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IGP Flexible Algorithms Reverse Affinity Constraint
draft-ppsenak-lsr-igp-flex-algo-reverse-affinity-00

Abstract

   An IGP Flexible Algorithm (Flex-Algorithm) allows IGPs to compute
   constraint-based paths.

   This document extends IGP Flex-Algorithm with additional constraints.

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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   time. It is inappropriate to use Internet-Drafts as reference
   material or to cite them other than as "work in progress."

   This Internet-Draft will expire on January 8, 2023.

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1. Introduction

An IGP Flex-Algorithm as specified in [I-D.ietf-lsr-flex-algo]
computes a constraint-based path.

This document extends IGP Flex-Algorithm with additional constraints.

2. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT",
"SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and
"OPTIONAL" in this document are to be interpreted as described in BCP
14 [RFC2119] [RFC8174] when, and only when, they appear in all
capitals, as shown here.

3. Use Case Example

The Flexible Algorithm definition can specify 'colors' that are used
by the operator to include or exclude links during the Flex-Algorithm
path computation. These link 'colors' are checked in the forwarding

direction of the SPF computation - e.g. in the direction from the
parent to the child.

In some cases, it is beneficial to check the 'colors' of the link
from the reverse direction of the traffic flow. For example, on a
point-to-point link between endpoints A and B and for the traffic
flowing in a direction from A to B, the input errors can only be
detected at node B. An operator may measure the rate of such input
errors and set certain 'color' on a link locally on node B when the
input error rate crosses a certain threshold. When Flex-Algorithm
calculation processes the link A to B, it may look at the 'colors' of
the link in the reverse direction, e.g., link B to A. This would
allow the operator to exclude such link from the Flex-Algorithm
topology.

4. IS-IS Flexible Algorithm Exclude Reverse Admin Group Sub-TLV

The IS-IS Flexible Algorithm Exclude Reverse Admin Group (FAERAG)
Sub-TLV is used to advertise the exclude rule that is used during the
Flex-Algorithm path calculation as specified in Section 10.

The IS-IS FAERAG Sub-TLV is a Sub-TLV of the IS-IS FAD Sub-TLV. It
has the following format:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                     Extended Admin Group                      |
+-                                                            -+
|                             ...                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
where:

   Type: 10

   Length: variable, dependent on the size of the Extended Admin
   Group. MUST be a multiple of 4 octets.

   Extended Administrative Group: Extended Administrative Group as
   defined in [RFC7308].

The IS-IS FAERAG Sub-TLV MUST NOT appear more than once in a single
IS-IS FAD Sub-TLV. If it appears more than once, the IS-IS FAD Sub-
TLV MUST be ignored by the receiver.

The IS-IS FAERAG Sub-TLV MUST NOT appear more than once in the set of FAD sub-TLVs for a given Flex-Algorithm from a given IS. If it appears more than once in such set, the IS-IS FAERAG Sub-TLV in the first occurrence in the lowest numbered LSP from a given IS MUST be used and any other occurrences MUST be ignored.

5. IS-IS Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV

The IS-IS Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV is used to advertise include-any rule that is used during the Flex-Algorithm path calculation as specified in Section 10.

The format of the IS-IS Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV is identical to the format of the FAERAG Sub-TLV in Section 4.

The IS-IS Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV Type is 11.

The IS-IS Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV MUST NOT appear more than once in a single IS-IS FAD Sub-TLV. If it appears more than once, the IS-IS FAD Sub-TLV MUST be ignored by the receiver.

The IS-IS Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV MUST NOT appear more than once in the set of FAD sub-TLVs for a given Flex-Algorithm from a given IS. If it appears more than once in such set, the IS-IS Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV in the first occurrence in the lowest numbered LSP from a given IS MUST be used and any other occurrences MUST be ignored.

6. IS-IS Flexible Algorithm Include-All Reverse Admin Group Sub-TLV

The IS-IS Flexible Algorithm Include-All Reverse Admin Group Sub-TLV is used to advertise include-any rule that is used during the Flex-Algorithm path calculation as specified in Section 10.

The format of the IS-IS Flexible Algorithm Include-All Reverse Admin Group Sub-TLV is identical to the format of the FAERAG Sub-TLV in Section 4.

The IS-IS Flexible Algorithm Include-All Reverse Admin Group Sub-TLV Type is 12.

The IS-IS Flexible Algorithm Include-All Reverse Admin Group Sub-TLV MUST NOT appear more than once in a single IS-IS FAD Sub-TLV. If it appears more than once, the IS-IS FAD Sub-TLV MUST be ignored by the receiver.

The IS-IS Flexible Algorithm Include-All Reverse Admin Group Sub-TLV
MUST NOT appear more than once in the set of FAD sub-TLVs for a given
Flex-Algorithm from a given IS. If it appears more than once in such
set, the IS-IS Flexible Algorithm Include-All Reverse Admin Group
Sub-TLV in the first occurrence in the lowest numbered LSP from a
given IS MUST be used and any other occurrences MUST be ignored.

