Interworking of GMPLS Control and Centralized Controller System

TEAS WG, IETF105, Montreal, Canada

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Review on Status & Changes

• Status:
  – Adopted in June;
  – Updated in July;

• Changes:
  – Enable more interwork scenarios;
  – More explicit description on scenarios; (mainly multi-domain)
Interworking

*Controller can be any SDN controller of EMS/NMS

Newly Added Description

Orchestrator

RESTconf/YANG

Netconf/PCEP

Controller*

Non-GMPLS Domain

GMPLS Domain

GMPLS Domain
Provisioning(1) – End-to-end

#1: Trigger the provisioning (e.g., via RESTconf/YANG)

#2: Head-end Initiating (e.g., via PCEP/Netconf)

#3: GMPLS Signalling (e.g., via RSVP-TE)

Remark: in this scenario, both domains request GMPLS (to run RSVP-TE);
Provisioning(2) – Multi-segment

#1: Trigger the provisioning (e.g., via RESTconf/YANG)

Controller*  Orchestrator  Controller*

#2.1: Head-end Initiating (e.g., via PCEP/Netconf)  #2.2: Head-end Initiating (e.g., via PCEP/Netconf)

Network

#3: GMPLS Signaling (ERO label included in Message in #2);

Remark: in this scenario, both domains request GMPLS (to run RSVP-TE);
Next Step

- Provide more detailed scenarios:
  - Multi-layer Provisioning;
  - Protection & Restoration;
  - Controller Reliability
  - Add more description on non-GMPLS domain interworking;
FOR BACKUP USE
Motivation of this work

DP = Data Plane;
CP = Control Plane (with GMPLS)

GMPLS Control Plane
- RSVP-TE
- OSPF-TE
- LMP

Centralized Controllers
- ACTN Controllers
- Netconf/REStconf+YANG
- PCE Protocol

Controller Hierarchies
**Interface Type**

1. Neighbor Level: Local Resource Discovery (e.g. LMP)
2. NE Level: Topology Discovery with Flooding of Information among NEs (e.g., OSPF-TE)
3. From PCE/Controller to NE: Interaction between PCE/Controllers to NE

### Topology Discovery Scenario

<table>
<thead>
<tr>
<th>IF Type:</th>
<th>Topology Initiation</th>
<th>Topology Update (e.g. add one node)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LMP</td>
<td>Number of LMP message: increase accordingly</td>
</tr>
<tr>
<td>2</td>
<td>OSPF (ISIS)</td>
<td>Message: each message will flood additional info</td>
</tr>
<tr>
<td>3</td>
<td>PCEP/Netconf</td>
<td>New PCEP session from new node to PCE; Need new message to configure the new node; Database will be updated</td>
</tr>
</tbody>
</table>
# Service Provisioning Scenario

## Service Provisioning Decomposition:
1. Step: Path Computation -> Path Establishment -> Database (NE/CTRL) update
2. Mode: Computation & signaling can be either centralized or distributed

<table>
<thead>
<tr>
<th></th>
<th>Distributed Control Plane</th>
<th>Centralized Path Compute + Distributed Signaling</th>
<th>Centralized Path Compute + Centralized Signaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path Compute</td>
<td>OSPF</td>
<td>PCEP/Netconf(Restconf)</td>
<td>PCEP/Netconf(Restconf)</td>
</tr>
<tr>
<td>Path Setup</td>
<td>RSVP</td>
<td>RSVP(inter-NE, IF#2)</td>
<td>PCEP/Netconf(Restconf)</td>
</tr>
<tr>
<td>Resource Update</td>
<td>OSPF</td>
<td>OSPF(inter-NE, IF #2)</td>
<td>OSPF(inter-NE, IF #2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PCEP-LS/Netconf (IF#3)</td>
<td>PCEP-LS/Netconf (IF#3)</td>
</tr>
</tbody>
</table>

IETF Ref:
- RFC3473
- RFC4203
- RFC4872/3/4
- RFC8283
- RFC6241
- RFC8040

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