YANG Mount

draft-clemm-netmod-mount

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Reminder - what is “YANG-Mount”? + current status

- “The other mount” (actually, the original mount): Mounting Instances, not Schemas
  - Alias-Mount: Define an alternative path to instance information already elsewhere in the tree
  - Peer-Mount: Allow to access instance information authoritatively owned by a different server
  - Involves server infrastructure extension
- -06 posted, but draft has been kept virtually unchanged since -04
- Kept “dormant” as interest focused on Schema-Mount
- However, use cases for YANG-Mount remain valid (and may get more pressing)
  - Applications require visibility to data instantiated on other servers, or elsewhere on the same server
    - Instead of redundant configuration of parameters that need to be consistent, maintain link to authoritative copy
    - Provide context-awareness to state elsewhere in the network, e.g. to maintain network-wide service levels
    - Consolidated real-time network state (compare ODL MD-SAL)
  - Device to device, controller to device, device to controller, …

Comparison YANG-Mount – Schema Mount

YANG-Mount	Schema Mount
Provide visibility - create additional access path to instantiated data (local – alias and remote – peer)	Reuse existing definitions (schemas) to create new models
A server extension (also involves modeling construct)	A modeling construct
Analogy: soft link* (*with some caveats)	Analogy: grouping/uses (or augments)
Reference mount target has authoritative copy	Mount Point has authoritative copy
No validation of data at or by mountpoint; validation of data is responsibility of authoritative data owner	Validation of data at mount point
Mount point provides visibility to data already instantiated elsewhere (no redundant data)	Mountpoint instantiates data
The same target mounted in different mountpoints does not result in additional data instances	Same target schema mounted in different mountpoints results in separate unrelated data instances

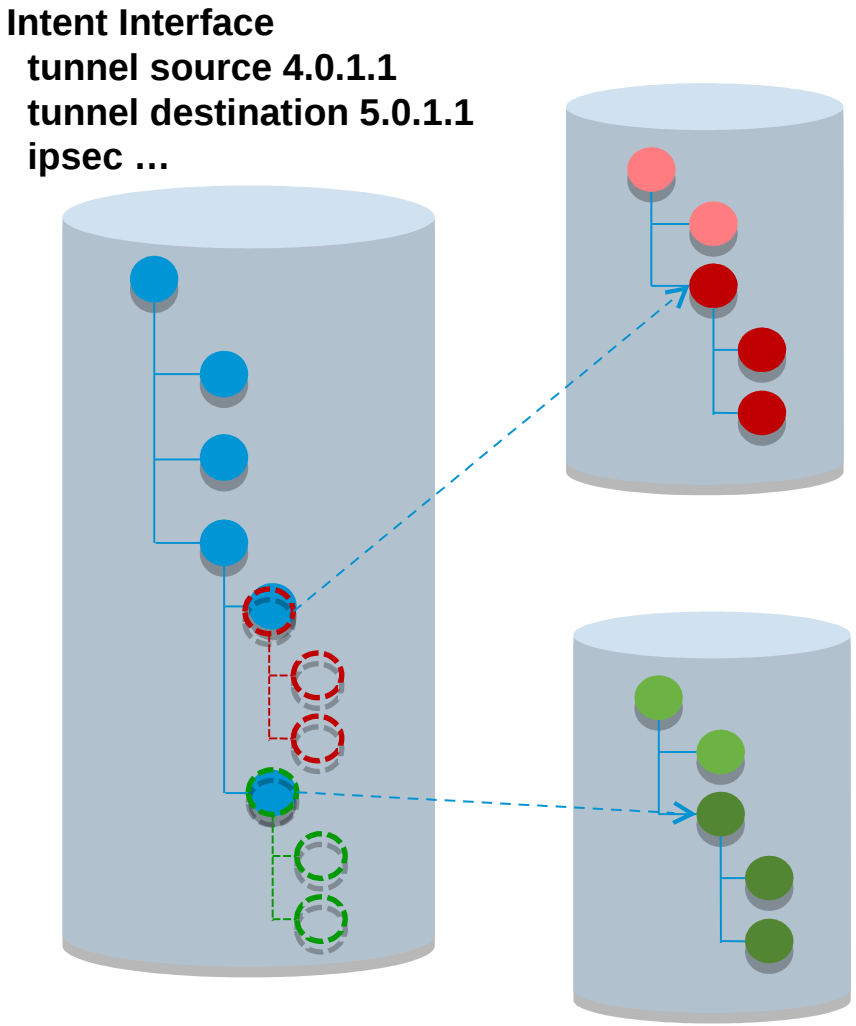
Commonality between YANG-Mount and Schema-Mount: YANG mountpoint extension

- YANG extension introduced to define mountpoints
- Differences in terms of additional parameters (to identify target node and target system)

