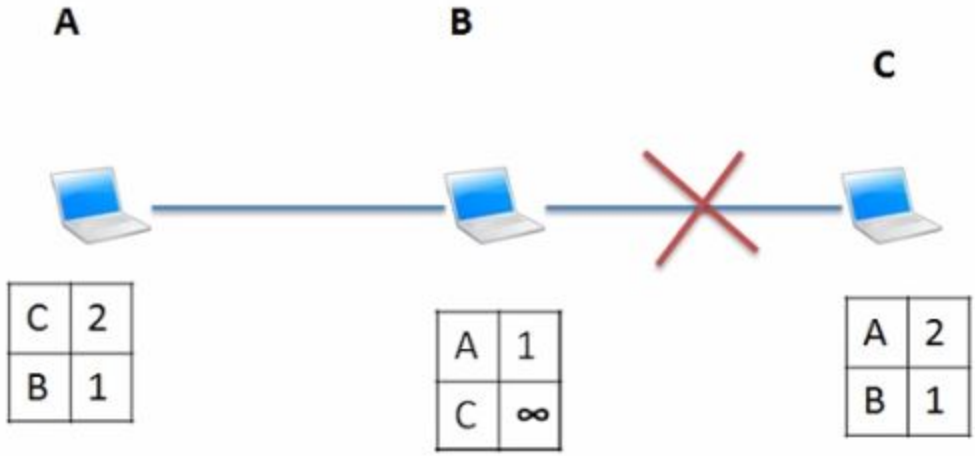


When B don't receive any update from C then B would know that C is disconnected.
B will set it's distance for C as Infinity.

Distance Vector Routing-Count to infinity problem



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A broadcast it's table to B.

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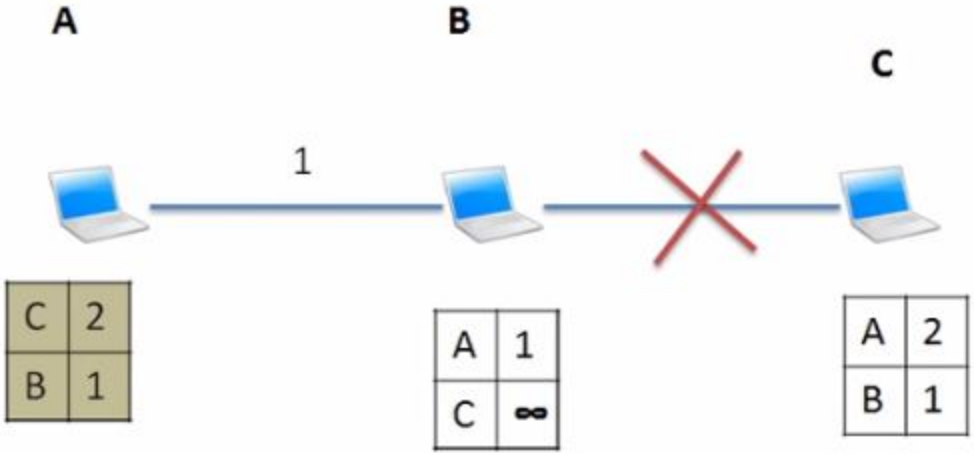
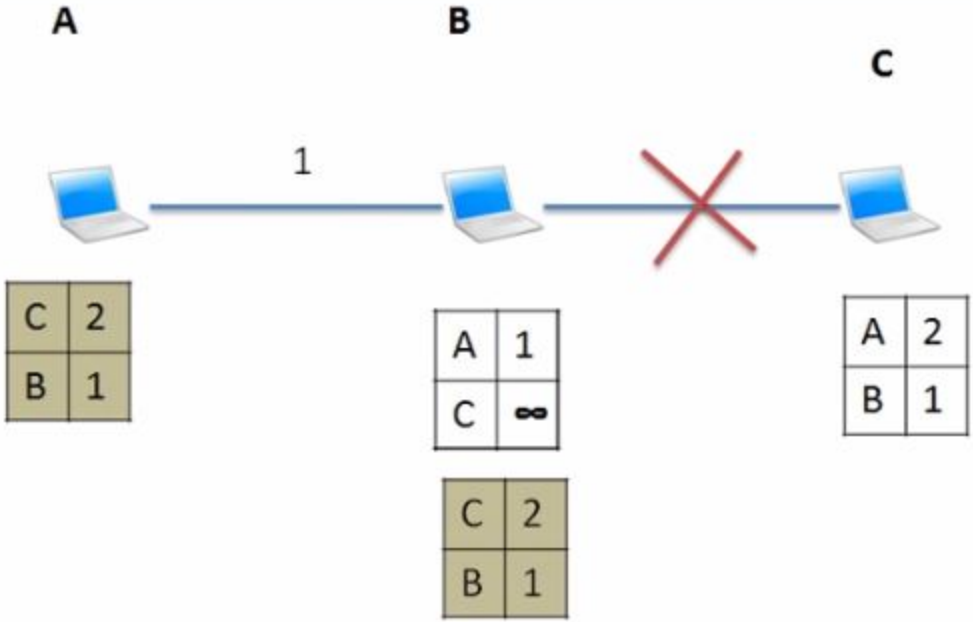


