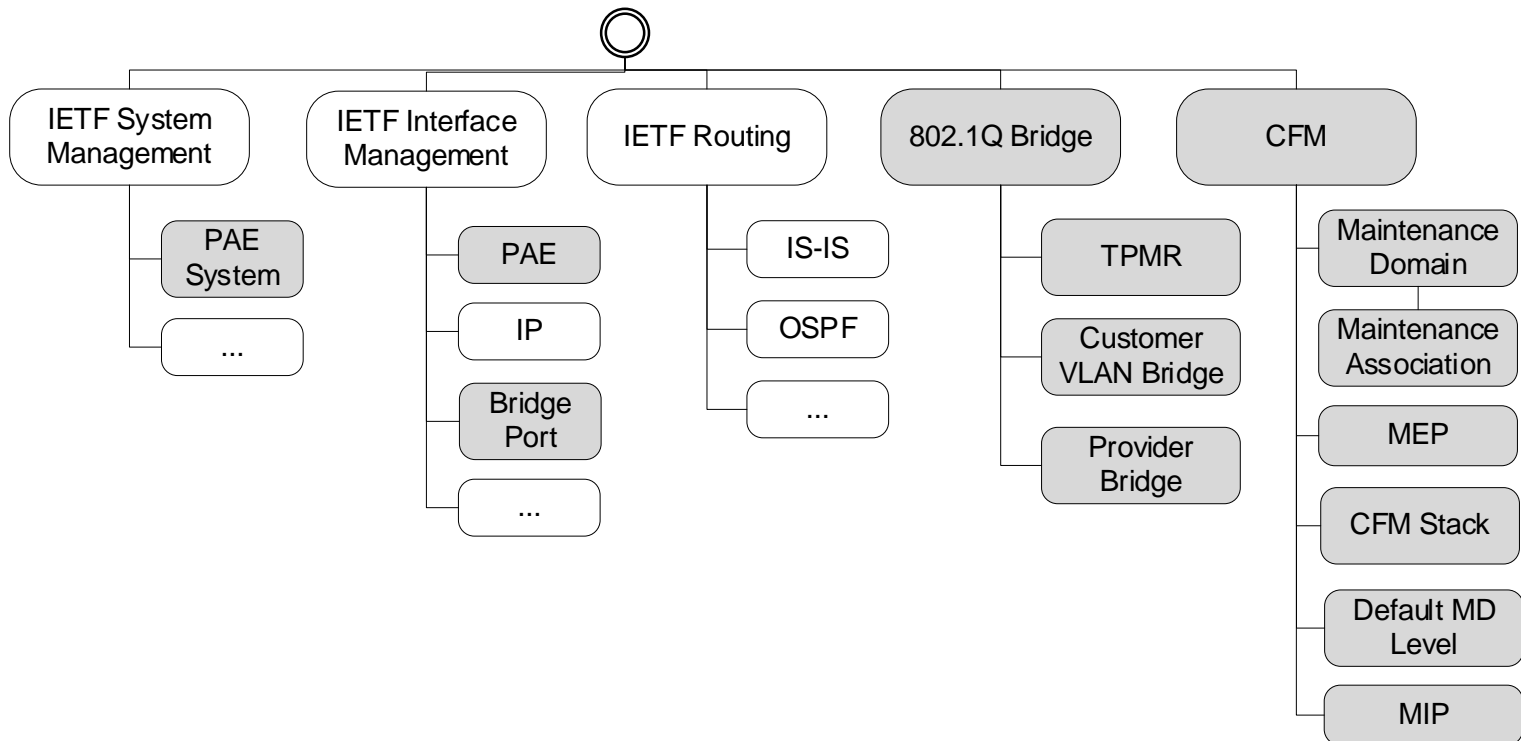


# IEEE 802.1Qcx (CFM) Data Model Overview

Marc Holness (mholness@ciena.com)  
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# YANG Model Relationships

