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A Policy Control Mechanism in IS-IS Using Administrative Tags
<draft-ietf-isis-admin-tags-01.txt>

1. Status of this Memo

2. Abstract

This document describes an extension to the IS-IS protocol to add operational capabilities that allow for ease of management and control over IP prefix distribution within an IS-IS domain. The IS-IS protocol is specified in [1], with extensions for supporting IPv4 specified in [2] and further enhancements for Traffic Engineering [4] in [3] and [6].

This document enhances the IS-IS protocol by extending the information that a Intermediate System (IS) [router] can place in Link State Protocol Data Units (LSPs) as specified in [2]. This

extension will provide operators with a mechanism to control IP prefix distribution throughout multi-level IS-IS domains. Additionally, the information can be placed in LSPs that have TLVs as yet undefined, if this information is used to convey the same meaning in these future TLVs as it is used in the currently defined TLVs.

3. Specification of Requirements

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].

4. Introduction

As defined in [2] and extended in [3], the IS-IS protocol may be used to distribute IP prefix reachibility information throughout an IS-IS domain. The IP prefix information is encoded as TLV type 128 and 130 in [2], with additional information carried in TLV 135 as specified in [3] and TLV 235 as defined in [6]. In particular, the extended IP Reachabilty TLV (135) contains support for a larger metric space, an up/down bit to indicate redistribution between different levels in the hierarchy, an IP prefix, and one or more sub-TLVs that can be used to carry specific information about the prefix. TLV 235 is a derivative of TLV 135, with the addition of MultiTopology membership information [6].

As of this writing no sub-TLVs have been defined; however, this draft proposes 2 new sub-TLVs for both TLV 135 and TLV 235 that may be used to carry administrative information about an IP prefix.

5. Sub-TLV Additions

This draft proposes 2 new "Administrative Tag" sub-TLVs to be added to TLV 135 and 235. These TLVs specify one or more ordered, 32 or 64 bit unsigned integers that may be associated with an IP prefix. Example uses of these tags include controlling redistribution between levels and areas, different routing protocols, or multiple instances of IS-IS running on the same router, or carrying BGP standard or extended communites.

The methods for which their use is employed is beyond the scope of this document and left to the implementer and/or operator.

The encoding of the sub-TLV(s) is discussed in the following

subsections.

5.1. 32-bit Administrative Tag Sub-TLV 1

The Administrative Tag shall be encoded as one or more 4 octet unsigned integers using Sub-TLV 1 in TLV-135 [3] and TLV 235 [6]. The Administrative Tag Sub-TLV has following structure:

```
1 octet of type (value: 1)
1 octet of length (value: multiple of 4)
one or more instances of 4 octets of administrative tag
```

An implementation may consider only one of the encoded tags, in which case the first encoded tag must be considered. A tag value of zero is reserved and should be treated as "no tag".

5.2. 64-bit Administrative Tag Sub-TLV 2

The Administrative Tag shall be encoded as one or more 8 octet unsigned integers using Sub-TLV 2 in TLV-135 [3] and TLV 235 [6]. The 64-bit Administrative Tag Sub-TLV has following structure:

```
1 octet of type (value: 1)
1 octet of length (value: multiple of 8)
one or more instances of 8 octets of administrative tag
```

An implementation may consider only one of the encoded tags, in which case the first encoded tag must be considered. A tag value of zero is reserved and should be treated as "no tag".

6. Ordering of Tags

The semantics of the tag order are implementation-dependent. That

is, there is no implied meaning to the ordering of the tags that indicates a certain operation or set of operations need be performed, based on the order of the tags. Each tag SHOULD be treated as an autonomous identifier that MAY be used in policy to perform a policy action. Whether or not tag A preceeds or succeeds tag B SHOULD not change the meaning of the tag set. However, an implementation MAY wish to preserve tag ordering such that an ordered set of tags has meaning to the local policy.

Each IS that receives an LSP with TLV(s) 135 and/or 235, that have associated SubTLV(s) 1 and/or 2, MAY operate on the tag values as warranted by the implementation. If an implementation needs to

change tag values, for example, at an area boundary, then the TLV(s) SHOULD be copied to the newly generated Level-1 or Level-2 LSP at which point, the contents of the SubTLV(s) MAY change as dictated by the policy action. In the event that no change is required, the SubTLV(s) SHOULD be copied in order into the new LSP, such that ordering is preserved.

7. A compliant IS-IS implementation:

MUST be able to assign one tag to any IP prefix in TLV(s) 135 and/or 235.

MAY be able to assign more than one tag to any IP prefix in TLV(s) 135 and/or 235.

MAY be able to rewrite or remove one or more tags associated with a prefix in TLV(s) 135 and/or 235 upon LSP generation at an area boundary.

8. Operation

An administrator associates an Administrative Tag value with some interesting property. When IS-IS advertises reachability for some IP prefix that has that property, it adds the Administrative Tag to the IP reachability information TLV for that prefix, and the tag "sticks" to the prefix as it is flooded throughout the routing domian.

Consider the network in figure 1. We wish to "leak" L1 prefixes [5] with some property, A, from L2 to the L1 router R1. Without policy-groups, there is no way for R2 to know property A prefixes from property B prefixes.

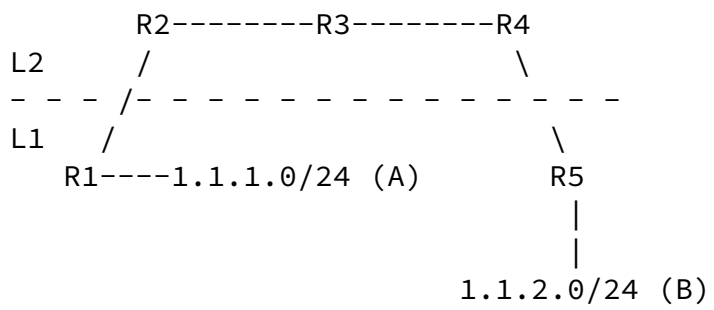

Figure 1

We associate Administrative Tag 100 with property A, and have R5 attach that value to the IP extended reachability information TLV for prefix 1.1.1.0/24. R2 has a policy in place to "match prefixes with Administrative Tag 100, and leak to L1."

The previous example is rather simplistic; it seems that it would be just as easy for R2 simply to match the prefix 1.1.1.0/24. However, if there are a large number of routers that need to apply some policy according to property A and large number of "A" prefixes, this mechanism can be quite helpful.

9. Security Considerations

This document raises no new security issues for IS-IS, as any annotations to IP prefixes should not pass outside the administrative control of the network operator of the IS-IS domain. Such an allowance would violate the spirit of Interior Gateway Protocols in general and IS-IS in particular.

10. IANA Considerations

The authors have chosen "1" as the typecode of the 32-bit Administrative Tag sub-TLV and "2" as the typecode of the 64-bt Administrative Tag SubTLV. These values must be allocated by IANA.

11. Acknowledgments

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12. References

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