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		Instance ID	0

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		Instance ID	0
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	R	N/P	*	E	V6

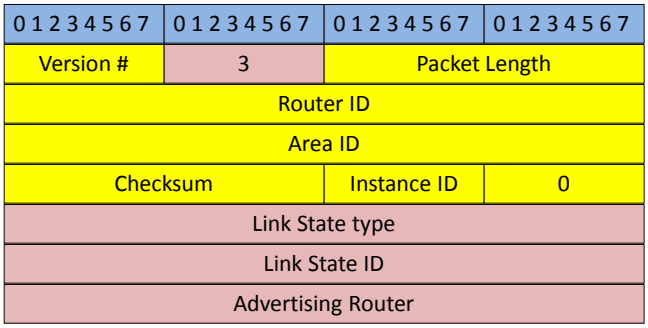
DC Bit: identifies support for demand circuits
R-bit: specifies whether the router is Active or not.
N/P Bit: support for LSA Type 7 (NSSA Externals)
MC Bit: support for multicast packets (MOSPF)
E Bit: identifies the support for LSA type 5 packets
V6-bit: IPv6 routing calculations are to be used.

OSPF Database Description

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 #	2	Packet Length	
Router ID			
Area ID			
Checksum		Instance ID	0
Interface MTU		Options	0 0 0 0 0 I M MS
An LSA Header			

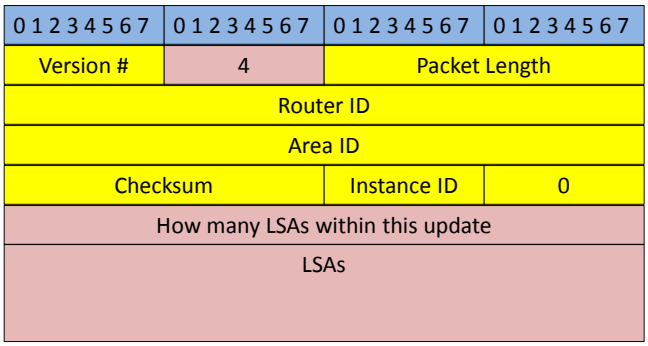
I Bit: When set, this is the first in sequence of database descriptor packets
M Bit: When set, there are more database descriptor packets to follow
MS Bit: Master/Slave bit, when set, this router is the master

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Database Description packets with a neighboring router, a router may find that parts of its link-state database are out-of-date.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		LS Type*	
Link State ID			
Advertising Router			
Link State Sequence Number			
Link State Checksum		Length	

* To keep from confusing routers, the LS Type is the type value + 0x2000

LSA Type 1 – Router LSA

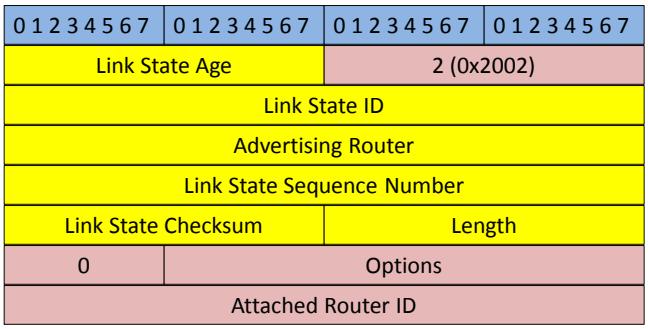
0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7	0 1 2 3 4 5 6 7
Link State Age		1 (0x2001)	
Link State ID			
Advertising Router			
Link State Sequence Number			
Link State Checksum		Length	
0 Nt x V E B	Options		
Type	0	Metric	
Interface ID			
Neighbor Interface ID			
Neighbor Router ID			

Could repeat for multiple links

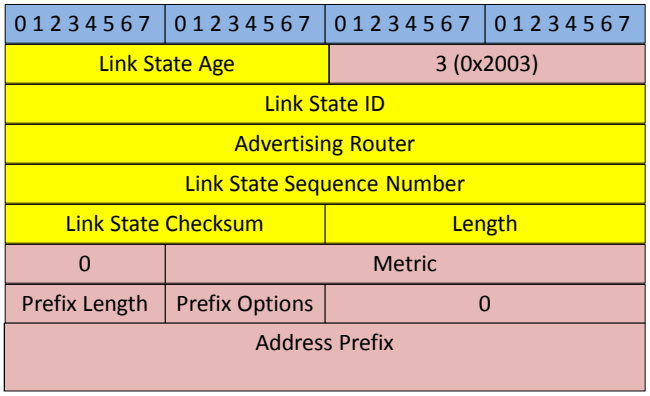
LSA Type 1 Bits/Fields

- Nt Bit: When set, the router is an NSSA border router and will translate LSA Type -7 to LSA Type-5
- 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)

