LIME Base YANG Model Work Update
draft-ietf-lime-yang-oam-model-00

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Design Goal of LIME base model

• Look for common structure for all OAM technologies to provide consistent representation
• Using configuration model to provide consistent configuration and representation
• Using RPC model for OAM command (e.g., ping, traceroute) to provide consistent reporting and representation.
• Using Notification model to provide consistent reporting and representation.
Model Structure Overview

- Comprise three Sub Models:
  - Configuration Sub Model
    - (Domain) Which domain the fault can be localized?
    - (MA) Which group the test belong to?
    - Test results
      - Parameters for connectionless (under MA but in the outside of session)
      - Parameters for connection oriented (under sessions)
    - Related-oam-layer (allow correlate fault in other layer)
  - RPC Sub Model
  - Notification Sub Model

- Adopt model structure concept defined for Ethernet/MPLS-TP network;
  - Make it adapt to various different OAM technologies
  - Extend it to a technology independent framework.
Why such Model structure

• Model all OAM technologies in the same way
  – Option A is a good option: Model OAM from fault management perspective and performance management perspective
  – Option B is a bad option: Model OAM technologies from each OAM protocol perspective

• Model OAM from more abstract user perspective
  – Where to have troubleshooting
  – How to group these tests, e.g., based on location, based on the path to be applied
  – OAM technology is applied from which testpoint to which testpoint
  – What OAM technology is used
Use Case A for LIME model

1. Service Request

I want to know whether Bob is reachable for me?

I should setup two tests, one is from A to B, the other is from B to C. Also I know A, B, C 3 testpoints in the same domain AS1.

2. Configure A, B using LIME Model extension for IP OAM

3. Run a test (e.g., Ping) and get test results back

4. Report test results back to the management system

management System

Testpoint A

Testpoint B

Testpoint C

Alice

Bob

AS 1
Applicability of LIME model to IP Ping and Traceroute

• In case of IP Ping and Traceroute, the technology type under domain is set as IPv4 or IPv6
• MD-name under domain is set by the management system as “AS1”
• In the use case A, the management system decide to have two separate tests to check whether Bob is reachable to Alice, therefore two MA-name is assigned by the management system to these two test, one is “test-A-B”, the second is “test-B-C”
• In some other cases, MA-name can be used to represent tunnel-name or lag-name and distinct test for different Tunnel or LAG.
Applicability of LIME model to IP Ping and Traceroute Configure Model

Configure testpoint A using LIME model

Configure testpoint B using LIME model

Configure testpoint C using LIME model

management System

Testpoint A

Testpoint B

Testpoint C
Applicability of LIME model to IP Ping and Traceroute

RPC Model for Ping

management System

Trigger OAM command (e.g., ping) to be executed from testpoint A to B

Ping RPC model is used
To notify configured testpoint
The ping is initiated from which Testpoint to which testpoint,
In which area, using which OAM technology and then Get test result back with Corresponding location information.

Testpoint A

<rpc message-id="101"
xmlns="urn:ietf:params:xml:ns:netconf:ud:1.0">
  <domain>
    <technology> IPv4 </technology>
    <MD-name-string>AS1</MD-name-string>
    <MA-name-string>Test-A-B</MA-name-string>
    <source-mep>A</source-mep>
    <destination-mp>
      <ipv4-address>
        192.0.1.0
      </ipv4-address>
    </destination-mp>
  </domain>
</rpc>

<rpc message-id="101"
xmlns="urn:ietf:params:xml:ns:netconf:ud:1.0">
  <domain>
    <technology> IPv6 </technology>
    <MD-name-string>AS1</MD-name-string>
    <MA-name-string>Test-B-C</MA-name-string>
    <source-mep>B</source-mep>
    <destination-mp>
      <ipv6-address>
        2001::4
      </ipv6-address>
    </destination-mp>
  </domain>
</rpc>

