YANG Data Model for IPv4-in-IPv6 Softwire Configuration and Management
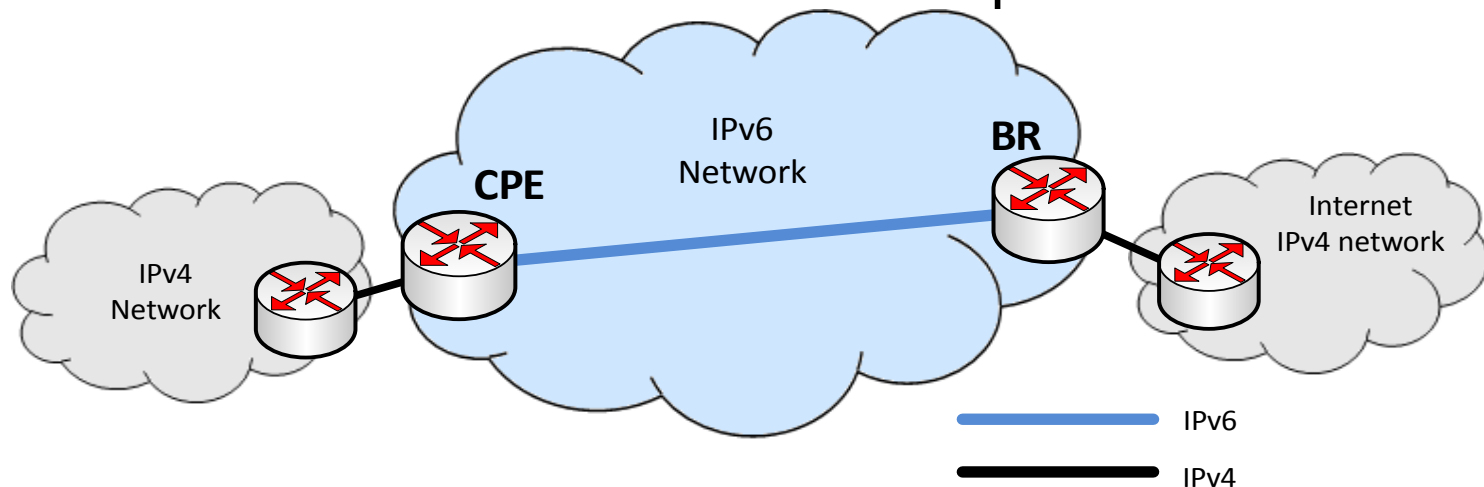
draft-sun-softwire-yang-03
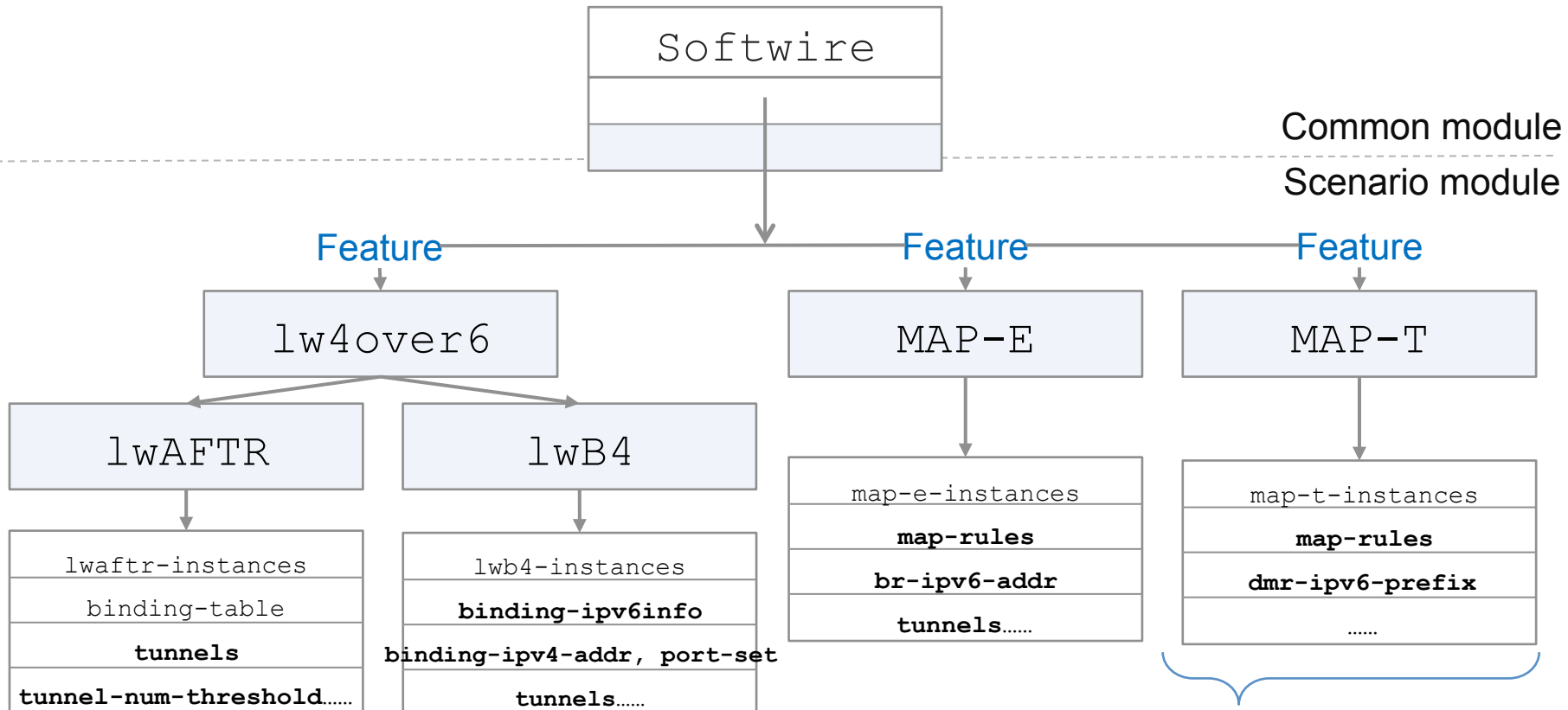
IETF93 Prague

