

IEEE 802.3 YANG data model(s) Call For Interest Consensus Presentation

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CFI Objectives

- To gauge the interest in developing YANG data model(s) for IEEE 802.3 management.
- We do not need to:
 - Fully explore the problem
 - Debate strengths and weaknesses of solutions
 - Choose a solution
 - Create a PAR or 5 Criteria
 - Create a standard
- Anyone in the room may vote or speak

Motivation

Develop a standard for YANG data models for IEEE 802.3 Ethernet PHYs

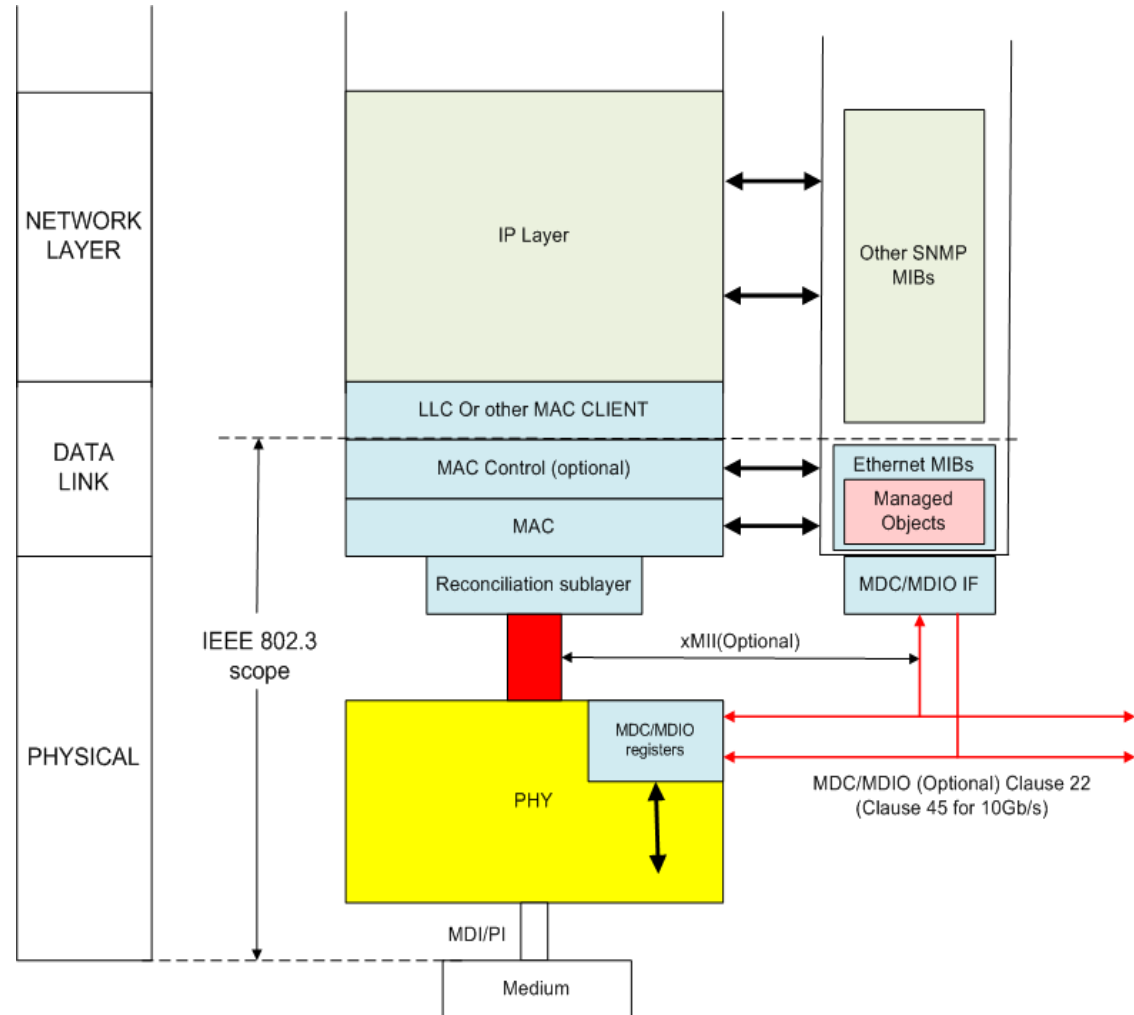
State of the Art:

