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               PCEP Extension for Native IP Network
               draft-wang-pcep-extension-native-ip-00.txt

Status of this Memo

    This Internet-Draft will expire on April 24, 2017.

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Abstract

    This document defines the PCEP extension for PCE application in
    Native IP network. The scenario and architecture of PCE in native IP
    is described in [I-D.draft-wang-teas-pce-native-ip-01.txt]. This
    draft describes the key information that is transferred between PCE
    and PCC to accomplish the end2end traffic assurance in Native IP
    network under central control mode.

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1. Introduction

    Traditionally, MPLS-TE traffic assurance requires the corresponding
    network devices support MPLS or the complex RSVP/LDP/Segment Routing
    etc. technologies to assure the end-to-end traffic performance. But
    in native IP network, there will be no such signaling protocol to
    synchronize the action among different network devices. It is

necessary to use the central control mode that described in [I-D.draft-zhao-teas-pce-control-function] to correlate the forwarding behavior among different network devices. Draft [I-D.draft-wang-teas-pce-native-ip-00.txt] describes the architecture and solution philosophy for the end2end traffic assurance in Native IP network via Dual/Multi BGP solution. This draft describes the corresponding PCEP extension to transfer the key information about BGP peer relationship, BGP Prefix advertised and the static route on on-path router.

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 RFC 2119 [RFC2119].

3. New Objects Extension

Three new objects are defined in this draft, they are BGP PEER object, BGP PREFIX object and STATICROUTE object.

BGP PEER object is used to tell the network device which peer it should be peered with dynamically, BGP PREFIX object is used to tell which prefixes should be advertised via the corresponding BGP peer and STATICROUTE object is used to point out which route should be to taken to arrive to the bgp peer.

4. Object Formats.

Each extension object takes the similar format, that is to say, it began with the common object header defined in [RFC5440] as the following:

```
  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
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 | Object-Class  |   OT  |Res|P|I|   Object Length (bytes)       |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                                                               |
 //                       (Object body)                        //
 |                                                               |
```

```
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

   Different object-class, object type and the corresponding object
   body is defined separated in the following section.

4.1. BGP PEER Object.

   The BGP PEER object is used in a PCE Initiate message [draft-ietf-
   pce-pce-initiated-lsp] to specify the ip address of BGP peer that
   the received network device should establish the BGP relationship
   with.

   This Object should only be sent to the head and end router of the
   end2end path in case there is no RR involved. If the RR is used
   between the head end routers, then such information should be sent
   to head router/RR and end router/RR respectively.

   BGP PEER Object Object-Class is **

   BGP PEER Object Object-Type is **

```
 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

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

|   Peer-Id     |       AT      |Resv.

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

|             IP Address of BGP Peer(4/16 Bytes)                |

//             IP Address of BGP Peer(4/16 Bytes)              //

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

   Peer-Id(8 bits): To distinguish the different BGP Peer, will be
      referenced in BGP PREFIX object, if the PCE use multiBGP solution
      for different QoS assurance requirement.

   AT(8 bits): Address Type. To indicate the address type of BGP Peer.
      Equal to 4, if the following IP address of BGP peer is belong to
      IPv4; Equal to 6 if the following IP address of BGP peer is belong
      to IPv6.

   Resv(16 bits): Reserved for future use.

   IP Address of BGP Peer(4/16 Bytes): IPv4 address of the BGP peer
      when AT equal to 4, length is 32bit; IPv6 address of the BGP peer
      when AT equal to 16, length is 128bit;

4.2. BGP PREFIX Object

   THE BGP PREFIX object is carried within in a PCE Initiate message
   [draft-ietf-pce-pce-initiated-lsp] to specify the IP prefixes that
   should be advertised by the corresponding BGP Peer.

   This Object should only be sent to the head and end router of the
   end2end path in case there is no RR involved. If the RR is used
   between the head end routers, then such information should be sent
   to head router/RR and end router/RR respectively.