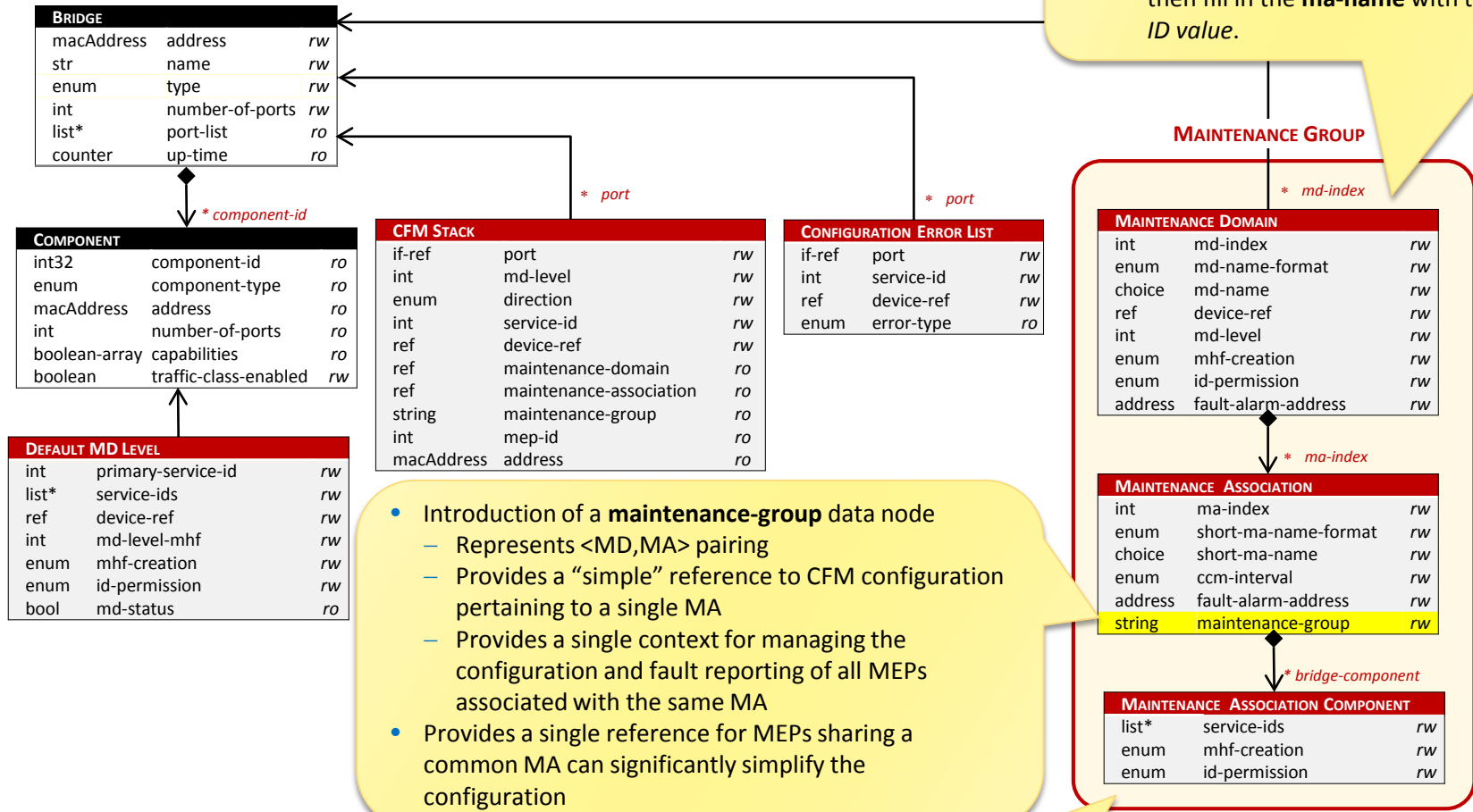
- IEEE 802.1 (P802.1Qcx) CFM related data model objects will be on its own branch of the hierarchy
  - Facilitates utilization of CFM on devices inclusive of 802.1Q Bridges



# IEEE 802.1Qcx Model

## BRIDGE/COMPONENT TO CFM RELATIONSHIPS

• For ITU-T SG15 Y.1731 modeling,  
 – MEG-ID can be supported by setting the **md-name-format** to 'none', the **ma-name-format** to 'icc-format', and then fill in the **ma-name** with the MEG ID value.

