DVMRP

Distance Vector Multicast Routing Protocol

DVMRP

- Defined in RFC 1075

- A routing protocol published in 1988 at Stanford University, to share information between **routers** to facilitate the transportation of IP multicast packets among networks. It formed the basis of the Internet's historic multicast backbone, Mbone.

- **Mbone** (short for "multicast backbone") was an experimental backbone and virtual network built on top of the Internet for carrying IP multicast traffic on the Internet.

- It was developed in the early 1990s and required specialized hardware and software.[1] Since the operators of most Internet routers have disabled IP multicast due to concerns regarding bandwidth tracking and billing, the Mbone was created to connect multicast-capable networks over the existing Internet infrastructure.

MBONE

- The first band to perform live on the internet was on MBONE, which used the MBONE virtual network!
- It was the first major cyberspace multicast concert!
- Mick Jagger opened the concert by saying, "I wanna say a special welcome to everyone that's, uh, climbed into the Internet tonight and, uh, has got into the M-bone. And I hope it doesn't all collapse."

Mbone session directory (sd), February 1996

MBONE uses DVMRP

- The purpose of Mbone was to minimize the amount of data required for multipoint audio/video-conferencing.

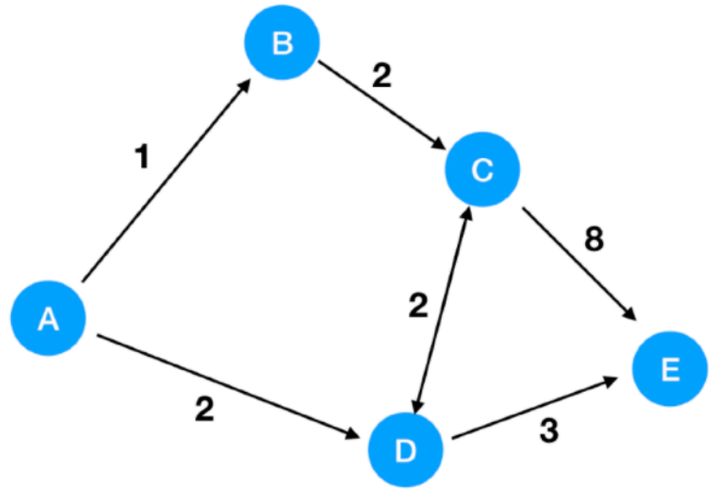
- Apart from DVMRP, it also uses the MOSPF routing scheme! Mbone was free and it used a network of routers that support IP multicast, and it enables access to real-time interactive multimedia on the Internet.

Derived from RIP

- It finds the least cost path between 2 nodes! - the objective of distance vector routing.

- Each node maintains a routing table. We have seen in the class the Bellman Ford Algorithm, which helps us achieve that.

- Routing table information is shared with neighbours (not the next-hop ones). On receiving a message, routing table is updated with min-cost path.



node	shortest cost from A
A	0
B	1
C	3
D	2
E	5

Derived from RIP

- The router generates a routing table with the multicast group of which it has knowledge with corresponding distances (i.e. number of devices/routers between the router and the destination).

- When a multicast packet is received by a router, it is forwarded by the router's interfaces specified in the routing table.

- F DVMRP routing messages can be used for three basic purposes: to periodically supply all routing information, to gratuitously supply routing information for recently changed routes, or supply some or all routes in response to a request.

Reverse Path Flooding

- DVMRP operates via a reverse path flooding technique, sending a copy of a received packet (specifically IGMP messages for exchanging routing information with other routers) out through each interface except the one at which the packet arrived.

- If a router does not wish to be part of a particular multicast group, it sends a "prune message" along the source path of the multicast.

Why Bellman Ford?

- Internet is a dynamic system!
- It will change and we will have to keep recomputing values and updating the tables.

- It doesn’t make sense to store the entire network, and the bellman-ford algorithm uses only the neighbouring nodes for the algorithm to function.

