Consideration for
Applying PCE in Native IP network

【 _ Centrally Control Dynamic Routing(CCDR) 】

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• Scenarios Summary and Requirements
• Proposed Solution
• Comparison with current technologies
• Further Action
Scenario Summary

**Detail Material**

S1: QoS Assurance for Hybrid Cloud Communication

S2: Traffic engineering for IDC/MAN asymmetric link

S3: Increased link utilization based on tidal phenomena

S4: Network temporal congestion elimination
Solution Requirements/Expectations

1. Apply for Native IP network
2. Identical deployment method for intra- and inter- domain.
3. No influence to existing router forwarding behavior
4. Easy interoperation for routers from different vendors.
5. Software Engineering friendly API interface.
6. Can utilize the power of centrally control(PCE) and flexibility/robustness of distributed control protocol.
7. Coping with the differentiation requirements for large amount traffic and prefixes.(China Telecom has about tens of T bps traffic and tens of thousand prefixes within the network)
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Proposed Solution

• Deploy PCE/SDN Controller in the native IP network
• PCE/SDN Controller is responsible for the complex algorithm to optimize the necessary traffic upon the real network situation
• Populate traffic prefixes via different BGP sessions between peers, manipulate the path to BGP nexhop of these prefixes via PCE to different traffic forwarding path.
Solution Benefit

• PCE/SDN Controller has powerful capabilities to solve complex traffic engineering scenarios and we have finished the large network simulation.

• Same deployment method for intra-/inter- domain in Native IP network and easy to expand to cover other kind networks, for example for MPLS traffic optimization later.

• Exploit the advantage of central control and distributed protocol
Related Drafts

   By experts from China Telecom, BUPT, China Mobile and Tencent Company.

   By experts from Huawei, China Telecom, Tencent, Juniper and ZTE

   By experts from Huawei, Juniper, ZTE and China Telecom.
What The Proposal Needs in the End?

- Select PCEP protocol to transfer the policy to router.
- There are also lots of discussion about this within PCE WG, please refer the discussion thread

**PCEP as the most suitable southbound protocol for SDN controller**

------we support this direction.

- Only the key parameters needs to be transferred:

<table>
<thead>
<tr>
<th>New PCEP Objects</th>
<th>Key Parameters</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer Address List (PAL)</td>
<td>List of Peer Addresses</td>
<td>PCC uses this information to build BGP connection with the appointed peer</td>
</tr>
<tr>
<td>Peer Prefix Association (PPA)</td>
<td>Relation between Different Prefixes and their associated peer</td>
<td>PCC advertises different prefixes via different BGP peer</td>
</tr>
<tr>
<td>Explicit Peer Route (EPR)</td>
<td>Explicit Routes to Peer Address</td>
<td>PCC builds the explicit routes to the peer address</td>
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We have also investigated the following current technologies, but seems none of them can meet the requirements/expectation for the mentioned scenarios.

### Comparison with other technologies

<table>
<thead>
<tr>
<th>Solutions</th>
<th>Our Worries</th>
</tr>
</thead>
</table>
| Segment Routing | 1. Not the same solution for intra-/inter- domain  
                2. Require the change of forwarding behavior on PE router.  
                3. Require Map server for coexisting with Non-SR router. |
| RSVP-TE       | 1. Signaling Burden/State Pressure on routers                                                  |
| Openflow      | 1. Can’t cope with the pressure from large amount prefixes differentiation requirements.  
                2. Only central control, not acceptable by network operator                              |
| NETCONF/YANG  | 1. Detail Elaborate Configuration Style is not easy understood by Software Engineering of PCE/SDN Controller, they prefer simple/abstract command.  
                2. Efficiency Consideration(Text vs. Binary)  
                3. Initial Configuration(YANG) vs. Dynamic Adjustment(PCEP) |
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Further Action

• Adopt scenario draft CCDR as WG draft?
• Adopt solution draft PCE in Native IP network as WG draft?
• Discuss the detail PCEP protocol extension draft at PCEP WG.
• More scenarios and contribution are welcome.
• Comments?

Nov.14 2017
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