

OSPF (Open Shortest Path First)

Features and Characteristics

- OSPFv2: IPv4, OSPFv3: IPv6
- Single-Area OSPF: only area 0, Multi-Area OSPF: all areas are connected to backbone (area 0)
- link: router interface, network segment
- link-state: information about a link (network prefix, prefix length, cost)

OSPF components

- Routing Protocol Messages (LSPs)
- Data Structures
 - Adjacency Database: Neighbor Table
 - Link-state Database: Topology Table
 - Forwarding Database: Routing Table
- Algorithm: Dijkstra shortest-path first (SPF) algorithm

OSPF Operation

1. Establish Neighbor Adjacencies (Hello Packets ⇒ Neighbor Table)
2. Exchange Link-State Advertisements (LSAs)
3. Build the Link State Database (⇒ Topology Table)
4. Execute the SPF Algorithm (⇒ SPF Tree)
5. Choose the Best Route (⇒ Routing Table)

OSPF Operational States

1. DOWN: send hello packet
2. INIT: received hello packet with own router-id
3. 2WAY: DR + BDR election (not on point-to-point networks)
4. EXSTART: decide first router
5. EXCHANGE: exchange DBDs
6. LOADING: send LSR
7. FULL: Routers are synchronized

DR (Designated Router) and BDR (Backup Designated Router) election

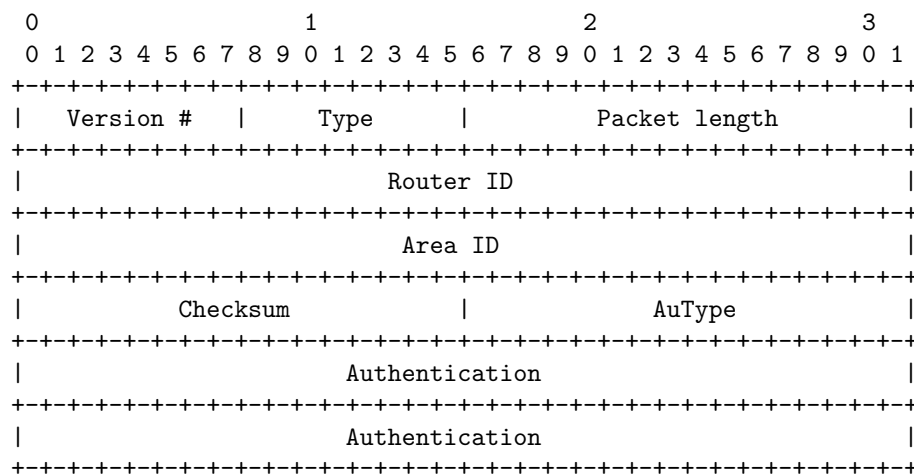
- on multiaccess networks, e.g. Ethernet
- 1. highest priority, 2. highest router id

Link State Packets (LSPs)

- Type 1: Hello packet
- Type 2: Database description packet (DBD): abbreviated list of LSDB
- Type 3: Link-state Request packet (LSR): request more information about an entry
- Type 4: Link-state Update packet (LSU): reply to LSR, contains one or more LSAs
 - LSA Type 1: Router LSA
 - LSA Type 2: Network LSA
 - LSA Type 3 or 4: Summary LSA
 - LSA Type 5: Autonomous System External LSA
 - LSA Type 6: Multicast OSPF-LSA
 - LSA Type 7: Defined for Not-So-Stubby areas
 - LSA Type 8: External Attributes LSA for Border Gateway Patrol (BGPs)
- Type 5: Link-state Acknowledgment packet (LSAck): Ack LSU

OSPF Packet Header

RFC2328



OSPF Hello Packet Data

RFC2328