5.2 Receiving Routing Messages

A router must know the virtual interface that a routing message arrived on. Because the routing message may be addressed to the all-multicast-routers IP address, and because of tunnels, the incoming interface can not be identified merely by examining the message's IP destination address

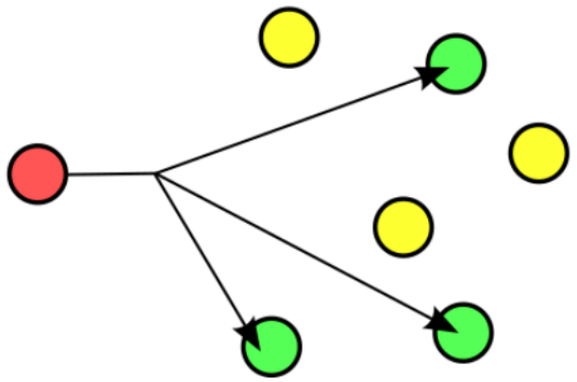
For each route expressed in a routing message, the following must occur:

```
IF a metric was given for the route:
THEN    add in the metric of the virtual interface that the message
        arrived on.

Lookup the route's destination address in the routing tables.
```

Multicast

- In computer networking, **multicast** is group communication[1] where data transmission is addressed to a group of destination computers simultaneously.



- Multicast can be one-to-many or many-to-many distribution. Multicast should not be confused with physical layer point-to-multipoint communication.

Telepresence

Internet Protocol Television

- The delivery of television content over Internet Protocol networks!

- This is different from terrestrial, satellite and cable tv formats. Unlike downloaded media, IPTV has the ability to stream the source media continuously. As a result, a client media player can begin playing the content (such as a TV channel) almost immediately.

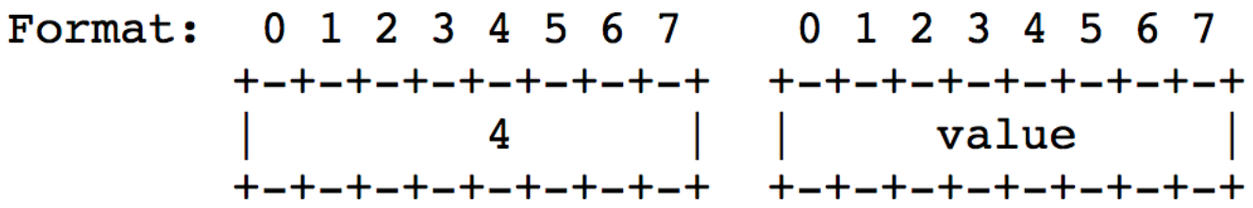
- This is known as the STREAMING MEDIA.

Is this limited to YouTube and Netflix?

Some Interesting Commands

- Metric Command: The metric command provides the metric to subsequent destinations. The metric is relative to the router that sent this DVMRP routing update.

- F It is an error for metric to equal 0.



Some Interesting Commands

- Destination Address Command: Array of 'count' additional arguments, with AFI = IP. Count is the number of addresses supplied, from 1 to 255. The length of the addresses depends upon the current address family. The number of addresses supplied is subject to the message length limitation of 512 bytes.

- The DA command provides a list of destinations. While this format can express routes to hosts, the routing algorithm only supports network and subnetwork routing. The current metric, infinity, flags0 and subnet-mask, when combined with a single destination address, define a route. The current metric must be less than or equal to the current infinity.

```
Array of 'count' additional arguments, with AFI = IP:

 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Destination Address1                                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Destination Address2                                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Flip Sides of DVMRP

- Being a naïve distance-vector protocol, DVMRP has difficulties with network scaling in some topologies. primarily due to the periodic reflooding necessary to detect new hosts.

- This was more prevalent in early versions of the protocol, prior to the implementation of pruning.

- DVMRP's flat unicast routing mechanism, which is used to determine the source interface of a data stream, also affects its ability to scale.