Broadcast

- Motivation
  - don’t have unicast routing
  - need to inform everyone
  - it’s “natural” for the underlying network
  - starting point for multicast

- Methods
  - flooding
  - reverse path forwarding
  - (minimum) spanning tree
Flooding

- **Trivial flooding**
  - resend every received packet to all neighbors

- **Limited flooding**
  - add sequence numbers (packet resent only once)
  - (if possible) don’t send packet where it came from

- **Characteristics**
  - no need for any coordination among nodes
  - (first copy of the) packet delivered over the shortest path (!)
  - state has to be kept in nodes
Reverse Path Forwarding

- Requires unicast routes

- Node $X$ accepts a packet from source $S$ via neighbor $N$ only if it is the neighbor you would forward to in order to reach $S$. 

![Diagram showing unicast path from X to S, with packet accepted and rejected scenarios.]
Spanning Tree

- Find minimum spanning tree
- Forward and copy packets along a spanning tree

**Characteristics**

- requires broader coordination among nodes to calculate the spanning tree
- nodes have to maintain state
## Comparison

<table>
<thead>
<tr>
<th></th>
<th>Flooding</th>
<th>Reverse path forwarding</th>
<th>Minimum spanning tree (MST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needs unicast routes</td>
<td>No</td>
<td>Yes</td>
<td>No (uses MST knowledge)</td>
</tr>
<tr>
<td>Involves multiple nodes</td>
<td>No</td>
<td>Yes (to get unicast routes)</td>
<td>Yes</td>
</tr>
<tr>
<td>State kept in nodes</td>
<td>Sequence #’s</td>
<td>Unicast routes</td>
<td>MST links</td>
</tr>
</tbody>
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