Background

- Multiple IPv4-in-IPv6 transition mechanisms:
  - Tunnel based:
    - lw4over6: draft-ietf-softwire-lw4over6
    - MAP-E: draft-ietf-softwire-map
  - Translation based:
    - MAP-T: draft-ietf-softwire-map-t

Softwire WG

IPv6
Network

BR

CPE

Internet
IPv4 network

IPv4
Network

———— IPv6

———— IPv4

Model structure


```
         Softwire
```

Common module
Scenario module

Feature   Feature   Feature

```
 lw4over6                   MAP-E               MAP-T
```

```
  lwAFTR      lwB4
```

```
lwaftr-instances          map-e-instances          map-t-instances
binding-table               map-rules                 map-rules
  tunnels                   br-ipv6-addr            dmr-ipv6-prefix
tunnel-num-threshold……      tunnels……                   ……
```

```
lwb4-instances
 binding-ipv6info
binding-ipv4-addr, port-set
    tunnels……
```

- Lw4o6 YANG model is more '**device-based**', so the model is divided into client and concentrator

- MAP-E/ MAP-T in separate containers, but client and concentrator share the same configuration rules

Major changes between **-00** and **-03**

- Per-request at IETF91, model includes client and concentrator

- Added new mechanism: **Map-T**

- Divided **Lightweight 4over6** module into **two parts**:
  - Sub-module: **lwAFTR** & **lwB4**

- Designed an **example for NETCONF** configuration

- Added brand-new **Notification** data model

- Consideration about **NAT/NAPT**
  - Include IP address and port set for CE to use for translation, but additional NAT-specific considerations are out of scope.

- Add **traffic-stat** container in state data model

- Add security and IANA considerations

YANG Doctor's Review

- 23 Comments received – Mostly linguistic, references, consistency

- Comment 3 - Suggestion to split from 1 module into 3 (one per sw mechanism). Still a single model in v03. Opinions?

- Comment 12 - Adding tunnel OAM was suggested (e.g. BFD). This suggestion was considered with the conclusion that it would not be a good idea due to the per-tunnel state that it would require

- Comment 20 - FMR/BMR rule definition shows that the current 'enumeration' type is wrong – this should be an 'FMR' rule boolean.

- **Complete set of YANG Doctor's review comments included at the end of this presentation**

Notification Model

- Use to monitor and receive the notifies from devices.

```
notifications:
    +--n softwire-lwaftr-event
    |  +--ro lwaftr-id
    |  +--ro invalid-entry*
    |  +--ro added-entry*
    |  +--ro modified-entry*
    +---n softwire-lwb4-event
    |  +--ro lwb4-binding-ipv6-addr-change
    +---n softwire-map-e-event
    |  +--ro map-e-id
    |  +--ro invalid-entry-id*
    |  +--ro added-entry*
    |  +--ro modified-entry*
    +---n softwire-map-t-event
       +--ro map-t-id
       +--ro invalid-entry-id*
       +--ro added-entry*
       +--ro modified-entry*
```

lwAFTR notification nodes

lwB4 notification nodes

MAP-E notification nodes

MAP-T notification nodes

XML Example (from libnetconf)