   BGP PREFIX Object Object-Class is **

   BGP PREFIX Object Object-Type is **

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Peer-Id    |      AT       |     Resv.     | Prefixes Num. |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              BGP Advertised IP Prefix TLV                    |
//             BGP Advertised IP Prefix TLV                    //
|              BGP Advertised IP Prefix TLV                    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

   Peer-Id(8 bits): To indicate which BGP peer should be used to
      advertise the following IP Prefix TLV. This value is assigned in
      the BGP PEER object and is referred in this object.

   AT(8 bits): Address Type. To indicate the address type of BGP Peer.
      Equal to 4, if the following IP address of BGP peer is belong to
      IPv4; Equal to 6 if the following IP address of BGP peer is belong
      to IPv6.

   Resv(8 bits): Reserved for future use.

   Prefixes Num(8 bits): Number of prefixes that advertised by the
      corresponding BGP Peer. It should be equal to num of the following
      IP prefix TLV.

   BGP Advertised IP Prefix TLV: Variable Length, use the TLV format to
      indicate the advertised IP Prefix.

4.3. STATICROUTE Object

   THE STATICROUTE Object is carried in a PCE Initiate message [draft-
   ietf-pce-pce-initiated-lsp] to specify the static route to the
   corresponding BGP peer address on each device that is on the end2end
   assurance path.

   This Object should be sent to all the devices that locates on the
   end2end assurance path that calculated by PCE.

   STATICROUTE Object Object-Class is **

   STATICROUTE Object Object-Type is **

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Peer-Id     |      AT       |       Resv.                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        Next Hop Address to the BGP Peer (IPv4/IPv6)           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

   Peer-Id(8 bits): To indicate the BGP peer that the following next
      hop address point to. This value is assigned in the BGP PEER
      object and is referred in this object.

   AT(8 bits): Address Type. To indicate the address type of
      staticroute. Equal to 4, if the following next hop address to the
      BGP peer is belong to IPv4; Equal to 6 if the following next hop
      address to the BGP peer is belong to IPv6.

   Resv(16 bits): Reserved for future use.

Next Hop Address to the BGP Peer TLV: Variable Length, use the TLV
   format to indicate the next hop address to the corresponding BGP
   peer that indicated by the Peer-Id.

5. Management Consideration.

6. Security Considerations

   TBD

7. IANA Considerations

   TBD

8. Conclusions

   TBD

9. References

9.1. Normative References

   [RFC4655] Farrel, A., Vasseur, J.-P., and J. Ash, "A Path

             Computation Element (PCE)-Based Architecture", RFC

             4655, August 2006,<http://www.rfc-editor.org/info/rfc4655>.

   [RFC5440]Vasseur, JP., Ed., and JL. Le Roux, Ed., "Path

             Computation Element (PCE) Communication Protocol

             (PCEP)", RFC 5440, March 2009,

                 <http://www.rfc-editor.org/info/rfc5440>.

9.2. Informative References

   [I-D.draft-ietf-pce-pce-initiated-lsp-07]
   E.Crabbe, I.Minei, S.Sivabalan, R.Varga, "PCEP Extensions for PCE-
   initiated LSP Setup in a Stateful PCE Model",
   https://tools.ietf.org/html/draft-ietf-pce-pce-initiated-lsp-07
   (work in progress), July, 2016

   [I-D.draft-wang-teas-pce-native-ip-01]
   Aijun Wang, Quintin Zhao, Boris Khasanov, Raghavendra Mallya, "PCE
   in Native IP Network", https://tools.ietf.org/html/draft-wang-teas-
   pce-native-ip-01(work in progress),October, 2016

   [I-D.draft-zhao-teas-pce-control-function]
   Farrel, Q.Zhao "An Architecture for use of PCE and PCEP in a Network
   with Central Control"
   https://datatracker.ietf.org/doc/draft-zhao-teas-pce-control-
   function/ (work in progress),June, 2016

10. Acknowledgments

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