



# OSPF LSA Types

### LSA Type 1 (router)

**LSID:** OSPF Router ID  
**Usage:** Represents each router and its connected interface within an area

**Scope:** Only flooded within one area  
**Generated by:** All routers. One generated per area

Router ID	32 bits
(For non-DR links) Neighbour ID + cost	Appears if the neighbors is reachable
(For non-DR links) Subnet/Mask + cost	Shows as a stub network
(For DR links) DR LAN IP Address + cost	Shows as a transit network

### LSA Type 2 (network)

**LSID:** DR LAN IP Address  
**Usage:** Represents a shared LAN segment as a node which type 1 LSAs connect to.

**Scope:** Only flooded within one area  
**Generated by:** The DR on a multiaccess network

Network Mask	Combined with the LSID will give the full subnet.
List of Attached Routers	Identified by their router IDs

**DR Election**

- Highest interface priority wins (default 1, max 255)
- High Router ID
- Repeat process for BDR

### LSA Type 10 (opaque example)

**LSID:** The LSID has been replaced with the 8 bit Opaque Type field and the 24 bit Opaque ID field  
**Usage:** Carries TLVs specific to Traffic Engineering

**Scope:** Flooded within an area  
**Generated by:** Routers configured for TE

Advertising Router	32 bit Router ID
Network MPLS TE router ID	Usually the same as the Advertising Router ID. Can be uniquely set

TLV #1 for traffic engineering

TLV #1 Sub TLV #1
...
TLV #1 Sub TLV #n

...

TLV #m for traffic engineering

TLV #m Sub TLV #1
...
TLV #m Sub TLV #n

Below is an example of a Link Type TLV and its Sub TLVs, used to carry information relevant to TE

TLV Type 2 - Link TLV		
Sub-TLV Number	Name	Octets
1	Link Type	1
2	Link ID	4
3	Local Interface IP address	4
4	Remote Interface IP address	4
5	TE Metric	4
6	Maximum Bandwidth	4
7	Max Reservable Bandwidth	4
8	Unreserved Bandwidth	32
9	Administrative Group	4

OSPF neighbors will set the O-bit in the OSPF Header Option field to indicate they can support opaque LSAs. In Cisco IOS the output "**RRR enabled**" will often refer to TE being supported. RRR (Routing with Resource Reservation) is a legacy name for TE

### LSA Type 3 (summary)

**LSID:** Network Address of subnet being advertised  
**Usage:** Represents a subnet from a different area.

**Scope:** Created from one area and flooded into another.  
**Generated by:** ABRs

Advertising Router	32 bit Router ID
Network Mask	Combined with the LSID will give the full subnet.
Cost (metric)	Cost of ASBR to reach subnet

A default type 3 LSA is flooded throughout stub areas

### LSA Type 4 (asbr-summary)

**LSID:** The Router ID of the ASBR  
**Usage:** If the advertising router of an external LSA is not in the same area, an LSA Type 4 will be used to find the cost from the ABR to the ASBR

**Scope:** Flooded into areas where the ASBR being represented does not exist  
**Generated by:** ABRs who recognise they are flooding Type 5 LSAs in to an area and the advertising router is in another area

Advertising Router	32 bit Router ID
Cost (metric)	Cost for the advertising router (the ABR) to reach the ASBR

### LSA Type 5 (external)

**LSID:** Network Address of subnet being advertised  
**Usage:** Represents a subnet redistributed into OSPF from an external source

**Scope:** Flooded into the backbone or non-stub areas  
**Generated by:** ASBRs

Advertising Router	32 bit Router ID (not necessarily in the same area)
Network Mask	Combined with the LSID will give the full subnet.
Cost (metric)	OSPF cost
External Metric Type	Type 2 (E2, default) means internal OSPF costs are not added to the cost of the route during SFP calculation. Type 1 (E1) routes do consider internal OSPF costs.

A default route type 5 LSA is flooded throughout an area when the **default information originate** command is used. The ASBR will do this only if it has a default from some other source.

### LSA Type 7 (external)

**LSID:** Network Address of subnet being advertised  
**Usage:** Represents a subnet redistributed into OSPF from an external source into a stub area

**Scope:** Flooded into a stub area. Converted to Type 5 LSA when advertised into other areas.  
**Generated by:** ASBRs

Advertising Router	32 bit Router ID
Network Mask	Combined with the LSID will give the full subnet.
Cost (metric)	OSPF cost
External Metric Type	Type 2 (N2, default) means internal OSPF costs are not added to the cost of the route during SFP calculation. Type 1 (N1) routes do consider internal OSPF costs

### All LSAs

All LSAs contain this basic information

Options	Includes the down-bit etc.
LSA Sequence Number	Starts at 0x80000001 and is increment at each change
LS Type	LSA Type
Length	Length of LSA
LS Age	Time LSA has been known. Every 1800 seconds the sequence number will be incremented and LSA will be reflooded

### Opaque LSAs

Opaque LSAs are designed to extend LSA functionality and are used to convey a variety of information. They can be thought of as being analogous to IS-IS TLVs. Above is an MPLS TE implementation of a type 10 LSA.

Type 9 - Opaque LSA with link local scope (IPv4 for OSPFv2)
Type 10 - Opaque LSA flooded throughout an area.
Type 11 - Opaque LSA with identical functionality to Type 10 just not sent to stub-areas.

Rare or unsupported by Cisco

Type 6 - MOSPF Group Membership
Type 8 - External Attributes