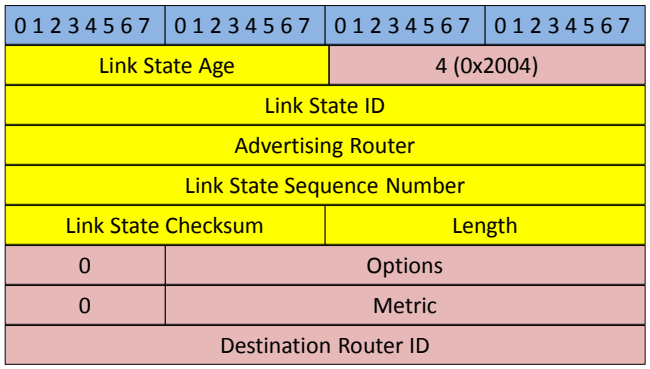
LSA Type 2 – Network LSA



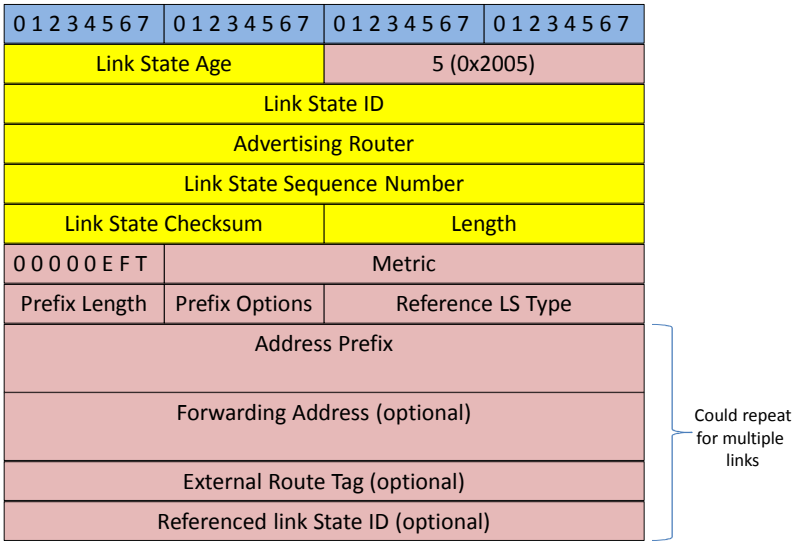
LSA Type 3 – Inter-Area-Prefix LSA



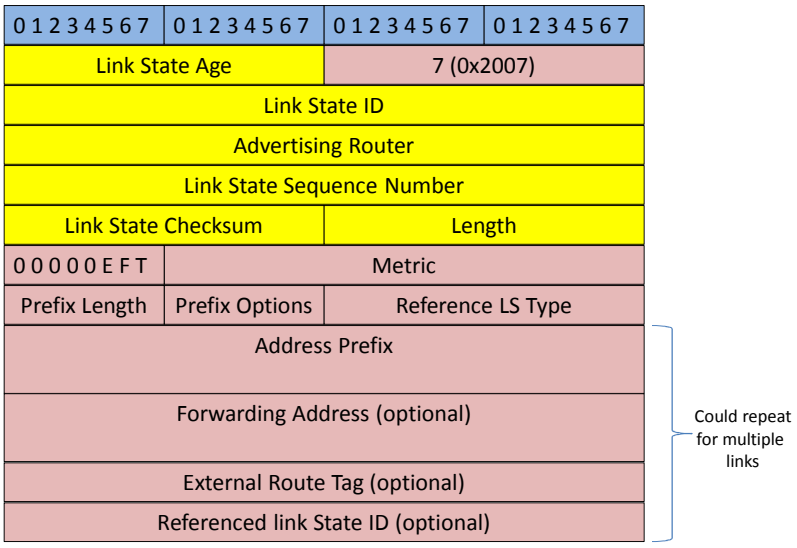
LSA Type 4 – Inter-Area-Router LSA



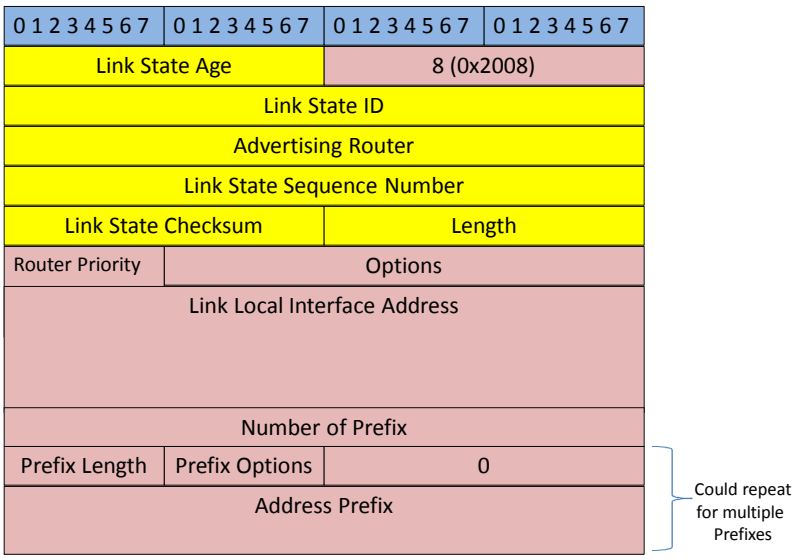
LSA Type 5 – AS External LSA



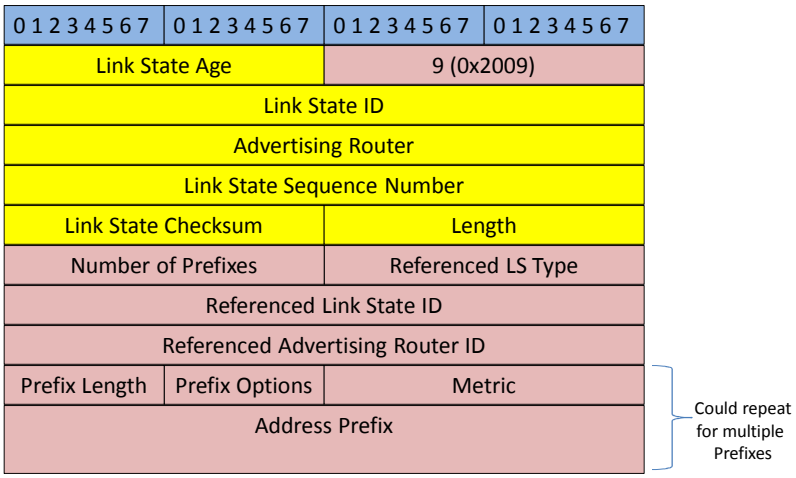
LSA Type 7 – NSSA External LSA



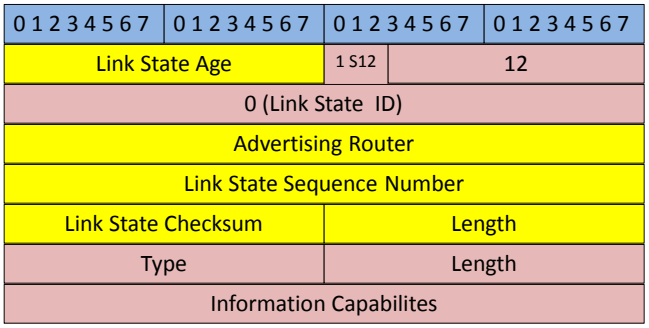
LSA Type 8 – Link LSA



LSA Type 9 – Intra-Area-Prefix LSA



LSA Type 12 – Opaque LSA



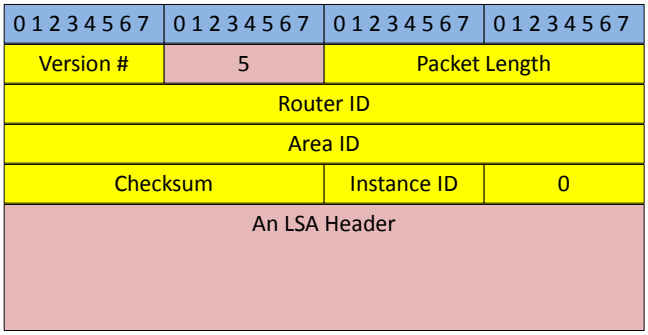
S12 bits are dependent on the desired flooding scope for the LSA.

Information Capability Types

The following informational capability bits are assigned:

Bit	Capabilities
0	OSPF graceful restart capable [GRACE]
1	OSPF graceful restart helper [GRACE]
2	OSPF Stub Router support [STUB]
3	OSPF Traffic Engineering support [TE]
4	OSPF point-to-point over LAN [P2PLAN]
5	OSPF Experimental TE [EXP-TE]
6-31	Unassigned (Standards Action)

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.