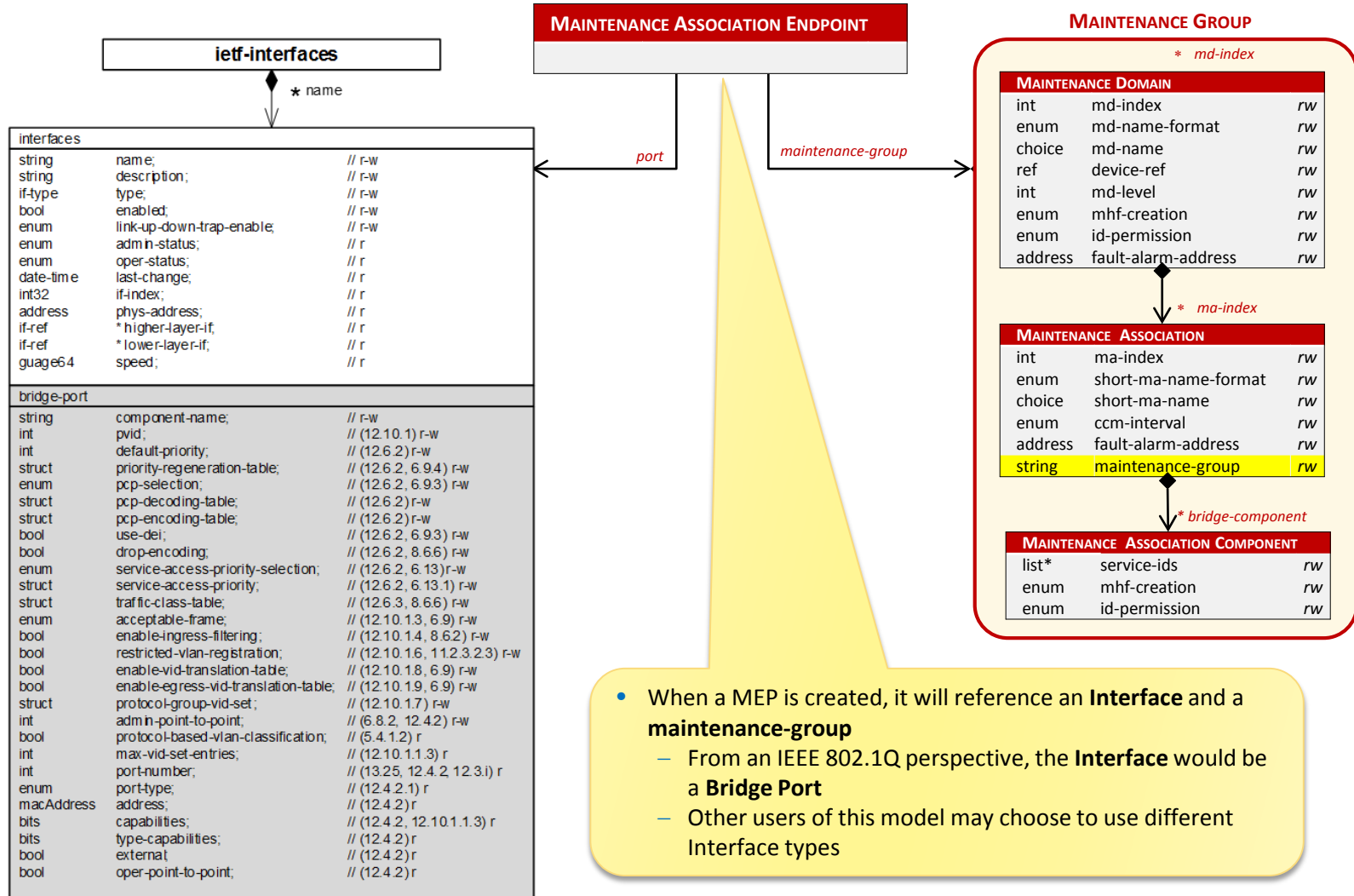


• Introduction of a **maintenance-group** data node  
 – Represents <MD,MA> pairing  
 – Provides a “simple” reference to CFM configuration pertaining to a single MA  
 – Provides a single context for managing the configuration and fault reporting of all MEPs associated with the same MA  
 • Provides a single reference for MEPs sharing a common MA can significantly simplify the configuration

• The Maintenance Association Component object contains the configuration and operational information of the MA that is variable across Bridges (or across components within a Bridge) within the MD.