B from A's table will find out that C can be reachable from A with distance 3.
B can reach A with distance 1 and from A, C is reachable with distance 2.

Distance Vector Routing-Count to infinity problem



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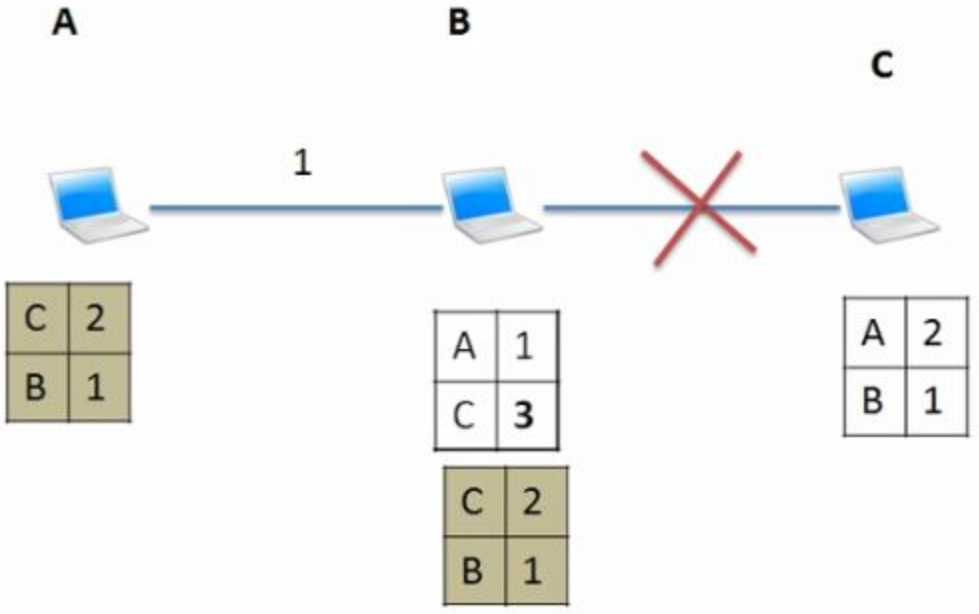

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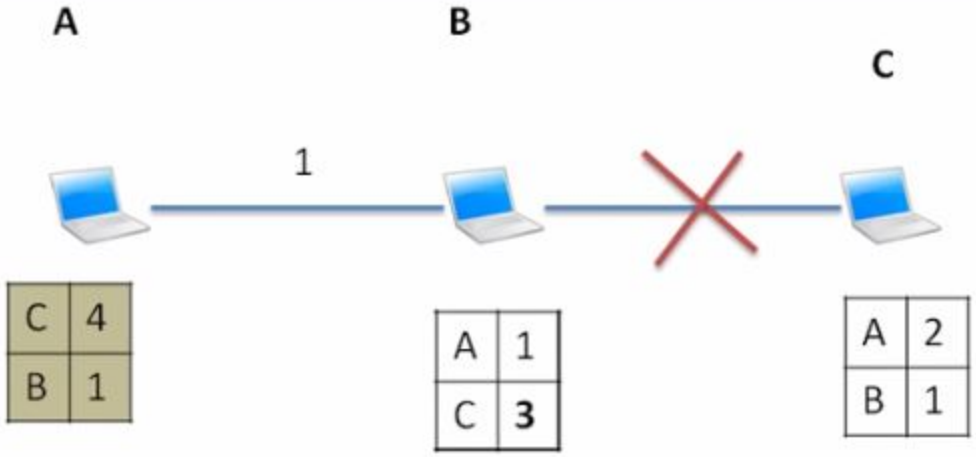


When B send it's table to A. A will update it's distance for Node C. Because A is reaching C via B.