Current IEEE 802.3 Ethernet
Management Model

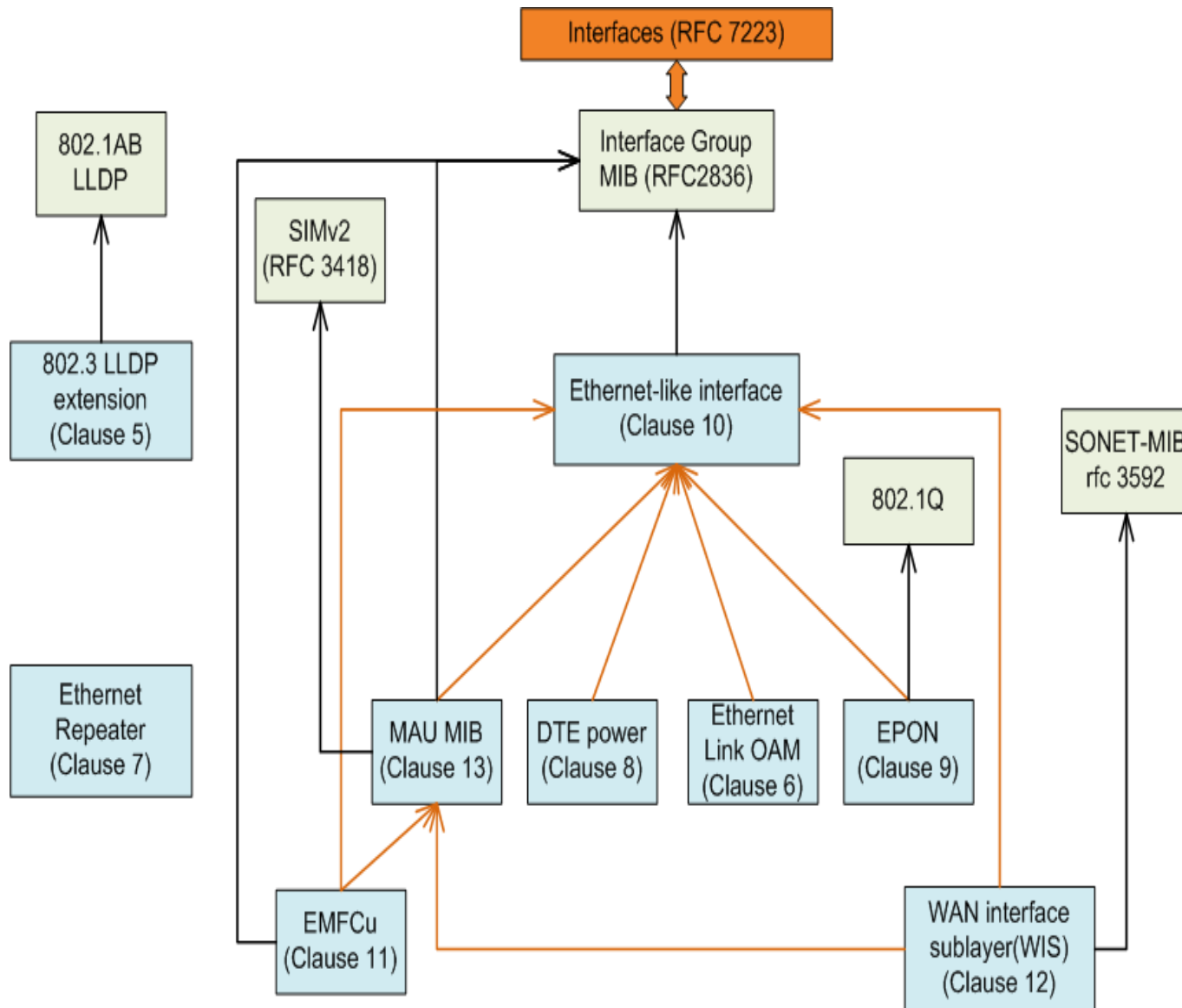
Current IEEE 802.3 Ethernet Management

IEEE 802.3 Ethernet management elements:

- Management Information Base (MIB) modules defined by IEEE Std 802.3.1, IEEE 802.1, IETF, vendors, etc.
- Pervasive access to MAC/MAC Control
- Pervasive access to PHY via MDIO Interface
- Mapping MAC/MAC Control information into MIB objects
- Mapping PHY information into registers and indirectly into MIB objects



IEEE Std 802.3.1-2013 MIBs



Market Drivers:

Why we need a new schema
besides SNMP/MIB?

What is YANG?

