Guidelines for YANG module authors on using the new Network Management Datastore Architecture (NMDA)

draft-usdt-nmda-guidelines &
draft-ietf-netmod-revised-datastores-03

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Problem definition:

- Operator requirement for devices to clearly differentiate between:
  - What it is being **asked to do** – i.e. the **intended configuration**
  - What it is **actually doing** – i.e. **operational state, including the applied configuration**.

- Different solutions to this problem have been evaluated by IETF.

- The agreed IETF solution defines a new “operational” datastore for operational state:
  - NETCONF/RESTCONF additions to support the operational datastore.
  - Replaces the existing ‘broken’ NETCONF GET operation.
  - This also has implications on the structure of YANG models to be optimized for use with NMDA.
Different YANG model structures

YANG models can be structured in different ways (including):

1. **IETF style split ‘config’ and ‘state’ top level trees** (*deprecated by NMDA*):
   E.g. this is the structure currently used by ietf-interfaces.yang (RFC 7223)

2. **Open Config style ‘config’ and ‘state’ containers immediately above config true leaves:**
   E.g. this is the structure consistently used by all Open Config YANG models (https://github.com/openconfig/public)
   The expired BGP YANG model draft also currently has this structure: draft-ietf-idr-bgp-model-02

3. **IETF combined config/state tree** (*NMDA style - the future of IETF YANG models*):
   Various draft modules are now following this convention:
   I2RS topology model: draft-ietf-i2rs-yang-network-topo-14
   TE topology model: draft-ietf-teas-yang-te-topo-11
From the BGP YANG model, consider:

- **4 Global Leaves:**
  - AS number *(configurable)*
  - Router Id *(configurable)*
  - Total paths *(state only)*
  - Total prefixes *(state only)*

- **4 Per Neighbor Leaves:**
  - Neighbor address *(configurable)*
  - Peer AS *(configurable)*
  - Messages: Container with ‘In’ and ‘Out’ state leaves
μBGP model as IETF split config/state module: (deprecated)
μBGP model as IETF combined config/state
YANG Module:
(NMDA – the future for IETF YANG models)
μBGP model as OpenConfig style YANG Module:
One tree with config/state containers
(for reference - not for IETF YANG models)
Advantages of combined (NMDA) YANG module structure

• The module is simpler and shorter to write, and doesn’t require extensive use of groupings.

• It is impossible for the configuration and state trees to become inconsistent in either path or value space.

• The modules are fully consistent with existing YANG semantics and all language constructs.

• The proposed structure takes into consideration support for other IETF work such as the I2RS WG.

• Deduplication of leaves means other model styles could be generated by tooling, if required.
How to migrate to NMDA style

• All YANG modules produced by IETF SHOULD conform to the NMDA architecture ...

• All YANG modules already published by IETF should be revised to conform to NMDA:
  • All nodes in any <foo>-state trees are copied into the <foo> (config true) tree, creating it if necessary.
  • The existing state tree is marked as deprecated.
  • Update descriptions as required for semantic consistency.

• Please also update WG draft YANG models to NMDA style
  • As above, but <foo>-state tree is also deleted.
Can we use NMDA style modules on existing NETCONF/RESTCONF?

• Yes, but:
  1. There is no way of reporting the “applied configuration value”.
  2. It cannot report system created configurable objects (e.g. an interface that always exists even without configuration)

• For most modules/implementations these limitations should not be problem.

• In a small number of cases, where this limitation is a problem:
  • A temporary “config false” “<foo module>-state” module MAY be constructed and put in the draft appendix, for use until NMDA compliant implementations become available.
  • Expected to be obsoleted over time.
Summary

• All unpublished IETF YANG modules SHOULD follow the NMDA style.

• Extra generated “<foo>-state” modules may be added into the draft appendix, when there is a genuine requirement to do so.

• Please email NMDA draft authors, or NETMOD WG alias, if you have questions on how to migrate your drafts:
  • draft-ietf-netmod-revised-datastores@ietf.org
  • netmod@ietf.org

• NMDA work is progressing in both NETCONF and NETMOD WGs.