A to C distance = A to B distance + B to C distance

= 1 + 3

= 4

Destination Sequenced Distance Vector Routing

To solve Distance vector problems, Destination sequence number added with every routing entry.

A node will update it's table if it receive an updated route to destination. [If a node receive an route with higher sequence number]

In DSDV routing table entry include
<destination, next hop, distance, sequence number>

Destination	Next Hop(Via)	Distance	Sequence number	Install Time

Sequence number originated from destination. Ensures loop freeness.

Install Time when entry was made (used to delete stale entries from table)

Destination Sequenced Distance Vector Routing

- DSDV is Proactive (Table Driven)
  - Each node maintains routing information for all known destinations
  - Routing information must be updated periodically
  - Traffic overhead even if there is no change in network topology

DSDV-Route Advertisement

- Advertise to each neighbor own routing information
  - Destination Address
  - Metric = Number of Hops to Destination
  - Destination Sequence Number
- Rules to set sequence number information
  - On each advertisement increase own destination sequence number (use only even numbers)
  - If a node is no more reachable (timeout) increase sequence number of this node by 1 (odd sequence number) and set metric = ∞

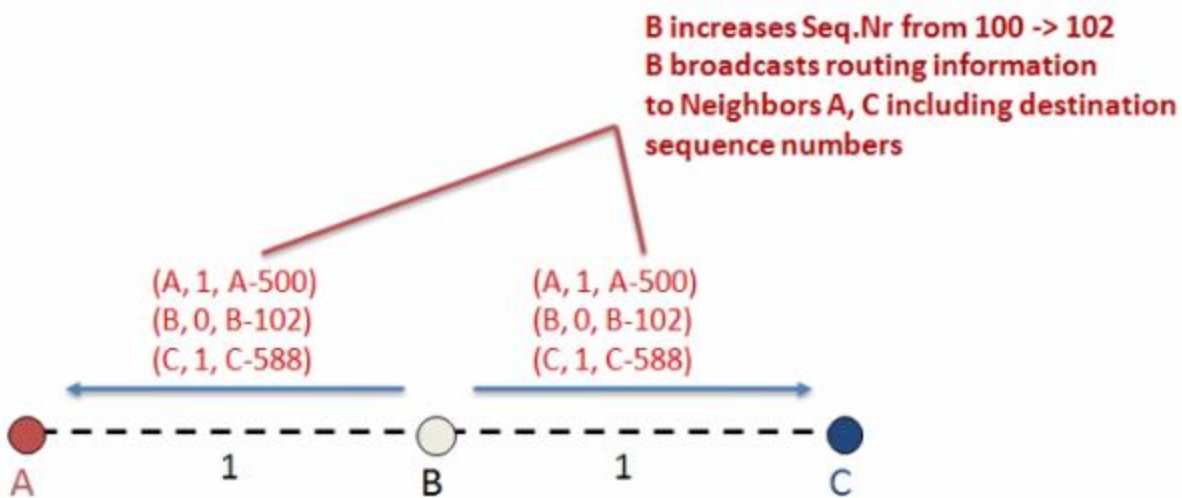
DSDV-Route Tables

Dest.	Next	Metric	Seq
A	A	0	A-550
B	B	1	B-100
C	B	3	C-588

Dest.	Next	Metric	Seq
A	A	1	A-550
B	B	0	B-100
C	C	2	C-588

Dest.	Next	Metric	Seq.
A	B	1	A-550
B	B	2	B-100
C	C	0	C-588

DSDV-Route Advertisement



Dest.	Next	Metric	Seq
A	A	0	A-550
B	B	1	B-102
C	B	2	C-588

Dest.	Next	Metric	Seq
A	A	1	A-550
B	B	0	B-102
C	C	1	C-588

Dest.	Next	Metric	Seq.
A	B	2	A-550
B	B	1	B-102
C	C	0	C-588

DSDV-Route Selection

- Update information is compared to own routing table
  - 1. Select route with higher destination sequence number (This ensure to use always newest information from destination)
  - 2. Select the route with better metric when sequence numbers are equal.

