L3DL Upper Layer Protocol Configuration
draft-ymbk-lsvr-l3dl-ulpc-01

Abstract

   This document users the Layer 3 Liveness and Discovery protocol to
   communicate the parameters needed to exchange inter-device Upper
   Layer Protocol Configuration for upper layer protocols such as the
   BGP family.

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.

Status of This Memo

   This Internet-Draft is submitted in full conformance with the
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1. Introduction

Massive Data Centers (MDCs) which use upper layer protocols such as
BGP4, BGP-LS, BGP-SPF, etc. may use the Layer 3 Liveness and
Discovery Protocol, L3DP, [I-D.ietf-lsvr-l3dl] to reveal the inter-
device links of the topology. It is desirable for devices to
facilitate the configuration parameters of those upper layer
protocols to enable more hands-free configuration. This document
defines a new L3DP PDU to communicate these Upper Layer Protocol
Configuration parameters.

2. Reading and Terminology

The reader is assumed to have read Layer 3 Discovery and Liveness
[I-D.ietf-lsvr-l3dl]. The terminology and PDUs there are assumed
here.

Familiarity with the BGP4 Protocol [RFC4271] is assumed. Familiarity
with BGP-SPF, [I-D.ietf-lsvr-bgp-spf], might be useful.

3. Upper Layer Protocol Configuration PDU

To communicate parameters required to configure peering and operation
of Upper Layer Protocols at IP layer 3 and above, e.g., BGP sessions
on a link, a neutral sub-TLV based Upper Layer Protocol PDU is
defined as follows:

```
 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 = 9   |                 Payload Length              ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~               |   ULPC Type   |   AttrCount   |             ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~       Attribute List ...      |   Sig Type    | Signature Len ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~               |                 Signature ...                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

The Type and Payload Length are defined in [I-D.ietf-lsvr-l3dl].

ULPC Type: An integer denoting the type of the uper layer protocol

```
0     :  Reserved
1     :  BGP
2-255 :  Reserved
```

The AttrCount is the number of attribute sub-TLVs in the Attribute
List.

The Attribute List is a, possibly null, set of sub-TLVs describing
the configuration attributes of the specific upper layer protocol.

3.1. BGP ULPC Attribute sub-TLVs

The parameters needed for BGP peering on a link are exchanged in sub-
TLVs within an Upper Layer Protocol PDU. The following describe the
various sub-TLVs for BGP.

The goal is to provide the minimal set of configuration parameters
needed by BGP OPEN to successfully start a BGP peering. The goal is
specifically not to replace or conflict with data exchanged during
BGP OPEN. Multiple sources of truth are a recipe for complexity and
hence pain.

If there are multiple BGP sessions on a link, e.g., IPv4 and IPv6,
then multiple sets of BGP sub-TLVs are exchanged within the BGP ULPC
PDU.

A peer receiving BGP ULPC PDUs has only one active BGP ULPC PDU at
any point in time; receipt of a new BGP ULPC PDU replaces any
previous one. If there are one or more open BGP sessions, receipt of
a new BGP ULPC PDU does not affect these sessions.

As a link may have multiple encapsulations and multiple addresses for
an IP encapsulation, which address of which encapsulation are to be
used for the BGP session MUST be specified.

For each BGP peering on a link here MUST be one agreed encapsulation,
and the addresses used MUST be in the corresponding L3DP IPv4/IPv6
Announcement PDUs. If a peering address has been announced as a
loopback, a two or three (one or both ends could be loopbacks) hop
BGP session will be established. Otherwise a direct one hop session
is used.

3.1.1. BGP ASN

The Autonomous System number MUST be specified. If the AS Number is
less than 32 bits, it is padded with high order zeros.

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Attr Type = 1 | Attr Len = 48 |            My ASN           ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

3.1.2. BGP IPv4 Address

The BGP IPv4 Address sub-TLV announces the sender's IPv4 BGP peering
source address to be used by the receiver. At least one of IPv4 or
IPv6 BGP source addresses MUST be announced.

As usual, the BGP OPEN capability negotiation will determine the AFI/
SAFIs to be transported over the peering, see [RFC4760] .

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Attr Type = 2 | Attr Len = 56 |   My IPv4 Peering Address   ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                               | Prefix Len  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

3.1.3. BGP IPv6 Address

The BGP IPv6 Address sub-TLV announces the sender's IPv6 BGP peering
source address to be used by the receiver. At least one of IPv4 or
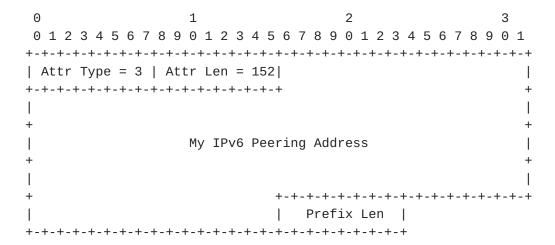IPv6 BGP source addresses MUST be announced.

As usual, the BGP OPEN capability negotiation will determine the AFI/
SAFIs to be transported over the peering, see [RFC4760] .

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Attr Type = 3 | Attr Len = 152|                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+                               +
|                                                               |
+                                                               +
|                     My IPv6 Peering Address                   |
+                                                               +
|                                                               |
+                               +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                               |   Prefix Len  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

3.1.4. BGP Authentication sub-TLV

The BGP Authentication sub-TLV provides any authentication data
needed to OPEN the BGP session. Depending on operator configuration
of the environment, it might be a simple MD5 key (see [RFC2385]), the
name of a key chain a KARP database (see [RFC7210]), or one of
multiple Authentication sub-TLVs to support hop[RFC4808].

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Attr Type = 4 |    Attr Len   |                               ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+                               ~
~                 BGP Authentication Data ...                   ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

3.1.5. BGP Miscellaneous Flags

The BGP session OPEN has extensive, and a bit complex, capability
negotiation facilities. In case one or more extra attributes might
be needed, the BGP Miscellaneous Flags sub-TLV may be used. No flags
are currently defined.

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Attr Type = 5 | Attr Len = 32 |         Misc Flags           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Misc Attrs:

Bit 0:   Ghu knows what
Bit 1-15: Must be zero

4. Security Considerations

All the Security considerations of [I-D.ietf-lsvr-l3dl] apply to this
PDU.

As the ULPC PDU may contain keying material, see Section 3.1.4, it
SHOULD BE signed.

Any keying material in the PDU SHOULD BE salted ad hashed.

The BGP Authentication sub-TLV provides for provisioning MD5, which
is a quite weak hash, horribly out of fashion, and kills puppies.
But, like it or not, it is what BGP deployments use.

5. IANA Considerations

This document requests the IANA create a new entry in the L3DL PDU
Type registry as follows:

```
       PDU
       Code     PDU Name
       ----     ------------------
         9       ULPC
```

This document requests the IANA create a registry for L3DL ULPC Type,
which may range from 0 to 255. The name of the registry should be
L3DL-ULPC-Type. The policy for adding to the registry is RFC
Required per [RFC5226], either standards track or experimental. The
initial entries should be the following:

```
       Value     Name
       -----     ------------------
         0       Reserved
         1       BGP
       2-255   Reserved
```

6. References

6.1. Normative References

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6.2. Informative References

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