# IEEE 802.1Qcx Model

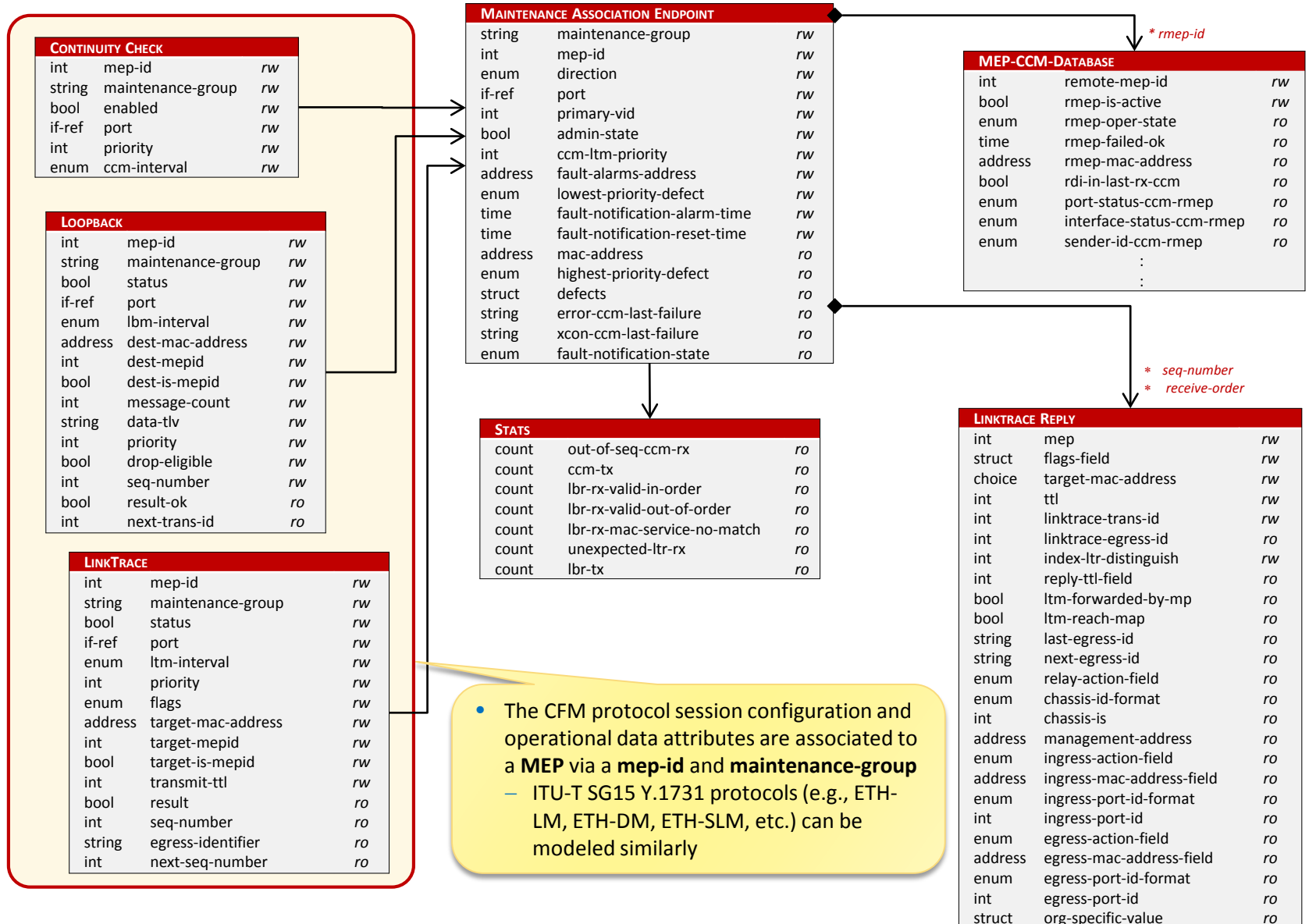
## CFM MEP OBJECT RELATIONSHIPS



- When a MEP is created, it will reference an **Interface** and a **maintenance-group**
  - From an IEEE 802.1Q perspective, the **Interface** would be a **Bridge Port**
  - Other users of this model may choose to use different Interface types

