

# Data Model for Lifecycle Management & Operations (DMLMO)

DMLMO IETF draft revision 04

Marisol Palmero (mpalmero@cisco.com)

Frank Brockners (fbrockne@cisco.com)

Sudhendu Kumar (skumar23@ncsu.edu)

Shwetha Bhandari (shwetha.bhandari@thoughtspot.com)

Camilo Cardona (camilo@ntt.net)

Diego Lopez (diego.r.lopez@telefonica.com)

<https://datatracker.ietf.org/doc/draft-palmero-opsawg-dmlmo/>

# LMO Information Model – 02

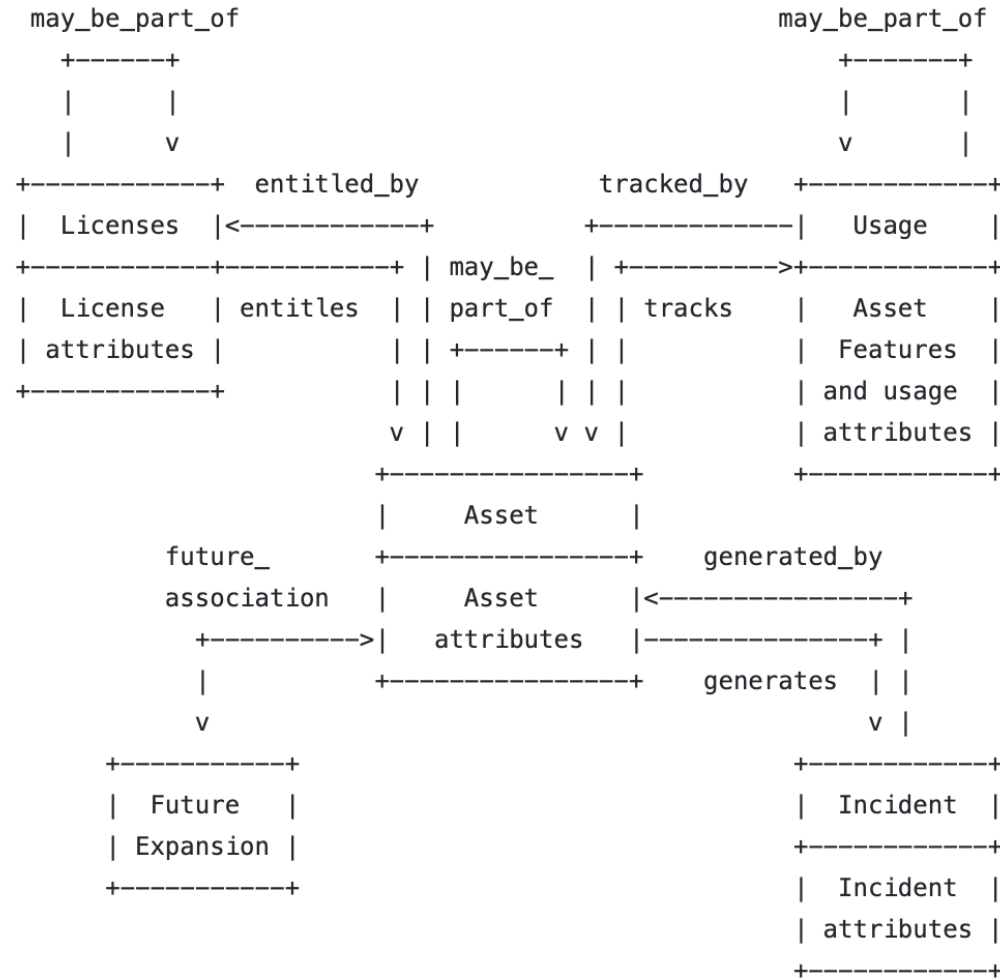
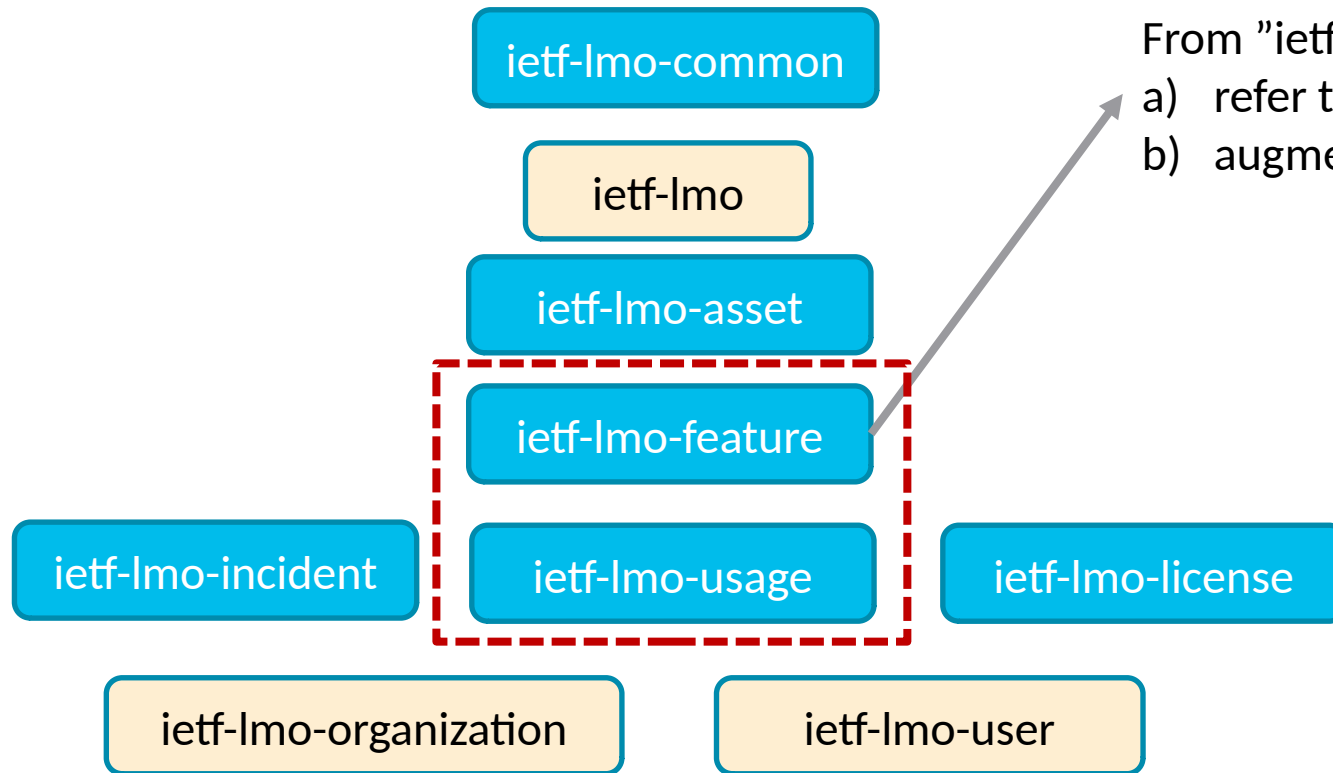