Testpoint B

Testpoint C

<rpc message-id="101"
xmlns="urn:ietf:params:xml:ns:netconf:ud:1.0">
  <domain>
    <technology> IPv4 </technology>
    <MD-name-string>AS1</MD-name-string>
    <MA-name-string>Test-A-B</MA-name-string>
    <source-mep>A</source-mep>
    <destination-mp>
      <ipv4-address>
        192.0.1.0
      </ipv4-address>
    </destination-mp>
  </domain>
</rpc>

<rpc message-id="101"
xmlns="urn:ietf:params:xml:ns:netconf:ud:1.0">
  <domain>
    <technology> IPv6 </technology>
    <MD-name-string>AS1</MD-name-string>
    <MA-name-string>Test-B-C</MA-name-string>
    <source-mep>B</source-mep>
    <destination-mp>
      <ipv6-address>
        2001::4
      </ipv6-address>
    </destination-mp>
  </domain>
</rpc>

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Applicability of LIME model to IP Ping and Traceroute Notification Model for IP Traceroute

See section 1.1 of rfc6241 notification: A server-initiated message indicating that a certain event has been recognized by the server.

Notification example:

```xml
<notification xmlns="urn:ietf:params:netconf:capability:notification:1.0">
  <technology> IPv4 </technology>
  <MD-name-string>AS1</MD-name-string>
  <MA-name-string>A-B</MA-name-string>
  <mep-name>A</mep-name>
  <defect-type>misconnection</defect-type>
  <error>
    <error-code>Destination-Unreachable-icmp-error</error-code>
    <error-code>mtu-error</error-code>
  </error>
</notification>
```

Trigger testpoint A to report defect upon Defect condition is met.

Notification model is used By testpoint receiving defect To report defect type and Testpoint generating defect, Back to the management System.

rpc reply element is similar to rpc element
What about testpoint doesn’t support MD and MA

1. MD and MA is not CFM specific information in the LIME model, MD and MA stand for management information or context information that help pinpoint fault type and location.
2. If every testpoint report test results together with MD and MA, we can make fault diagnosis or fault comparison more easier.
3. MD and MA is set by the management system and sent by the management system to the testpoint using LIME model, MD and MA will not be injected into ping, traceroute.
4. If the testpoint doesn’t want to receive MD and MA information, we can have two different models, one is with MD and MA for management system, the other is one without MD and MA for testpoint A
   a. Configure Testpoint A without MD and MA level info
   b. Report to management system without MD and MA level info
   c. Correlate MD and MA with Testresults in the LIME model
   d. The cost is the management system should know how to map MD and MA back to LIME model when testpoint reports back test results.
Applicability of LIME model to BFD

Here is an example of applicability of OSPF model to BFD,

1. OSPF model is a model extension to ietf-routing base model and base model for OSPF BFD model,

2. OSPF BFD model use grouping defined in BFD base model

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Applicability of LIME model to BFD

LIME model follow the same idea:

- LIME BFD model is a model extension to LIME base model
- LIME BFD model reuses grouping defined in BFD model.
- LIME BFD model is an application of BFD i.e., use BFD in the LIME BFD model

To provide consistent reporting, representation and configuration.
Use case B for Applicability of LIME model to LSP Ping

- PE-A initiates an MPLS LSP Ping request for an FEC at the target device PE-B
- PE-B receives the IP packet, processes the MPLS echo request, and sends an MPLS echo reply to PE-A through alternate route
- PE-A receives the MPLS echo reply in response to the MPLS echo request and know connectivity of an LDP LSP.
Applicability of LIME model to LSP Ping

• MD-Name can be set by the management system as area-A or AS-1
• MA-Name can be set as LDP-FEC, Tunnel-Name, LAG-Name or other meanings based on test for different path
• Source address and destination address of LSP ping corresponds to source MEP and destination MEP
Next Step

• Do we need separate operation model?
  – No? we use rpc and notification to report the state
• Fix the open issues raised one the list
• Solicit more comments and reviews on the draft
• Prepare another revision based on the discussion

Slight DT Reorganization
– We lost two members (thank you Nobo and Tissa). We gained one new member (hello Santosh!)

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