7. OSPF Flexible Algorithm Exclude Reverse Admin Group Sub-TLV

The OSPF Flexible Algorithm Exclude Reverse Admin Group (FAERAG) Sub-
TLV is used to advertise the exclude rule that is used during the
Flex-Algorithm path calculation as specified in Section 10.

The OSPF FAERAG Sub-TLV is a Sub-TLV of the OSPF FAD TLV. It has the
following format:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              Type             |             Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                    Extended Admin Group                       |
+-                                                             -+
|                            ...                                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
where:

   Type: 10

   Length: variable, dependent on the size of the Extended Admin
   Group. MUST be a multiple of 4 octets.

   Extended Administrative Group: Extended Administrative Group as
   defined in [RFC7308].

The OSPF FAERAG Sub-TLV MUST NOT appear more than once in an OSPF FAD
TLV. If it appears more than once, the OSPF FAD TLV MUST be ignored
by the receiver.

8. OSPF Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV

The usage of this Sub-TLVs is described in Section 5.

The format of the OSPF Flexible Algorithm Include-Any Reverse Admin
Group Sub-TLV is identical to the format of the OSPF FAERAG Sub-TLV
in Section 7.

The OSPF Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV
Type is 11.

The OSPF Flexible Algorithm Include-Any Reverse Admin Group Sub-TLV
MUST NOT appear more than once in an OSPF FAD TLV. If it appears
more than once, the OSPF FAD TLV MUST be ignored by the receiver.

9. OSPF Flexible Algorithm Include-All Reverse Admin Group Sub-TLV

The usage of this Sub-TLVs is described in Section 6.

The format of the OSPF Flexible Algorithm Include-All Reverse Admin
Group Sub-TLV is identical to the format of the OSPF FAERAG Sub-TLV
in Section 7.

The OSPF Flexible Algorithm Include-All Reverse Admin Group Sub-TLV
Type is 12.

The OSPF Flexible Algorithm Include-All Reverse Admin Group Sub-TLV
MUST NOT appear more than once in an OSPF FAD TLV. If it appears
more than once, the OSPF FAD TLV MUST be ignored by the receiver.

10. Calculation of Flexible Algorithm Paths

Three new rules are added to the existing rules specified in sec 13
of [I-D.ietf-lsr-flex-algo].

   6. Check if any exclude reverse AG rule is part of the Flex-
   Algorithm definition. If such exclude rule exists, check if any
   color that is part of the exclude rule is also set on the link
   from the reverse direction. If such a color is set on the link
   from the reverse direction, the link MUST be pruned from the
   computation.

   7. Check if any include-any reverse AG rule is part of the Flex-
   Algorithm definition. If such include-any rule exists, check if
   any color that is part of the include-any rule is also set on the
   link from the reverse direction. If no such color is set on the
   link from the reverse direction, the link MUST be pruned from the
   computation.

   8. Check if any include-all reverse AG rule is part of the Flex-
   Algorithm definition. If such include-all rule exists, check if
   all colors that are part of the include-all rule are also set on
   the link from the reverse direction. If all such colors are not
   set on the link from the reverse direction, the link MUST be
   pruned from the computation.

[11](#). IANA Considerations

[11.1](#). Sub-Sub-TLVs for Flexible Algorithm Definition Sub-TLV

This document defines the following Sub-Sub-TLVs in the "ISIS Sub-Sub-TLVs for Flexible Algorithm Definition Sub-TLV" registry:

Type: 10

Description: Flexible Algorithm Exclude Reverse Admin Group

Reference: This document ([Section 4](#)).

Type: 11

Description: Flexible Algorithm Include-Any Reverse Admin Group

Reference: This document ([Section 5](#)).

Type: 12

Description: Flexible Algorithm Include-All Reverse Admin Group

Reference: This document ([Section 6](#)).

Above code points represent suggested values. The final code points allocation is subject to the allocations made by [[I-D.ietf-lsr-flex-algo](#)] and [[I-D.ietf-lsr-flex-algo-bw-con](#)].

[11.2](#). OSPF Flexible Algorithm Definition TLV Sub-TLV Registry

This document registers following Sub-TLVs in the "OSPF TLVs for Flexible Algorithm Definition TLV" registry:

Type: 10

Description: Flexible Algorithm Exclude Reverse Admin Group

Reference: This document ([Section 7](#)).

Type: 11

Description: Flexible Algorithm Include-Any Reverse Admin Group

Reference: This document ([Section 8](#)).

Type: 12

Description: Flexible Algorithm Include-All ReverseAdmin Group

Reference: This document ([Section 9](#)).

Above code points represent suggested values. The final code points allocation is subject to the allocations made by [I-D.ietf-lsr-flex-algo] and [I-D.ietf-lsr-flex-algo-bw-con].

12. Security Considerations

This document inherits security considerations from [I-D.ietf-lsr-flex-algo].

13. Acknowledgements

TBD

14. Normative References

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