Figure 1: Information Model

# Changes in -04

## Flexibility and Consistency to the structure of the YANG modules

- Capability of integration and extention



From "ietf-lmo-feature" module you can:  
a) refer to asset instances(1:many) and  
b) augment new leafs into ietf-lmo-asset

Modules can be consistently imported & augmented

New in  
DMLMO-v3

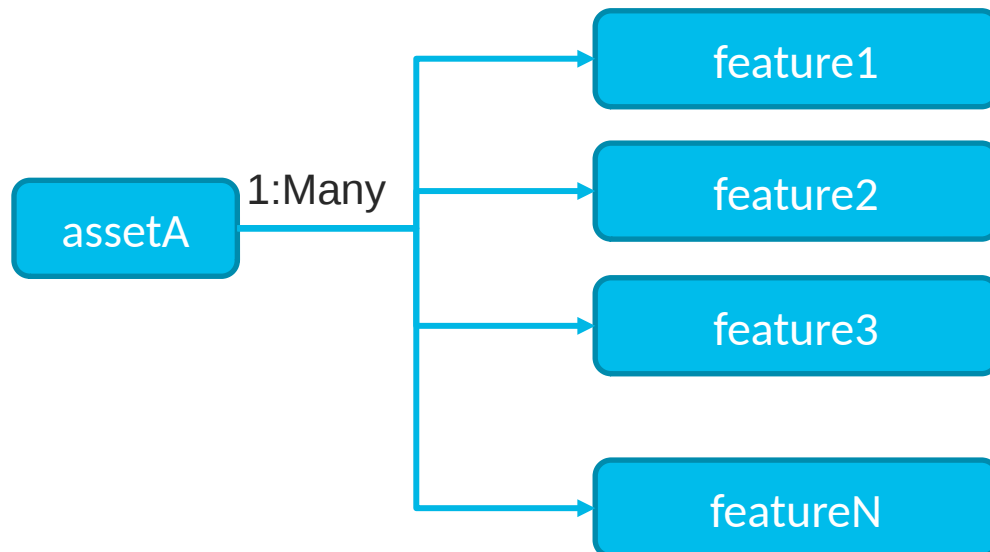
DMLMO-v2 &  
previous

# Changes in -04

## Flexibility and consistency to the YANG modules structure

- Cross reference between dataset:

