

ISIS WG  
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## **IS-IS extensions for advertising router information**

[draft-vasseur-isis-caps-02.txt](#)

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### Abstract

This document defines a new optional IS-IS TLVs named CAPABILITY, formed of multiple sub-TLVs, which allows a router to announce its capabilities within an IS-IS level or the entire routing domain.



## Conventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC-2119](#) [ii].

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## [1. Introduction](#)

There are several situations where it is useful for the IS-IS routers to learn the capabilities of the other routers of their IS-IS level, area or routing domain. Some applications are described in [IS-IS-TE-CAP]. For the sake of illustration, three examples related to MPLS Traffic Engineering are described here:

1. Path Computation Element (PCE) discovery ([INTER-DOMAIN-PATH-COMP]): in several situations, the Traffic Engineering Label Switched (TE LSP) path is computed by a Label Switch Router (LSR) which is not the head-end for that LSP (e.g an ABR or an ASBR respectively in the context of inter-area and inter-AS MPLS TE ([INTER-AREA-AS])). In such a case, having the ability to discover the capability of a router to act as a PCE is extremely useful in term of ease of operation, capacity to react to PCE failure, load sharing between a set of PCEs and so on.
2. Mesh-group: the setting up of a mesh of TE LSPs requires some significant configuration effort. [\[IS-IS-TE-CAP\]](#) proposes an auto-discovery mechanism whereby every LSR of a mesh advertises its mesh-group membership by means of IS-IS extensions.
3. Point to Multi-point TE LSP (P2MP LSP). A specific sub-TLV ([IS-IS-TE]) allows an LSR to advertise its Point To Multipoint capabilities ([\[P2MP\]](#) and [\[P2MP-REQS\]](#)).

The capabilities mentioned above require the specification of new sub-TLVs carried within the CAPABILITY TLV defined in this document.



Note that the examples above are provided for the sake of illustration. This document proposes a generic capability advertising mechanism not limited to MPLS Traffic Engineering.

This document defines a new optional IS-IS TLVs named CAPABILITY, formed of multiple sub-TLVs, which allows a router to announce its capabilities within an IS-IS level or the entire routing domain. The applications mentioned above require the specification of new sub-TLVs carried within the CAPABILITY TLV defined in this document.

Definition of these sub-TLVs is outside the scope of this document.

## **2. IS-IS Router CAPABILITY TLV**

The IS-IS Router CAPABILITY TLV is composed of 1 octet for the type, 1 octet specifying the TLV length, 1 octet of bit flags and a variable length value field, starting with 4 octets of Router ID, indicating the source of the TLV, and followed by 1 octet of flags. A set of optional sub-TLVs may follow the flag field.

TYPE: 242 (To be assigned by IANA)

LENGTH: from 5 to 255

VALUE:

Router ID (4 octets)

Flags (1 octet)

Set of optional sub-TLVs (0-250 octets)

Flags

```
0 1 2 3 4 5 6 7
+-+--+--+--+--+
| Reserved |D|S|
+-+--+--+--+--+
```

Currently two bit flags are defined.

S bit (0x01): If the S bit is set(1), the IS-IS Router CAPABILITY TLV MUST be flooded across the entire routing domain. If the S bit is not set(0), the TLV MUST NOT be leaked between levels. This bit MUST NOT be altered during the TLV leaking.

D bit (0x02): When the IS-IS Router CAPABILITY TLV is leaked from level-2 to level-1, the D bit MUST be set. Otherwise this bit MUST be clear. IS-IS Router capability TLVs with the D bit set MUST NOT be leaked from level-1 to level-2. This is to prevent TLV looping.



The Router CAPABILITY TLV is OPTIONAL. As specified in [section 3](#), more than one Router CAPABILITY TLVs from the same source MAY be present.

This document does not specify how an application may use the Router Capability TLV and such specification is outside the scope of this document.

### **3. Element of procedure**

In case of advertising capabilities with different flooding scopes, a router MUST originate a minimum of two Router CAPABILITY TLVs, each TLV carrying the set of sub-TLVs with the same flooding scope. For instance, if a router advertises two sets of capabilities C1 and C2 with an area/level scope and routing domain scope respectively, C1 and C2 being specified by their respective sub-TLV(s), the router MUST originate two Router CAPABILITY TLVs:

- One Router CAPABILITY TLV with the S flag cleared carrying the sub-TLV(s) relative to C1. This Router CAPABILITY TLV MUST NOT be leaked into another level.
- One Router CAPABILITY TLV with the S flag set carrying the sub-TLV(s) relative to C2. This Router CAPABILITY TLV MUST be leaked into other IS-IS levels. When the TLV is leaked from level-2 to level-1, the D bit MUST be set in the level-1 LSP advertisement.

When leaking Capability TLVs downward from Level-2 into Level-1, if the originator of the TLV is a Level-1 router in another area, it is possible that multiple copies of the same TLV may be received from multiple L2 routers in the originating area. To prevent a router from leaking multiple copies of the same TLV, the router performing the downward leaking MUST check for such duplication by comparing the contents of the TLVs.

When leaking Capability TLVs received from other systems, the router performing the leaking MUST only leak a TLV if the system advertising the TLV (which may or may not be the system which originated the TLV) is reachable via Level-x paths, where "x" is the level (1 or 2) in which the sending system advertised the TLV.

### **4. Interoperability with routers not supporting the capability TLV.**

Routers which do not support the Router CAPABILITY TLV MUST silently ignore the TLV(s) and continue processing other TLVs in the same LSP. Routers which do not support specific sub-TLVs carried within a Router CAPABILITY TLV MUST silently ignore the unsupported sub-TLVs and continue processing those sub-TLVs in the Router CAPABILITY TLV which are supported. How partial support may impact the operation of



the capabilities advertised within the Router CAPABILITY TLV is outside the scope of this document.

In order for Router CAPABILITY TLVs with domain-wide scope originated by L1 Routers to be flooded across the entire domain at least one L1/L2 Router in every area of the domain SHOULD support the Router CAPABILITY TLV.

If leaking of the CAP TLV is required, the entire CAP TLV MUST be leaked into another level even though it may contain some of the unsupported sub-TLVs.

## **5. Security considerations**

No new security issues are raised in this document.

## **6. Acknowledgment**

The authors would like to thank Dave Ward, Jean-Louis Le Roux, Paul Mabey and Andrew Partan for their useful comments.

## **7. Intellectual Property Considerations**

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## 8. References

### Normative references

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[ISIS-TE] Li, T., Smit, H., "IS-IS extensions for Traffic Engineering", [RFC 3784](#), June 2004.

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## 9. Author's Addresses

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