

# YANG

## Some lessons learned

Don Fedyk  
dfedyk@labn.net

# Based on experience in Industry, IEEE and IETF

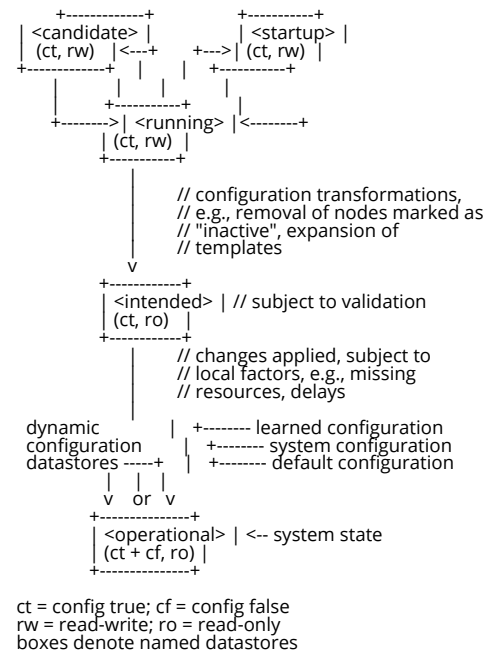
- Recommended to 802.1 Testing of YANG
  - PYANG
    - Pyang is Validation – Equivalent to Grammar checking a document.
    - Limited Testing
  - Other tools
    - YUMA123 and ConfD
      - Validation and testing data against the schema
      - Useful to highlight some errors
      - Found errors in Published 802.1 YANG
    - Yanglint
      - Tests the schema against
        - » Configuration, operational, Remote Procedure Calls and Notifications
        - » You supply the data and yanglint validates the YANG rules, xpath etc. against the data and the model.
      - A good tool for standards
- Most of feedback has been adopted by the IEEE 802.1 Yangsters

# Industry and Standards: YANG

- YANG is Documentation and Modeling
- Industry view of YANG
  - YANG schema validates various data stores
  - Enforcement of YANG data may be encoded in the YANG schema or related software.
  - YANG may have hardened rules
- Standards view of YANG
  - Desire to describe configuration and operational data relevant to systems being developed.
  - Enforcement should be limited to simple checks – e.g. data types and range checking.
  - Opinion YANG should avoid hard rules
  - The goal is to avoid continuous document updates.

RFC 8342

Figure 2 Architectural Model of Datastores



**Different emphasis when implementing a system versus documenting standard.**

# Some additional Guidelines

## (Augmenting Yangsters Guidelines of course!)

- Test the data to see how it looks
  - Json Output is very readable.
- YANG input should be Human readable when possible.
  - Avoid Binary when possible. It's encoded in base64
  - Use Hex decimal or integer if possible.
  - Values are understood by YANG parsers Strings are not.
  - Avoid Floating point numbers when possible
    - YANG has no type for this - it becomes string representing an IEEE floating format.
    - Fixed point decimal handles most cases, and it is stored as integer and a scalar.
    - 1 Nanosecond:
      - Decimal = 0.000000001 (YANG Value)
      - IEEE floating point 3089705f (Hex) (YANG String)
      - Base64 (IEEE floating point 3089705f) MllwXw== (Still a String)
- Beware of lists that have mixed case strings as Keys
  - IP addresses and MAC addresses YANG formats support mixed case and are not good Keys.

# Other Uses for YANG

- Several places modeling is used to describe interfaces.
  - YANG is a open tool chain that can describe interfaces
- For Example: Type, Length, Value and Dictionaries with Keys
  - Can be expressed as JSON data
  - YANG can document TLVs
    - In fact LLDP yang closely maps to LLDP TLVs.

# Is SNMP dead?

- Some customers still require SNMP for legacy systems.
- Converting SNMP tables to YANG has mixed results.
- However, it is relatively easy to organize SNMP to correspond to a YANG model.
  - Personally utilized this in two projects
  - YANG adds an intuitive hierarchy that SNMP can mimic
  - SMI tool chain works well

# Comments? Questions?

Thank You

**IEEE  
802**