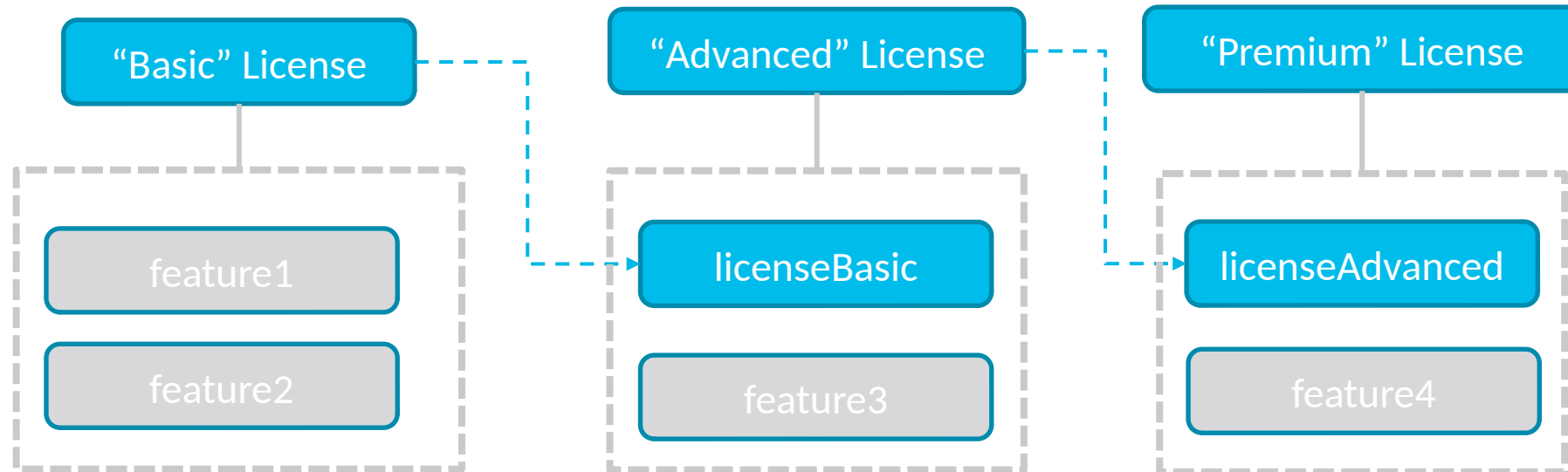
- dataset or instances: asset, feature, license, incident, organization, user, etc
- Relation can be “1:Many” or “1:1”



# Changes in -04

## Flexibility and consistency to the YANG modules structure

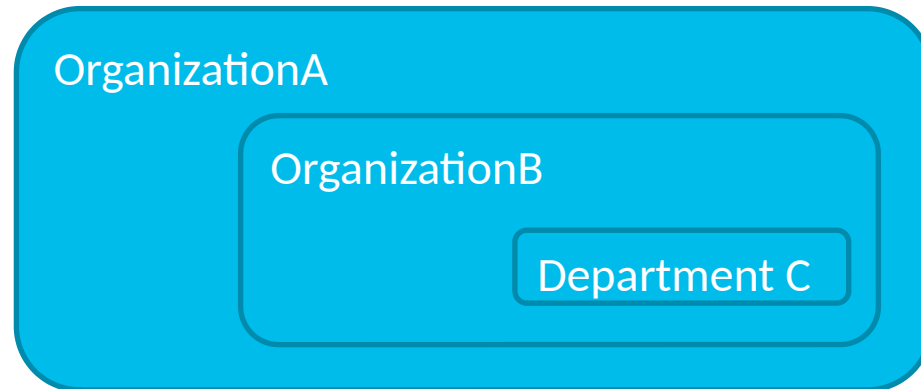
- “Combo” options have been considered for licenses to include features



