OSPF Packet Header

0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7
Version #	Type	Packet Length	
Router ID			
Area ID			
Checksum		Authentication Type	
Authentication			
Authentication			

Type 1 Hello
Type 2 Database Description
Type 3 Link State Request
Type 4 Link State Update
Type 5 Link State Acknowledgment

OSPF Hello

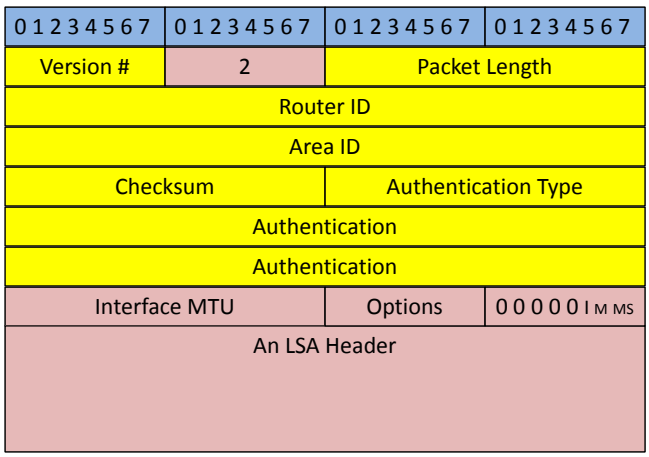
0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7
Version #	1	Packet Length	
Router ID			
Area ID			
Checksum		Authentication Type	
Authentication			
Authentication			
Network Mask			
Hello Interval		Options	Router Pri
Router Dead Interval			
Designated Router			
Backup Designated Router			
Neighbor (could repeat for multiple neighbors)			

Options Field

0	1	2	3	4	5	6	7
*	*	DC	EA	N/P	MC	E	*

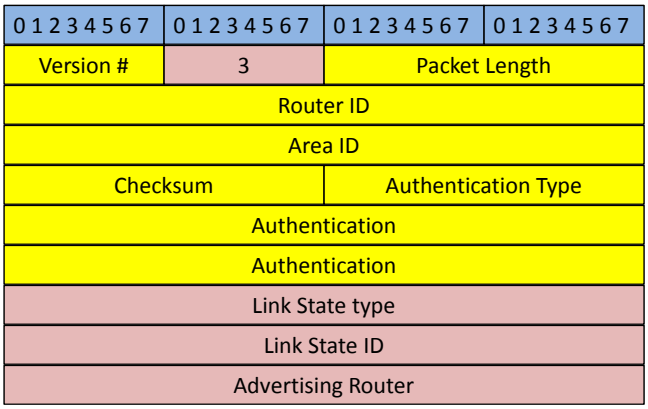
DC Bit: identifies support for demand circuits
EA Bit: ability to support External Attribute LSA
N/P Bit: support for LSA Type 7 (NSSA Externals)
MC Bit: support for multicast packets (MOSPF)
E Bit: identifies the support for LSA type 5 packets

OSPF Database Description



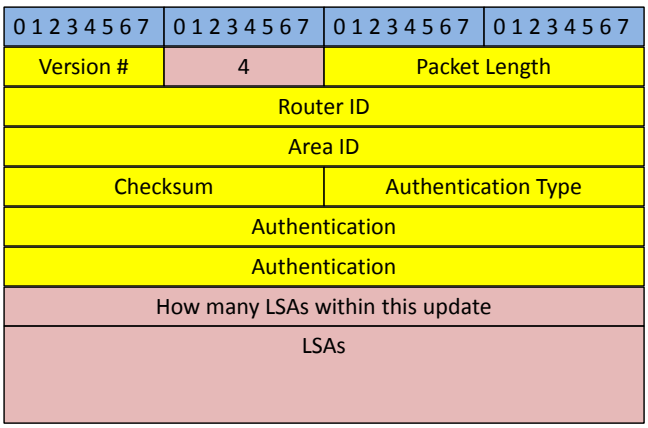
I Bit: When set, this is the first in sequence of database descriptor packets
M Bit: When set, there are more database descriptor packets to follow
MS Bit: Master/Slave bit, when set, this router is the master

OSPF Link State Request



After exchanging Database Description packets with a neighboring router, a router may find that parts of its link-state database are out-of-date. The Link State Request packet is used to request the pieces of the neighbor's database that are more up-to-date.

