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Advertisement of Stub Link Attributes
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Abstract

This document describes the mechanism that can be used to differentiate the stub links from the normal interfaces within ISIS or OSPF domain.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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Table of Contents

1. Introduction 2
2. Conventions used in this document 3
3. Consideration for Identifying Stub Link 3
4. Protocol Extension for Stub Link Attributes 3
4.1. OSPF Stub-Link TLV 4
4.2. ISIS Stub-link Sub-TLV 5
5. Security Considerations 6
6. IANA Considerations 6
7. Acknowledgement 7
8. References 7
8.1. Normative References 7
8.2. Informative References 8
Authors' Addresses 8

1. Introduction

Stub links are used commonly within an operators enterprise or service provider networks. One of the most common use cases for stub links is in a data center Layer 2 and Layer 3 Top of Rack(TOR) switch where the inter connected links between the TOR switches and uplinks to the core switch are only a few links and a majority of the links are Layer 3 VLAN switched virtual interface trunked between the TOR switches serving Layer 2 broadcast domains. In this scenario all the VLANs are made as stub links as it is recommended to limit the number of network LSAs between routers and switches to avoid unnecessary hello processing overhead.

Another common use case is an inter-AS routing scenario where the same routing protocol but different IGP instance is running between the adjacent BGP domains. Using stub link on the inter-AS connections can ensure that prefixes contained within a domain are only reachable within the domain itself and not allow the link state database to be merged between domain which could result in undesirable consequences.

For operator which runs different IGP domains that interconnect with each other via the stub links, there is desire to obtain the inter-AS topology information as described in [I-D.ietf-idr-bgpls-inter-as-topology-ext]. If the router that runs BGP-LS within one IGP domain can distinguish stub links from other

normal interfaces, it is then easy for the router to report these stub links using BGP-LS to a centralized PCE controller.

Draft [I-D.dunbar-lsr-5g-edge-compute] describes the case that edge compute server attach the network and needs to flood some performance index information to the network to facilitate the network select the optimized application resource. The edge compute server will also not run IGP protocol.

And, stub links are normally the boundary of one IGP domain, knowing them can facilitate the operators to apply various policies on such interfaces, for example, to secure their networks, or filtering the incoming traffic with scrutiny.

But OSPF and ISIS have no position to identify such stub links and their associated attributes now.

This document defines the protocol extension for OSPFv2/v3 and ISIS to indicate the stub links and their associated attributes.

2. 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 [RFC2119] .

3. Consideration for Identifying Stub Link

OSPF[RFC5392] defines the Inter-AS-TE-v2 LSA and Inter-AS-TE-v3 LSA to carry the TE information about inter-AS links. These LSAs can be used to transfer the information about the stub link which is located at the boundary of one AS. This document defines the Stub-Link TLV within these LSAs to identify the stub link and transfer the associated attributes then.

ISIS[RFC5316] defines the Inter-AS Reachability TLV to carry the TE

information about inter-AS links. This TLV can be used to transfer the information about the stub link which is located at the boundary of one AS. This document defines the Stub-Link TLV to identify the stub link and transfer the associated attributes.

4. Protocol Extension for Stub Link Attributes

The following sections define the protocol extension to indicate the stub link and its associated attributes in OSPFv2/v3 and ISIS.

4.1. OSPF Stub-Link TLV

This document defines the OSPF Stub-Link TLV to describe stub link of a single router. This Stub-Link TLV is only applicable to the Inter-AS-TE-v2 LSA and Inter-AS-TE-v3 LSA. Inclusion in other LSA MUST be ignored.

The OSPF Stub-Link TLV which is under the IANA codepoint "Top Level Types in TE LSAs" has the following format:

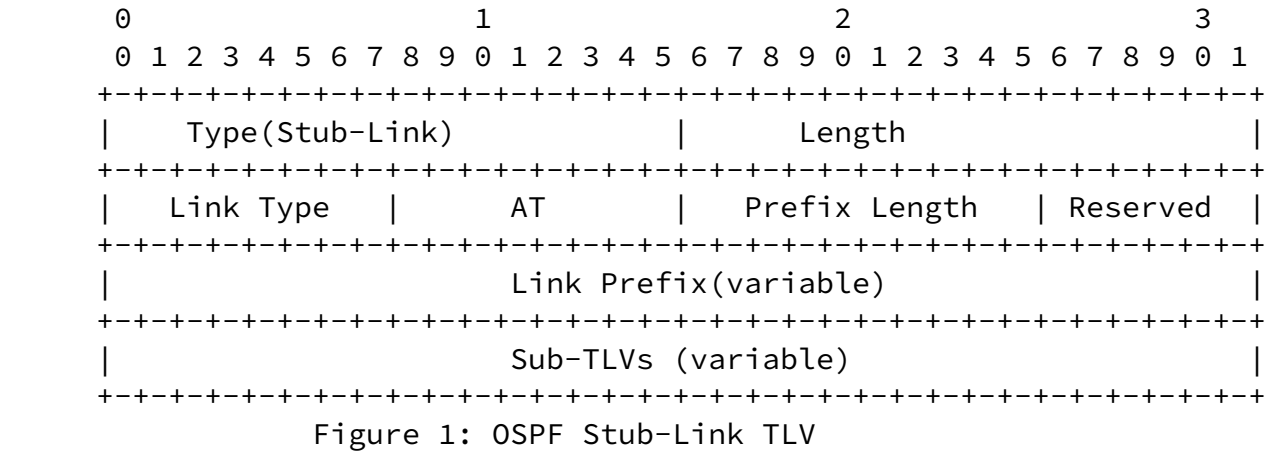

Figure 1: OSPF Stub-Link TLV

Type: The TLV type. The value is 7(TBD) for OSPF Stub-Link

Length: Variable, dependent on sub-TLVs

Link Type: Define the type of the stub-link. This document defines the followings type:

- o 0: Reserved
- o 1: Numbered AS boundary link
- o 2: Unnumbered AS boundary link
- o 3: Loopback link
- o 4: Vlan interface link
- o 5-255: For future extension

AT: Address Type. 1 for IPv4, 2 for IPv6

Prefix Length: The length of the interface address, in octet.

