# UNIT IV

The Network Layer

Broadcast Routing

Broadcasting (one-to-all) is a communication mechanism where data is sent to all the nodes in a network. The broadcast address is a special reserved address bit for broadcasting messages in a network. Devices such as bridges use boradcast.

Advantages of Broadcast

- **Easy Implementation:** Since broadcast transmits data to every device on a network segment without requiring connections or group management, it is easy to implement.

- **Effective for Small Networks:** Broadcast is a useful technique in smaller networks or when data needs to be shared with every device

- **Useful for Specific Uses:** Broadcast works well for sending information to every node or for local area network (LAN) announcements.

Disadvantages of Broadcast

- **Network Congestion:** Data is delivered to every device on the network via broadcast, using up extra bandwidth and processing power. This might cause congestion in the network.

- **Inefficiency:** Sending data to devices that might not need it wastes resources, making broadcast ineffective for targeted communication.

- **Lack of Scalability:** Sending data to every device might overload the network and cause performance problems, hence broadcast is not scalable to larger networks or the internet.

NETWORK A

NETWORK B
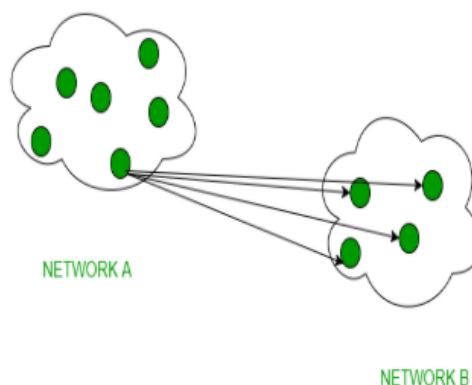
Multicast Routing

Multicasting has one/more senders and one/more recipients participate in data transfer traffic. In multicasting traffic recline between the boundaries of unicast and broadcast. It server's direct single copies of data streams and that are then simulated and routed to hosts that request it.

Advantages of Multicast

- **Scalability:** As multicast is scalable, it can be used for applications where multiple users need to receive the same data at once, such as online gaming, live streaming, and video conferencing.

- **Decreased Server Load:** Performance and efficiency are increased because the server is under much less load because data is only broadcast to a multicast group once.

- **Optimized Network Traffic:** Since multicast only sends data to devices that specifically ask for it, it reduces unnecessary network traffic.

Disadvantages of Multicast

- **Complexity:** Compared to unicast or broadcast, multicast execution requires more complicated network design and maintenance.

- **Restricted Support:** The widespread usage of multicast may be limited or require additional expenditure in suitable equipment because not all network devices and infrastructures support it.

- **Security Concerns:** Since data is transferred to many recipients in multicast, there is a potential for improper management that might make it less safe than in unicast.

NETWORK B

NETWORK B
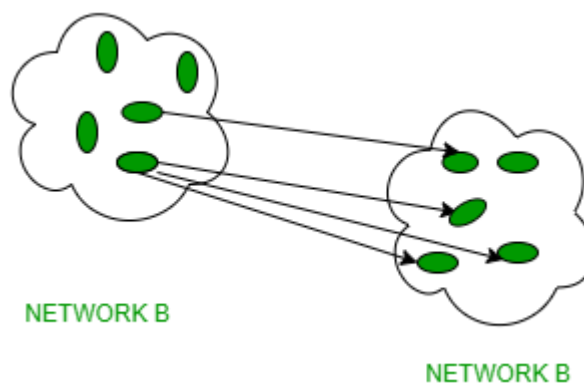
Difference Between Broadcast and Multicast

Sr. No.	Broadcast	Multicast
1	It has one sender and multiple receivers.	It has one or more senders and multiple receivers.
2	It sent data from one device to all the other devices in a network.	It sent data from one device to multiple devices.
3	It works on star and bus topology.	It works on star, mesh, tree and hybrid topology.
4	It scale well across large networks.	It does not scale well across large networks.
5	Its bandwidth is wasted.	It utilizes bandwidth efficiently.
6	It has one-to-all mapping.	It has one-to-many mapping.
7	Hub is an example of a broadcast device.	Switch is an example of a multicast device.
8	It increases network traffic because the data packets are sent to every other node in the network.	It doesn't increase network traffic.
9	The message to be sent should be tripled checked as some sensitive or confidential information shouldn't be distributed to everyone in the network.	No such issue, because the message is target to only selected people.