OSPF Link State Update



OSPF LSA Header

0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7
Link State Age		Options	LS Type
Link State ID			
Advertising Router			
Link State Sequence Number			
Link State Checksum		Length	

LSA Type 1 – Router LSA

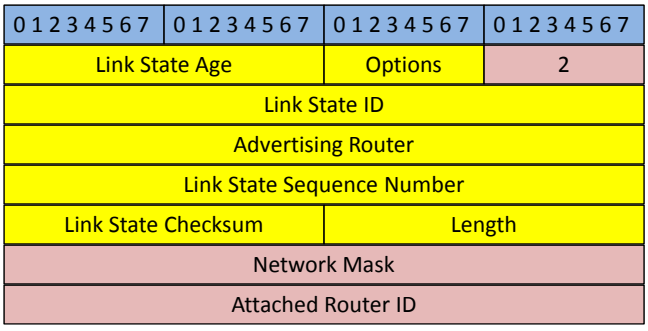
0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7
Link State Age		Options	1
Link State ID			
Advertising Router			
Link State Sequence Number			
Link State Checksum		Length	
0 Nt W V E B 0		Number of Links	
Link ID			
Link Data			
Type	# TOS	Metric	

Could repeat for multiple links

LSA Type 1 Bits/Fields

- Nt Bit: When set, the router is an NSSA border router and will translate LSA Type -7 to LSA Type-5
- W Bit: When set, the router is a wild-card multicast receiver
- V Bit: When set, the router is an endpoint of one or more fully adjacent virtual links.
- E Bit: When set, the router is an AS boundary router
- B Bit: When set, the router is an area border router
- Type is a brief description of the link
  - 1 Point to point
  - 2 connection to transit network
  - 3 connection to a stub network
  - 4 Virtual link
- Link ID identifies the object that this links connects to
  - 1 Neighbors Router ID
  - 2 IP address of the DR
  - 3 IP Network/Subnetwork number
  - 4 Neighbor Router ID
- # TOS is the number of different Type of Service metrics given (other than the required link metric)

LSA Type 2 – Network LSA



LSA Type 3/4 – Summary LSA

0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7
Link State Age		Options	3 or 4
Link State ID			
Advertising Router			
Link State Sequence Number			
Link State Checksum		Length	
Network Mask			
0	Metric		
TOS	TOS Metric		

Type 3 summary-LSAs are used when the destination is an IP network.
Type 4 summary-LSAs are used when the destination is an AS boundary router within another area.

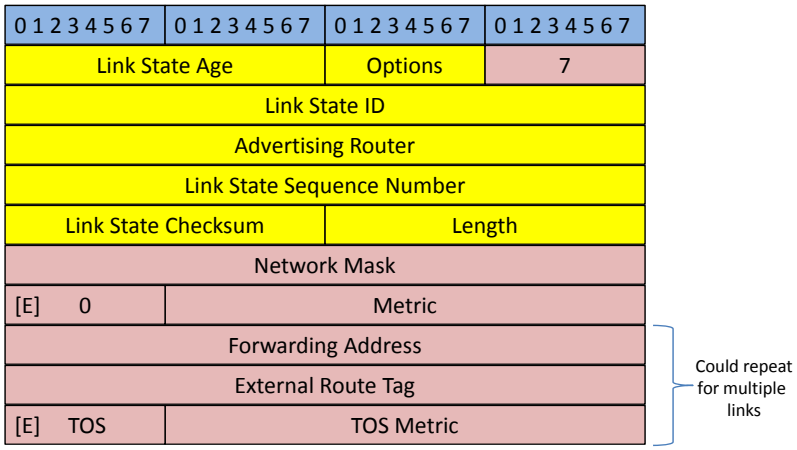
LSA Type 5 – AS External LSA

0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7
Link State Age		Options	5
Link State ID			
Advertising Router			
Link State Sequence Number			
Link State Checksum		Length	
Network Mask			
[E] 0	Metric		
Forwarding Address			
External Route Tag			
[E] TOS	TOS Metric		

Could repeat for multiple links

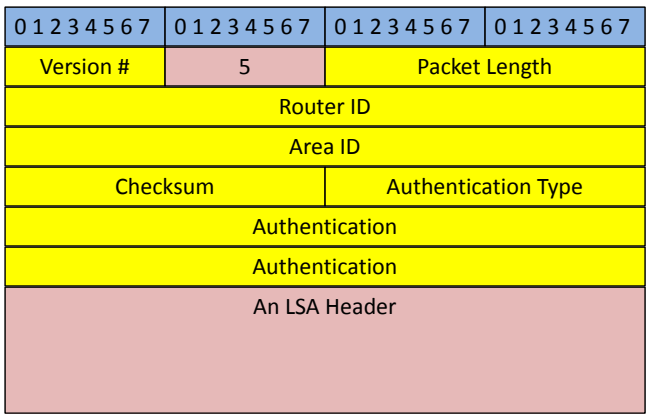
E Bit: External type

LSA Type 7 – NSSA External



E Bit: External type

OSPF Link State Acknowledgement



To make the flooding of LSAs reliable, flooded LSAs are explicitly acknowledged. This acknowledgment is accomplished through the sending and receiving of Link State Acknowledgment packets.