Refresher

- Super-impose new path structures on top of YANG data trees to access instantiated YANG data
- Commonality between YANG-Mount and Schema-Mount: YANG mountpoint extension
  - YANG extension introduced to define mountpoints
  - Differences in terms of additional parameters (to identify target node and target system)
- Allow YANG data nodes to link data in other (remote or local) subtree locations
  - Insert (remote) subtrees under a mount point in a datastore
    - Mount client: a YANG server that maintains the mounted “view”
    - Mount server: the authoritative owner of the data
    - For on-demand object access, mount server does not need to be aware of mount client
  - Defines an alternative path to access data nodes
    - Clients of the YANG server with mounted structure have visibility to it like “native” information
- Original draft emphasized remotability of data
  - YANG Server allows its clients to access data that is conceptually federated across a network
    - (Note: Peer-mount is also the basis for MD-SAL in Open Daylight, and is now proven/robust)
- However, mount points can also be defined for local data ⇨ Alias Mount

Mount Concept – Peer Mount



Concept:

- Refer to data nodes / subtrees in remote datastores
- Remote data nodes visible as part of local data store
- Avoid need for data replication and orchestration
- Authority remains with original owner

Why:

- Federated datastore - treat network as a system
- “Borderless Agents”, “Network-as-a-System”

Notes

- Caching optimizations are possible (leverage YANG-Push)
- Circular mounting prohibited
- Focus on data nodes (not notifications)
- Original owner is authoritative
  - Conditions/constraints/etc apply only there
- Mounted data intended as “read-only”
  - Clients know the difference between data that is mounted vs data that is authoritatively owned
  - This is about providing visibility, not about changing authority
  - NMDA analogies apply

Next steps

- Editorial
  - Editorial cleanup, relationship with schema-mount
  - Investigate support for notifications referring to objects under their aliased name
  - Consider extensions to accommodate dynamic configuration of mountpoints
  - Review mountpoint construct for alignment between YANG-Mount and Schema-Mount
- Working group
  - Solicit feedback – is there interest to move forward with this?
  - Would fit well as a “next step” once schema mount is done

Thank you!

Backup

Usage example

```
rw controller-network
    +-- rw network-elements
        +-- rw network-element [element-id]
            +-- rw element-id
            +-- rw element-address
            |   +-- ...
            +-- M interfaces
```

Module structure

```
...
 list network-element {
     key "element-id";
     leaf element-id {
          type element-ID;
     }
     container element-address {
          ...
     }
     mnt:mountpoint "interfaces" {
         mnt:target "./element-address";
         mnt:subtree "/if:interfaces";
     }
  }
...
```

Mountpoint declaration

- YANG module defines YANG mount extensions + data model for mountpoint management
- YANG extensions:

  Mountpoint: Defined under a containing data node (e.g. container, list)

  Target: References data node that identifies remote server [peer-mount only]

  Subtree: Defines root of remote subtree to be attached

```
<network-element>
   <element-id>NE1</element-id>
    <element-address> .... </element-address>
    <interfaces>
       <if:interface>
           <if:name>fastethernet-1/0</if:name>
           <if:type>ethernetCsmacd</if:type>
           <if:location>1/0</if:location>
            ...
       </if:interface>
        ...
```

Instance information

Alias mount example

```
rw my-container
    +-- rw sub-container
        +-- M interfaces


...
```

Module structure

```
container my-container {
  container subcontainer {
     mnt:mountpoint "interfaces" {
          mnt:subtree "/if:interfaces";
     }
  }
...
```

Mountpoint declaration

Mount point is local

```
<my-container>
   <sub-container>
   <interfaces>
       <if:interface>
           <if:name>fastethernet-1/0</if:name>
           <if:type>ethernetCsmacd</if:type>
           <if:location>1/0</if:location>
             ...
       </if:interface>
        ...
```

Instance information

Mountpoint management

```
rw mount-server-mgmt
  +-- rw mountpoints
  |   +-- rw mountpoint [mountpoint-id]
  |       +-- rw mountpoint-id  string
  |       +-- rw mount-target
  |       |   +--: (IP)
  |       |   |    +-- rw target-ip  yang:ip-address
  |       |   +--: (URI)
  |       |   |    +-- rw uri  yang:uri
  |       |   +--: (host-name)
  |       |   |    +-- rw hostname  yang:host
  |       |   +-- (node-ID)
  |       |   |    +-- rw node-info-ref  mnt:subtree-ref
  |       |   +-- (other)
  |       |        +-- rw opaque-target-id  string
  |       +-- rw subtree-ref  mnt:subtree-ref
  |       +-- ro mountpoint-origin enumeration
  |       +-- ro mount-status  mnt:mount-status
  |       +-- rw manual-mount? empty
  |       +-- rw retry-timer? uint16
  |       +-- rw number-of-retries? uint8
  +-- rw global-mount-policies
      +-- rw manual-mount? empty
      +-- rw retry-time? uint16
      +-- rw number-of-retries? uint8
```

- Mountpoints can be system-administered
- Applications&users are not exposed to this
- System administration can add bindings

  Update on-demand, periodic, on-change
- Not shown:

  Mount bindings - data update subscriptions
- Model needs updating to distinguish alias and peer mount