

Link State Routing Algorithm

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Putting it all together

- What message to send? Link-state packet (LSP)
- What to do when you receive an LSP? Action at a node
- When to send LSPs? Updates

Link State Packet

graph

- The id of node sending the packet
- The link-state of the node: neighborhood information (list of neighbors and cost to each)
- Sequence number
- Time-To-Live (TTL)


Action at a node

- Suppose a node X receives an LSP generated by node Y (Y need not be X's neighbor)
- Did I (i.e. X) hear from Y before?
 - No: Store the link-state information. Start an ageing timer.
 - Yes: Compare sequence number of this packet (Seq_new) with stored information (Seq_old).
 - If $\text{Seq_new} > \text{Seq_old}$, overwrite old link-state information, refresh ageing timer, forward to 'required' neighbors
 - If $\text{Seq_old} \geq \text{Seq_new}$, discard received packet → outdated info

Updates

- Flooding leads to lot of traffic
 - Avoid to the extent possible
- Triggered updates
 - A node floods the network whenever its link-state information changes
- Periodic updates
 - Need not be sent often, use long timers (order of hours)

Route Calculation

- Once a node has a LSP packet from every node, it has complete graph information
 - Use Dijkstra's algorithm to calculate shortest paths to nodes
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Points to Note

- No problem of looping since each node has global information
 - Transient loops still possible
- Fast convergence
- But, scaling problems due to:
 - Flooding, computation, ^{areas} amount of information storage required at each node
 - Can reduce overhead by setting period update timer to hours

Distance Vector vs Link State Algorithm

- DV: Each node talks only with directly connected neighbors but tells everything it has learned
 - Loops, slow convergence
- Link State: Each node talks to all nodes, but only state of directly connected node
 - Fast convergence but scalability concerns

Summary

- Link State routing: Another approach based on reliable flooding
- Provides fast convergence, but can pose scalability problems
- OSPF: a popular standard based on link state routing