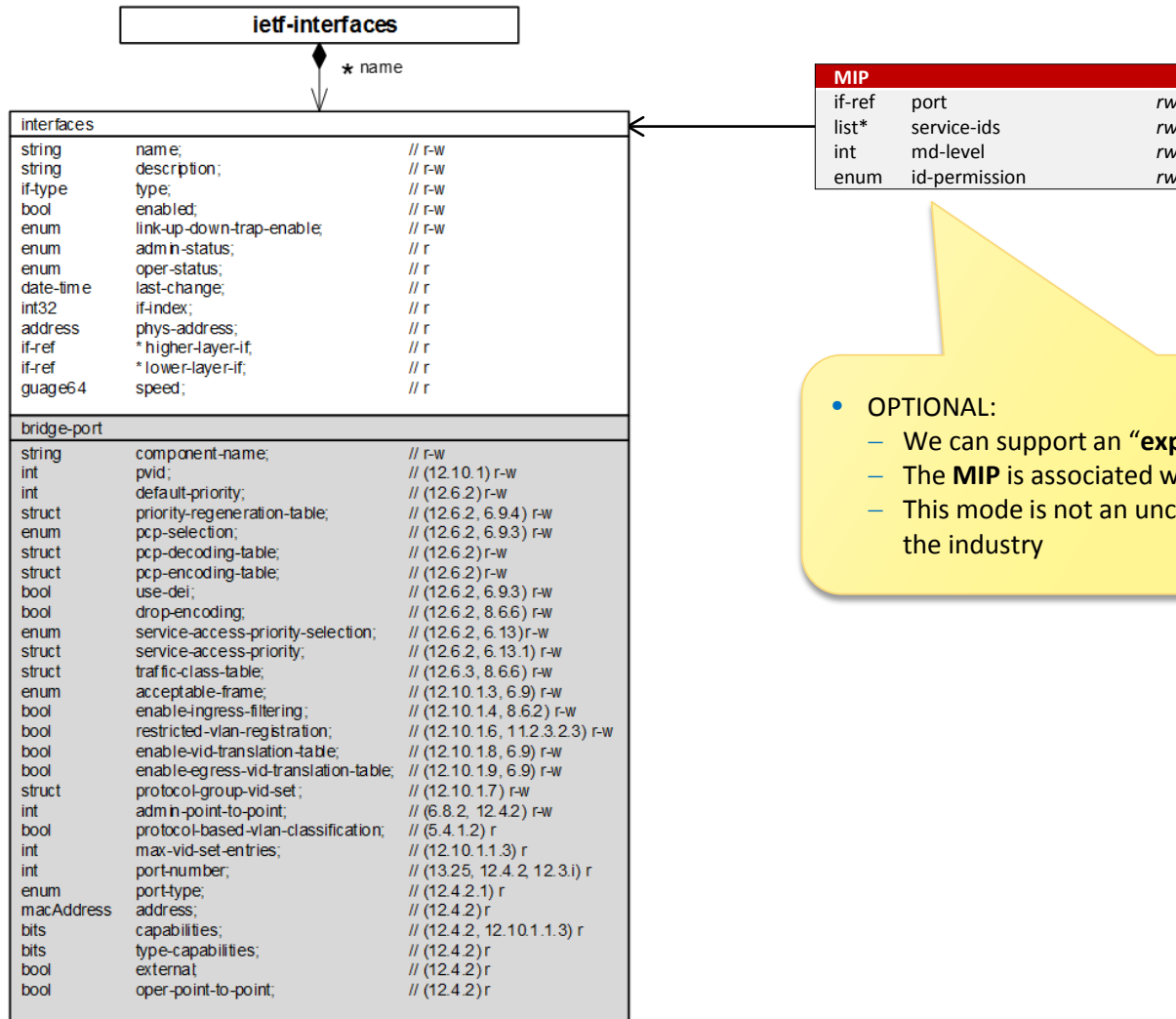
# IEEE 802.1Qcx Model

## CFM MEP OBJECT RELATIONSHIPS



# IEEE 802.1Qcx Model

## CFM MIP OBJECT RELATIONSHIPS



# IEEE 802.1Qcx Model

## CFM TRANSMIT COMMANDS AND NOTIFICATIONS

**TRANSMIT-LOOPBACK-MESSAGE** and  
**TRANSMIT-LINKTRACE-MESSAGE**  
commands can (also) be  
implemented by RPCs (Remote  
Procedure Calls)

