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BGP SR Policy Extensions for Computing-Aware Traffic Steering (CATS)
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Abstract

An SR (Segment Routing) Policy is a set of candidate paths, each consisting of one or more segment lists. The CATS (Computing-Aware Traffic Steering) can steer traffic between clients of a service and sites offering the service. This document proposes the BGP SR policy extensions for distributing CATS services.

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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This Internet-Draft will expire on 4 December 2026.

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1. Introduction

Segment routing (SR) [RFC8402] is a source routing paradigm that explicitly indicates the forwarding path for packets at the ingress node. The ingress node steers packets into a specific path according to the Segment Routing Policy (SR Policy) as defined in [RFC9256]. In order to distribute SR policies to the headend, [RFC9830] specifies a mechanism by using BGP.

The CATS (Computing-Aware Traffic Steering) as per [I-D.ietf-cats-framework] can steer traffic between clients of a service and sites offering the service. Segment Routing (SR) can be used as an encapsulation solution for CATS data plane from an Ingress CATS-Router to an Egress CATS-Router while using an anycast IP address as the Computing-aware Service ID (CS-ID) associated with a service. And the CATS Service Contact Instance ID (CSCI-ID) is representing a specific service contact instance which serves the service request. This document proposes the BGP SR policy extensions for distributing CATS services.

2. Conventions Used in This Document

2.1. Abbreviations

2.2. 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. BGP SR Policy for CATS

As per [I-D.ietf-cats-framework], a standalone C-PS can be a functional component of a centralized controller. And C-PS will collect the metric information from C-SMA and C-NMA and also determine the best paths to forward traffic. When the SR is used as the data plane encapsulation for CATS from an Ingress CATS-Router to an Egress CATS-Router, the C-PS or the controller may distribute SR policies to the CATS Ingress CATS-Router.

The Figure 1 shows an example of BGP SR Policy for CATS service from CATS-Forwarder 1 as ingress node to CATS-Forwarder 2 as egress node. The SR policy is configured with policy color 100 and NLRI is mapping to the CATS service which is refereed as CS-ID 1. Two service sites with service contact instances represented with CSCI-ID 1 and CSCI-ID 2 are connected to the CATS-Forwarder 2 from the interfaces with Endpoint SID End.DX-1 and End.DX-2. The SR policy may be distributed to carry the identifiers of CATS services.