- Example of configure lw4over6 AFTR **Binding-Table**:
  - Add an entry in **B**inding–**T**able, which on the lwAFTR (2001::2). The data values are '2001::1', '123.1.1.1' and '1234' respectively.

```
<rpc message-id="101" xmlns:nc="urn:params:xml:ns:yang:ietf-softwire:1.0">
   <edit-config>
     <target>
       <running/>
     </target>
   <softwire-config>
   <lw4over6-aftr>
      <lw4over6-aftr-instances>
        <lw4over6-aftr-instance>
          <aftr-ipv6-addr>2001::2</aftr-ipv6-addr>
          <binding-table>
            <binding-entry>
              <binding-ipv4-addr>123.1.1.1</binding-ipv4-addr>
              <port-set>
                <psid>1234</psid>
              </port-set>
              <binding-ipv6-addr>2001::1</binding-ipv6-addr>
              <active>1</active>
            </binding-entry>
          </binding-table>
        </lw4over6-aftr-instance>
      </lw4over6-aftr-instances>
   </lw4over6-aftr>
   </softwire-config>
```

Status and next steps

- Comments and suggestions are welcome!

- Adopt it as a WG item?

Backup

YANG Doctor Review Comments 1/3

- 1) CPE vs CE. We need consistency in the doc I think.

- 2) MAP-E.   Does that still exist? Or is it MAP and MAP-T now?

- 3) Section 1.   You've stated that each mechanism has its own module - but that's no longer the case, is it?   It's all in one module, but with different sections. Having said that there's so little shared information (see below) that I'd be tempted to put each mechanism in its own module (but with a common module for shared groupings).

- 4) Section 2 (grammar nit). I'd say "the configuration and management information..." (not "configure and manage").

- 5) Section 6. you probably need to add security considerations soon.

- 6) section 7. I don't think there would be IANA considerations for a YANG model? Or not unless IANA sets up a namespace registry.

- 7) section 8. you've acknowledged Rajiv but then added him as an author.

- 8) section 9.1.   MAP is now up to -13.

- 9) section 9.1. You have listed RFC6021/RFC6241 but there's no ref to either in the text.

- 10) section 9.1. I think RFC6991 could be informative?

- 11) section 9.2. You've also listed RFC6333/RFC6470 without actually referring to those from the text.

YANG Doctor Review Comments 2/3

- 12) (general). Is it worth thinking about OAM? For example you could enable multi-hop BFD on the tunnels for all cases bar MAP-T (where there's no tunnel).   Likewise might be worth thinking about fragmentation. We covered both issues in the keyed IP tunnel YANG.

- (remaining comments are on the Yang model in section 4 - so I guess doing the YANG-doctor job here):

- 13) (softwire-config). Do we need a configurable description for softwire? (assuming we keep the shared data node - see below).

- 14) (softwire-config). Should the tunnel-mtu be uint16 rather than uint32? Also I'm not convinced tunnel-mtu is a per-domain parameter. isn't it per tunnel?   The "v6" way is probably to use PMTU discovery.   We put a bunch of stuff on this in the keyed-ip-tunnel YANG draft (relates to fragmentation of course - see above).   Also tunnel-mtu doesn't apply to MAP-T (as there's no tunnel)

- 15) (softwire-config). Is there any value in enabling/disabling softwire globally (rather than just per mechanism)?

- 16) Given the above 3 comments I'm not sure we need any shared softwire config (or status).

- 17) (map-e/map-t). I'd suggest renaming the "map-rules" list to "map-rule" and the map-rule-table" container to "map-rules".

YANG Doctor Review Comments 3/3

- 18) (map-e/map-t). You could possibly make the id, name and map-rules all a common grouping between map-e/map-t (so then the only difference is the br-ipv6-addr vs the dmr-ipv6-prefix). At that point you could remove the existing map-rule grouping as it would only be used by the new grouping.

- 19) (map-t). Yes - I think we need the IPv6 prefix for the MAP-E/MAP-T domain in the BR config. The BRs need to originate that prefix into IPv6 iBGP.

- 20) (map-rule). Would we ever have FMR rules at a BR? (FMR rules are for direct CE to CE communication)

- 21) (map-rule). The drafts specify that BMR rules may also be FMR rules - so you may need a way to specify that a rule is both?

- 22) (softwire-state). I don't think you need enable leaves on the status containers? In fact I'm not sure there's much in the state containers that you need to retain. The map-rules for example are only needed if there's a non-configuration way of creating them.

- 23) (softwire-lwaftr-event). Do you want "default false" on the exceed-sw-um-limit? I generally go for empty types rather than booleans - so you only include the field if it's true.