Link Prefix: The prefix of the stub-link. It's length is determined by the field "Prefix Length".

Sub-TLVs: Existing sub-TLV that defined within "Open Shortest Path First (OSPF) Traffic Engineering TLVs" for TE Link TLV(Value 2) can be included if necessary. If the stub-link is "Unnumbered AS boundary link", then the "Remote AS number" , "IPv4 Remote ASBR ID", "IPv6 Remote ASBR ID" sub-TLV MUST be included to facilitate the pairing of inter-AS link.

If this TLV is advertised multiple times in the same Inter-AS-TE-v2/v3 LSA, only the first instance of the TLV is used by receiving OSPFv2/v3 routers. This situation SHOULD be logged as an error.

If this TLV is advertised multiple times for the same link in different Inter-AS-TE-v2/v3 LSA originated by the same OSPFrouter, the OSPFStub-Link TLV in these LSAs with the smallest Opaque ID is used by receiving OSPFrouters. This situation may be logged as a warning.

It is RECOMMENDED that OSPF routers advertising OSPF Stub-Link TLVs in different OSPF Inter-AS-TE v2/v3 LSAs re-originate these LSAs in ascending order of Opaque ID to minimize the disruption.

This document creates a registry for Stub-Link attributes in

Section 6.

4.2. ISIS Stub-link Sub-TLV

This document defines the ISIS Stub-Link TLV to describes stub link of a single router.

The ISIS Stub-Link TLV has the following format:

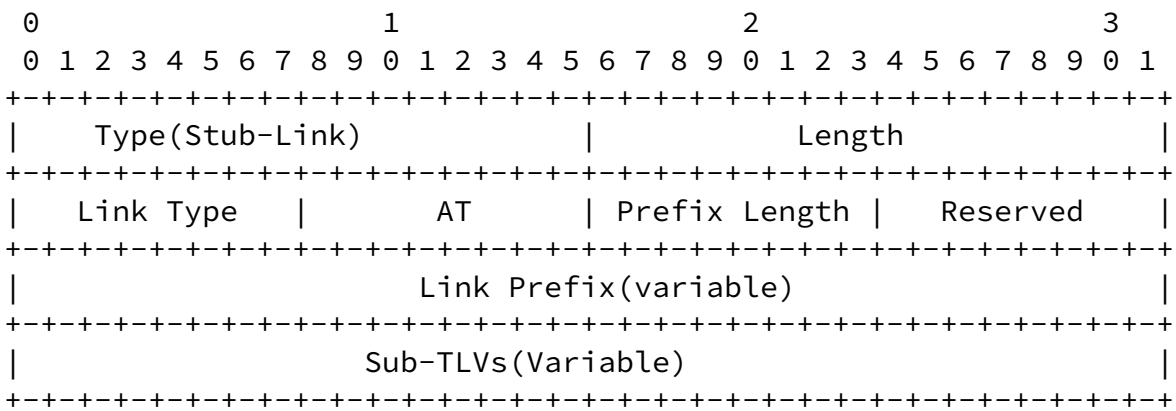

Figure 2: ISIS Stub-Link Sub-TLV

Type: ISIS TLV codepoint. Value is 151(TBD) for stub-link TLV.

Length: Variable, dependent on sub-TLVs

Link Type: Define the type of the stub-link. This document defines the followings type:

- 0: Reserved
- 1: Numbered AS boundary link
- 2: Unnumbered AS boundary link
- 3: Loopback link
- 4: Vlan interface link
- 5-255: For future extension

AT: Address Type. 1 for IPv4, 2 for IPv6

Prefix Length: The length of the interface address, in octet.

Link Prefix: The prefix of the stub-link. It's length is determined by the field "Prefix Length".

Sub-TLVs: Existing sub-TLVs that defined within "IS-IS Sub-TLVs for TLVs Advertising Neighbor Information " can be included if necessary. If the stub-link is "Unnumbered AS boundary link", then the "Remote AS number" , "IPv4 Remote ASBR ID", "IPv6 Remote ASBR ID" sub-TLV MUST be included to facilitate the pairing of inter-AS link.

5. Security Considerations

Security concerns for ISIS are addressed in [RFC5304] and[RFC5310]

Security concern for OSPFv3 is addressed in [RFC4552]

Advertisement of the additional information defined in this document introduces no new security concerns.

6. IANA Considerations

IANA is requested to the allocation in following registries:

Registry	Type	Meaning
Top Level Types in TE LSAs	7	OSPF Stub-Link TLV
ISIS Top-Level TLV	151	IS-IS Stub-Link TLV

Figure 3: IANA Allocation for newly defined TLVs

7. Acknowledgement

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8. References

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