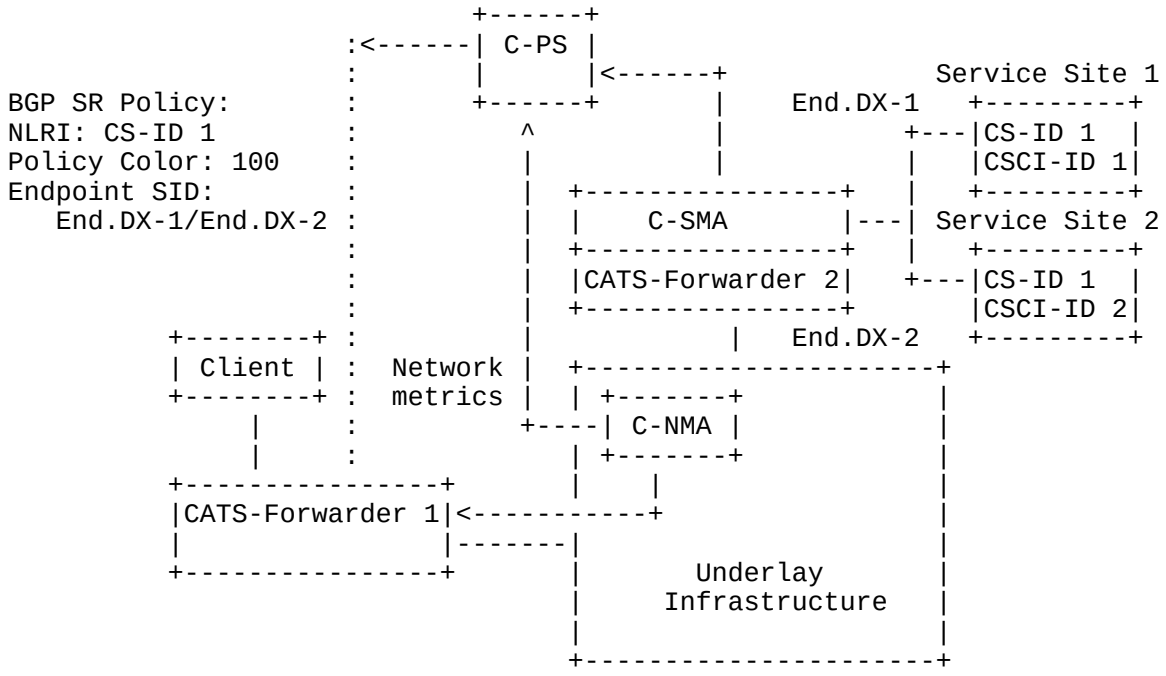

Figure 1: Example of BGP SR Policy for CATS

4. CATS Service Identifier in SR Policy

As per [I-D.ietf-cats-framework], CS-ID is representing a service in CATS, which the clients use to access it. CSCI-ID is representing a specific service contact instance. As defined in [RFC9830], the SR policy with CS-ID and CSCI-ID encoding structure is shown in Figure 2 as follows:

```
SR Policy SAFI NLRI: <Distinguisher, Policy-Color, Endpoint>
Attributes:
   Tunnel Encapsulation Attribute (23)
      Tunnel Type: SR Policy (15)
          Binding SID
          SRv6 Binding SID
          Preference
          Priority
          Policy Name
          Policy Candidate Path Name
          Explicit NULL Label Policy (ENLP)
          CS-ID
              CSCI-ID
              CSCI-ID
              ...
          Segment List
              Weight
              Segment
              Segment
              ...
          ...
```

Figure 2: SR policy with CS-ID and CSCI-ID Encoding

4.1. CS-ID Sub-TLV

The format of CS-ID Sub-TLV is shown in Figure 3 as follows:

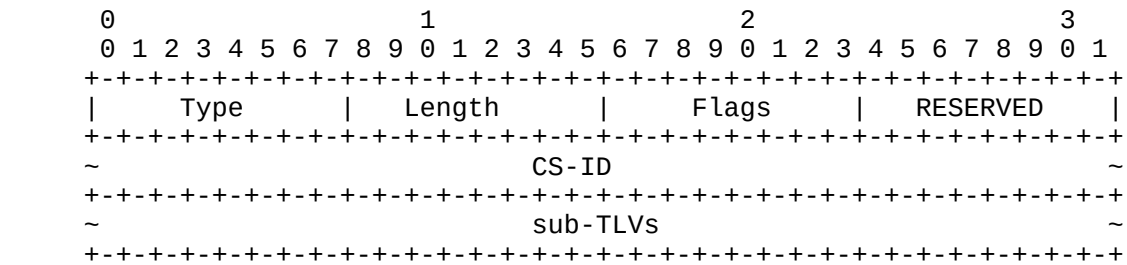

Figure 3: CS-ID Sub-TLV

where:

* Type: TBD.

* Length: variable.

* Flags: 1 octet of flags. None are defined at this stage. Flags SHOULD be set to zero on transmission and MUST be ignored on receipt.

* RESERVED: 1 octet of reserved bits. It SHOULD be set to zero on transmission and MUST be ignored on receipt.

* CS-ID: indicates the identifier associated with the CATS service. It is 4 octets which carry a 32-bit unsigned non-zero number in SR networks and 16 octets which carry a 128-bit unsigned non-zero number in SRv6 networks.

* sub-TLVs: indicates the CSCI-ID Sub-TLVs that can be carried.

4.2. CSCI-ID Sub-TLV

The format of CSCI-ID Sub-TLV is shown in Figure 4 as follows:

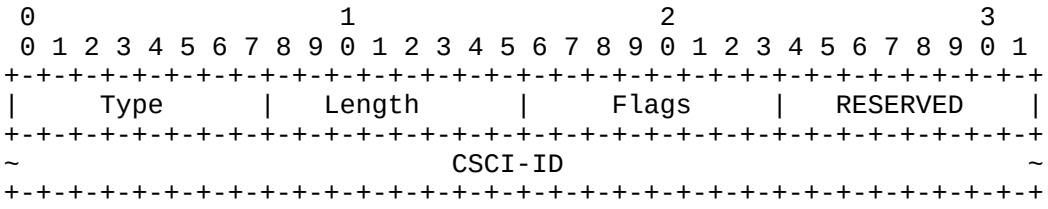

Figure 4: CSCI-ID Sub-TLV

where:

* Type: TBD.

* Length: variable.

* Flags: 1 octet of flags. None are defined at this stage. Flags SHOULD be set to zero on transmission and MUST be ignored on receipt.

* RESERVED: 1 octet of reserved bits. SHOULD be set to zero on transmission and MUST be ignored on receipt.

* CSCI-ID: indicates the identifier for a specific service contact instance. It is 4 octets which carry a 32-bit unsigned non-zero number in SR networks and 16 octets which carry a 128-bit unsigned non-zero number in SRv6 networks.

5. Security Considerations

This document defines new BGP Tunnel Encapsulation Attribute sub-TLVs for CATS, which do not introduce any new security considerations beyond those already listed in [RFC9256] and [RFC9830].

6. IANA Considerations

IANA is requested to assign a new sub-TLV code point from "BGP Tunnel Encapsulation Attribute sub-TLVs" registry in the "Border Gateway Protocol (BGP) Tunnel Encapsulation" registry group.

Type	Name	Reference
TBD1	CS-ID	this document

This document requests creation of a new registry called "CSCI-ID Sub-TLVs" .
The allocation policy of this registry is "Specification Required" according to [RFC8126].

The following initial Sub-TLV codepoints are assigned by this document:

Type	Name	Reference
TBD2	CSCI-ID	this document

7. Contributors

The following people have substantially contributed to this document:

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8. References

8.1. Normative References

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