TRANSMIT-LOOPBACK()		
string	maintenance-group	<i>rw</i>
int	mep-id	<i>rw</i>
enum	interval	<i>rw</i>
choice	target-address	<i>rw</i>
int	lbm-tx-number	<i>rw</i>
str	data	<i>rw</i>
bool	data-tlv	<i>rw</i>
int	priority	<i>rw</i>
int	dei	<i>rw</i>
bool	lbm-result-ok	<i>ro</i>
int	loopback-trans-id	<i>ro</i>

TRANSMIT-LINKTRACE()		
string	maintenance-group	<i>rw</i>
int	mep-id	<i>rw</i>
enum	interval	<i>rw</i>
choice	target-address	<i>rw</i>
int	ltm-flags	<i>rw</i>
str	ltm-ttl	<i>rw</i>
bool	ltm-result-ok	<i>ro</i>
int	ltm-seq-number	<i>ro</i>
string	ltm-egress-identifier	<i>ro</i>

Notification (Traps/Alarms) for  
**MEP FAULT ALARM**

MEP FAULT ALARM	
string	maintenance-group
enum	md-name-format
choice	md-name
enum	ma-name-format
choice	ma-name
int	mep-id
enum	mep-priority-defect

**NOTE:** There is much detail missing from the configuration example. The intent is to illustrate the flow of the configuration steps based upon the current proposed model structure.

# Configuration Examples

XML Representation



# Example Customer VLAN Bridge Configuration (Qcp)

- Configuration example of a **Customer VLAN Bridge** with two bridge ports

1

```
<bridges xc:operation="create">
  <bridge>
    <name>my-bridge</name>
    <address>01-12-23-34-45-AF</address>
    <bridge-type>customer-vlan-bridge</bridge-type>
    <component>
      <name>my-component</name>
      <id>1</id>
      <type>c-vlan-component</type>
      <address>01-12-23-34-45-56</address>
    </component>
    <bridge-vlan>
      <vlan>
        <vid>1001</vid>
        <name>vid1001</name>
      </vlan>
    </bridge-vlan>
  </bridge>
</bridges>
```

- a) Bridge and associated C-VLAN Component created as a result of configuration
- b) Configure VLANs supported by the Bridge

# Example Customer VLAN Bridge Configuration

2

```
<interfaces xc:operation="create">
  <interface>
    <name>port-1</name>
    <type>ethernetCsmacd</type>
    <bridge-port>
      <component-name>my-component</component-name>
      <port-type>cvlan-bridge-port</port-type>
    </bridge-port>
  </interface>
  <interface>
    <name>port-2</name>
    <type>ethernetCsmacd</type>
    <bridge-port>
      <component-name>my-component</component-name>
      <port-type>cvlan-bridge-port</port-type>
    </bridge-port>
  </interface>
</interfaces>
```

- c) CVLAN Bridge Ports are created and associated with the C-VLAN Component

# Example MEG ID Configuration

- Configuration example of a **Maintenance Entity Group ID (MEGID)** associated with a Bridge (*my-bridge*)

3

```
<cfm xc:operation="create">
  <bridge>my-bridge</bridge>
  <maintenance-domains>
    <maintenance-domain>
      <index>1</index>
      <name-format>none</name-format>
      <md-level>4</md-level>
      <maintenance-association>
        <index>1</index>
        <name-format>icc-format</name-format>
        <name>my-meg-id-val</name>
        <maintenance-group>maintenance-group-1</maintenance-group>
      </maintenance-association>
    </maintenance-domain>
  </maintenance-domains>
</cfm>
```

# Example MAID Configuration

- Configuration example of a **Maintenance Association ID (MAID)** associated with a Bridge (*my-bridge*)