# Changes in -04

Flexibility and consistency to the YANG modules structure

- Introduced hierarchy structure:  
“parent” / ”child”



```

<id>router</id>
<serial-number xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-assets-inventory">212121</serial-number>
<aggregation xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-assets-inventory">>true</aggregation>
<number-of-instances xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-assets-inventory">2</number-of-instances>
<install-location xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-assets-inventory">
  <geo-location>
  </geo-location>
</install-location>
<features xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-feature">
  <feature>
    <lmo-class>feature</lmo-class>
    <id>feature1</id>
  </feature>
  <feature>
    <lmo-class>feature</lmo-class>
    <id>feature2</id>
  </feature>
</features>
<id xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-incident-management">router</id>
<licenses xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-licenses">
  <lmo-class>license</lmo-class>
  <id>Advanced</id>
</licenses>
</inst>
</lmo>
<lmo>
  <lmo-class xmlns:ietf-lmo-feature="urn:ietf:params:xml:ns:yang:ietf-lmo-feature">ietf-lmo-feature:feature</lmo-class>
  <inst>
    <id>feature1</id>
    <asset xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-feature">
      <lmo-class xmlns:ietf-lmo-asset="urn:ietf:params:xml:ns:yang:ietf-lmo-assets-inventory">ietf-lmo-asset:asset</lmo-class>
    </asset>
    <subfeatures xmlns="urn:ietf:params:xml:ns:yang:ietf-lmo-feature">
      <subfeature>
        <lmo-class>feature</lmo-class>
        <id>feature3</id>
      </subfeature>
      <subfeature>
        <lmo-class>feature</lmo-class>

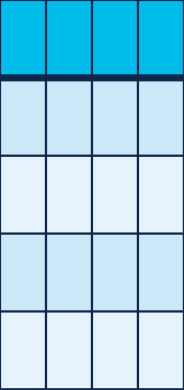
```

# Our Asks & Next Steps:

- We welcome and appreciate feedback from the working group
- Licenses are complex, we´re working to evaluate how to tackle them.
- Evolve the YANG modules:
  - Tune attributes that have been defined as part of the datasets:
    - enums vs. identities?
    - leafs marked as mandatory, evaluate the reason
    - Address for assets (MAC/IP), with purpose being management of the asset



# Backup Slides



	IMPORT	AUGMENT
<b>ietf-lmo</b>	ietf-lmo-common	
<b>ietf-lmo-assets</b>  (asset > base ietf-lmo-common:lmo-class)	ietf-lmo-common ietf-lmo	ietf-lmo-asset:asset
<b>ietf-lmo-feature</b>  (feature > base ietf-lmo-common:lmo-class)	ietf-lmo-common ietf-lmo ietf-lmo-assets-inventory	ietf-lmo-feature:feature ietf-lmo-assets
<b>ietf-lmo-licenses</b>  (license > base ietf-lmo-common:lmo-class)	ietf-lmo-common ietf-lmo ietf-lmo-assets-inventory ietf-lmo-feature	ietf-lmo-licenses:license ietf-lmo-assets


	IMPORT	AUGMENT
<b>ietf-lmo-incident</b> (incident > base ietf-lmo-common:lmo-class)	ietf-lmo-common ietf-lmo ietf-lmo-assets-inventory ietf-lmo-feature	ietf-lmo-incident:incident
<b>ietf-lmo-usage</b> (base ietf-lmo-common:lmo-class)	ietf-lmo-common ietf-lmo ietf-lmo-assets-inventory ietf-lmo-feature	ietf-lmo-usage:usage
<b>ietf-lmo-organization</b> (base ietf-lmo-common:lmo-class)	ietf-lmo-common ietf-lmo ietf-lmo-assets-inventory ietf-lmo-licenses	ietf-lmo-organization:organization ietf-lmo-licenses
<b>ietf-lmo-user</b> (base ietf-lmo-common:lmo-class)	ietf-lmo-common ietf-lmo ietf-lmo-assets-inventory ietf-lmo-licenses ietf-lmo-organization	ietf-lmo-licenses

YANG Suite / NETCONF / YANG set "features" / Modules

mpalmero

NETCONF

YANG Set: features | Module(s): ietf-lmo-feature

NETCONF Operation: get-config | Device: lmoSimRouter

Buttons: Edit Device, Open Device Window, Run RPC(s), Clear RPC(s), Build RPC, Replays, RPC Options...

Nodes	Value
id	
parent	
capture-info	
ietf-lmo-asset:vendor	
ietf-lmo-asset:name	
ietf-lmo-asset:description	
ietf-lmo-asset:pid	string
ietf-lmo-asset:serial-number	
ietf-lmo-asset:vid	
ietf-lmo-asset:mac-address	
ietf-lmo-asset:ip-address	
ietf-lmo-asset:entity-name	
ietf-lmo-asset:product-description	
ietf-lmo-asset:udi	
ietf-lmo-asset:transparency-info	
ietf-lmo-asset:role	
ietf-lmo-asset:aggregation	
ietf-lmo-asset:number-of-instances	
ietf-lmo-asset:platform-dependency-os	
ietf-lmo-asset:install-location	
ietf-lmo-asset:deployment-mode	
ietf-lmo-asset:activation-date	
ietf-lmo-asset:software-version	
ietf-lmo-asset:hotfixes	

```
<rpc xmlns="urn:ietf:params:xml:ns:netconf:base:1.0" message-id="101">
  <get-config>
    <source>
      <running/>
    </source>
    <with-defaults xmlns="urn:ietf:params:xml:ns:yang:ietf-netconf-with-defaults">report-all</with-defaults>
  </get-config>
</rpc>
```