DSDV-New Node

2. Insert entry for D with sequence number D-000
Then immediately broadcast own table

1. D broadcast for first time
Send Sequence number D-000

Dest.	Next	Metric	Seq.
A	A	0	A-550
B	B	1	B-104
C	B	2	C-590

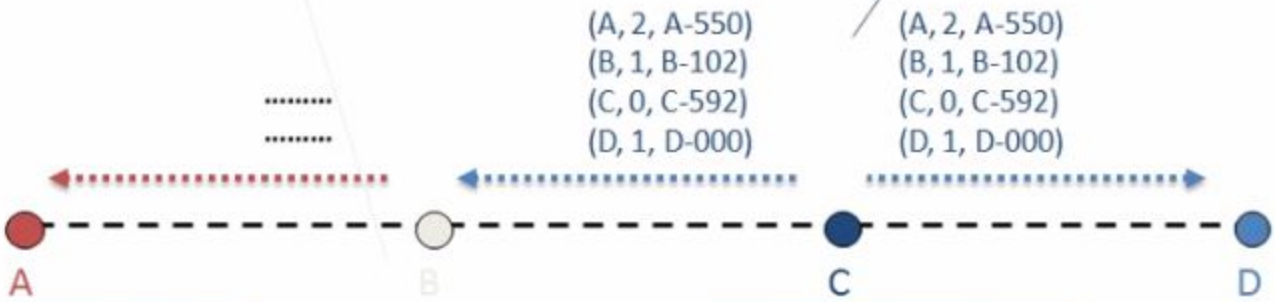
Dest.	Next	Metric	Seq.
A	A	1	A-550
B	B	0	B-104
C	C	1	C-590

Dest.	Next	Metric	Seq.
A	B	2	A-550
B	B	1	B-104
C	C	0	C-590
D	D	1	D-000

DSDV-New Node

3. C increases its sequence number to C-592 then broadcasts its new table.

4. B gets this new information and updates its table.....



Dest.	Next	Metric	Seq.
A	A	0	A-550
B	B	1	B-104
C	B	2	C-590

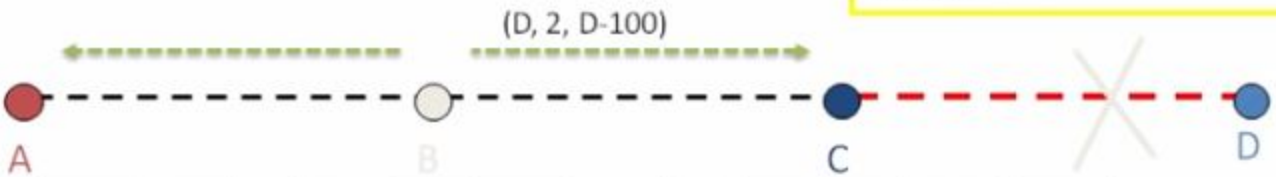
Dest.	Next	Metric	Seq.
A	A	1	A-550
B	B	0	B-102
C	C	1	C-592
D	C	2	D-000

Dest.	Next	Metric	Seq.
A	B	2	A-550
B	B	1	B-102
C	C	0	C-592
D	D	1	D-000

DSDV-No loop, No Count to Infinity Problem

2. B does its broadcast
-> no affect on C (C knows that B has stale information because C has higher seq. number for destination D)
-> no loop -> no count to infinity

1. Node C detects broken Link:
-> Increase Seq. Nr. by 1
(only case where not the destination sets the sequence number -> odd number)



Dest.	Next	Metric	Seq.
...	...	...	
D	B	3	D-100

Dest.c	Next	Metric	Seq.
...	...	...	
D	C	2	D-100

Dest.	Next	Metric	Seq.
...	...	...	
D	D	∞	D-101

DSDV-Immediate Advertisement