4

```
<cfm xc:operation="create">
  <maintenance-domains>
    <maintenance-domain>
      <index>2</index>
      <name-format>char-string</name-format>
      <name>my-domain</name>
      <md-level>4</md-level>
      <maintenance-association>
        <index>2</index>
        <name-format>char-string</name-format>
        <name>my-association</name>
        <maintenance-group>maintenance-group-2</maintenance-group>
      </maintenance-association>
    </maintenance-domain>
  </maintenance-domains>
</cfm>
```

# Example MEP Creation Configuration

- Configuration example of a **Maintenance Association End Point (MEP)** on Bridge Port (*port-1*)

5

```
<cfm>
  <mep xc:operation="create">
    <port>port-1</port>
    <maintenance-group>maintenance-group-1</maintenance-group>
    <mep-id>100</mep-id>
    <direction>up</direction>
    <admin-state>true</admin-state>
  </mep>
</cfm>
```

- ❖ The MEP is associated with the maintenance-group identifier. This provides a pointer to all the maintenance-domain and maintenance-association (or in ITU-T case, the MEG ID) information to be used by this MEP

# Example Loopback Session Configuration

- Configuration example of a **Loopback Session** associated with a MEP

6

```
<cfm>
  <loopback>
    <port>port-1</port>
    <maintenance-group>maintenance-group-1</maintenance-group>
    <mep-id>100</mep-id>
    <dest-mac-address>01-AB-BC-CD-DE-EE</dest-mac-address>
    <count>3</count>
    <priority>5</priority>
    <interval>1sec</interval>
    <status>true</status>
  </loopback>
</cfm>
```

# Example CCM Session Configuration

- Configuration example of a **Continuity Check Message Session** associated with a MEP

7

```
<cfm>
  <continuity-check>
    <ccm-enabled>true</ccm-enabled>
    <port>port-1</port>
    <maintenance-group>maintenance-group-1</maintenance-group>
    <mep-id>100</mep-id>
    <priority>7</priority>
    <interval>1sec</interval>
  </continuity-check>
</cfm>
```

# Example MIP Configuration

- Configuration example of a **Maintenance Association Intermediate Point (MIP)** (explicit mode)

8

```
<cfm>
  <mip>
    <port>port-2</port>
    <service-type>vlan-id</service-type>
    <service-id>
      <vid>1001</vid>
    </service-id>
    <md-level>4</md-level>
  </mip>
</cfm>
```



# Example MIP Configuration

- Configuration example of a **Maintenance Association Intermediate Point (MIP)** (indirect mode)

9

```
<cfm>
  <default-md-levels>
    <default-md-level>
      <component-id>1</component-id>
      <primary-service-id>
        <vid>1001</vid>
      </primary-service-id>
    </default-md-level>
  </default-md-levels>
</cfm>
```

# Example Remote MEP Configuration

- Configuration example of a **Remote MEP**

10

```
<cfm>
  <mep>
    <port>port-1</port>
    <maintenance-group>maintenance-group-1</maintenance-group>
    <active-rmeps>5101</active-rmeps>
  </mep>
</cfm>
```

# Example MEP Stats Retrieval Configuration

- Configuration example for retrieving **MEP Stats**

11

```
<rpc message-id="99">
  <get-config>
    <source>
      <running/>
    </source>
    <filter type="subtree">
      <top>
        <cfm>
          <mep>
            <port>port-1</port>
            <maintenance-group>maintenance-group-1</maintenance-group>
            <stats/>
          </mep>
        </cfm>
      </top>
    </filter>
  </get-config>
</rpc>
```

```
<rpc-reply message-id="99">
  <data>
    <top>
      <cfm>
        <mep>
          <port>port-1</port>
          <maintenance-group>maintenance-group-1</maintenance-group>
          <stats>
            <mep-ccm-sequence-errors>0</mep-ccm-sequence-errors>
            <mep-ccms-sent>0</mep-ccms-sent>
            <mep-lbr-in>0</mep-lbr-in>
            :
            <mep-lbr-out>0</mep-lbr-out>
          </stats>
        </mep>
      </cfm>
    </top>
  </data>
</rpc-reply>
```

# GitHub

CFM YANG (*ieee802-dot1q-cfm*)

<https://github.com/YangModels/yang/blob/master/standard/ieee/802.1/draft/ieee802-dot1q-cfm.yang>