- YANG is ...
 - a flexible and extensible data modelling language
 - describes configuration, monitoring, administration, and notification capabilities in a device-independent manner
- A YANG data model is designed to include ...
 - the common features and parameters/attributes of configuration and operational state for a type of devices or functions

Comparison between SNMP/MIB and NETCONF/YANG

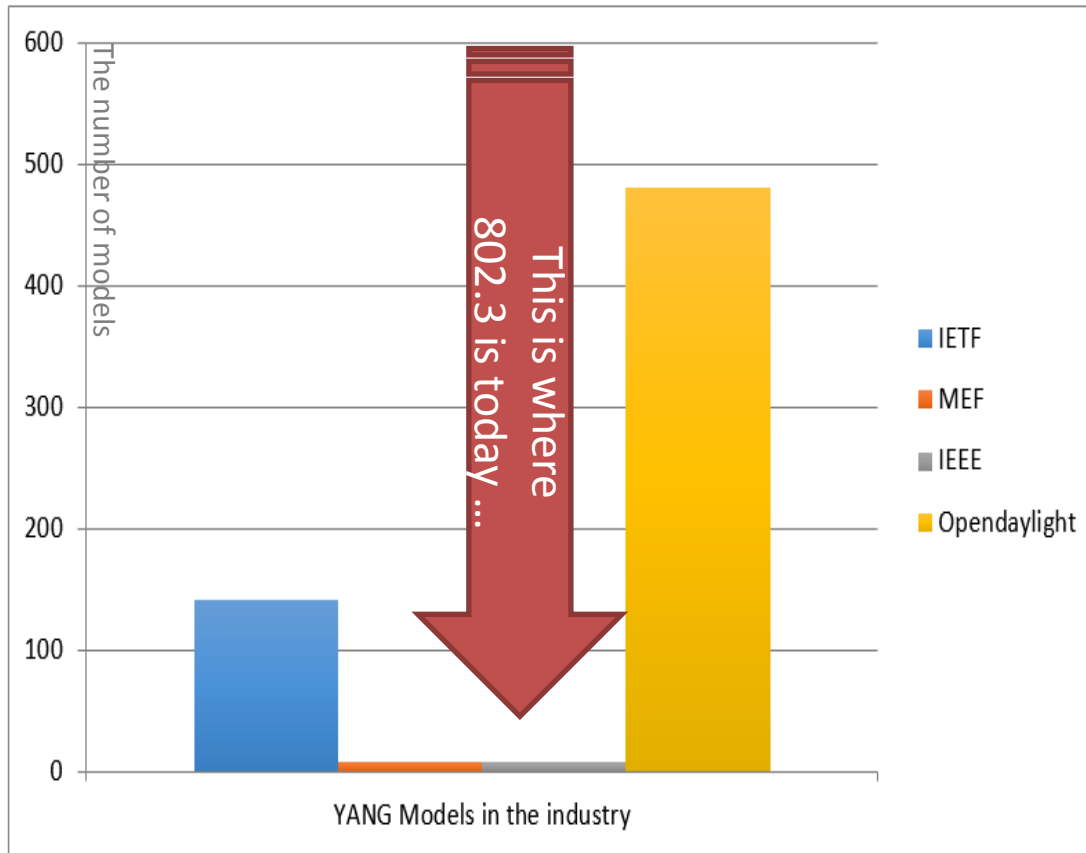
	SNMP/MIB	NETCONF/YANG
Operation Track	<u>No backup, no rollback, no state</u> information	Network-wide <u>transaction-oriented configuration flow, with roll-back, locking, configuration backup and verification capabilities</u>
Batch configuration	A single management element is configured at a time	A single configuration and state model for all involved devices
Human readable	No	Yes
Tooling	No	Allow code generation
Granularity	Single device/interface	End-to-end network function decoupled from underlying network element hardware
Error handling	No, error handling requires added NMS intelligence	Yes

- YANG/NETCONF can provide better network management than SNMP/MIB
- SNMP is a small subset of the YANG capabilities we can deliver today

SNMP time is over

- The use of SNMP for network management is decreasing quickly in active networks
- SNMP/MIB is still used extensively for statistics purposes and data mining
- IETF recommends against the use of SNMP/MIB for network management in new installations:
<https://www.ietf.org/iesg/statement/writable-mib-module.html>, dated 2014
- The use of YANG/NETCONF is recommended instead.
- The IEEE 802.3 Working Group needs to remain current with the industry's network management best practices

Industry is developing YANG data models



The development of YANG data models are increasing in the industry, including:

- IETF
- IEEE 802.1
- MEF
- ITU-T
- ODL
- BBF
-

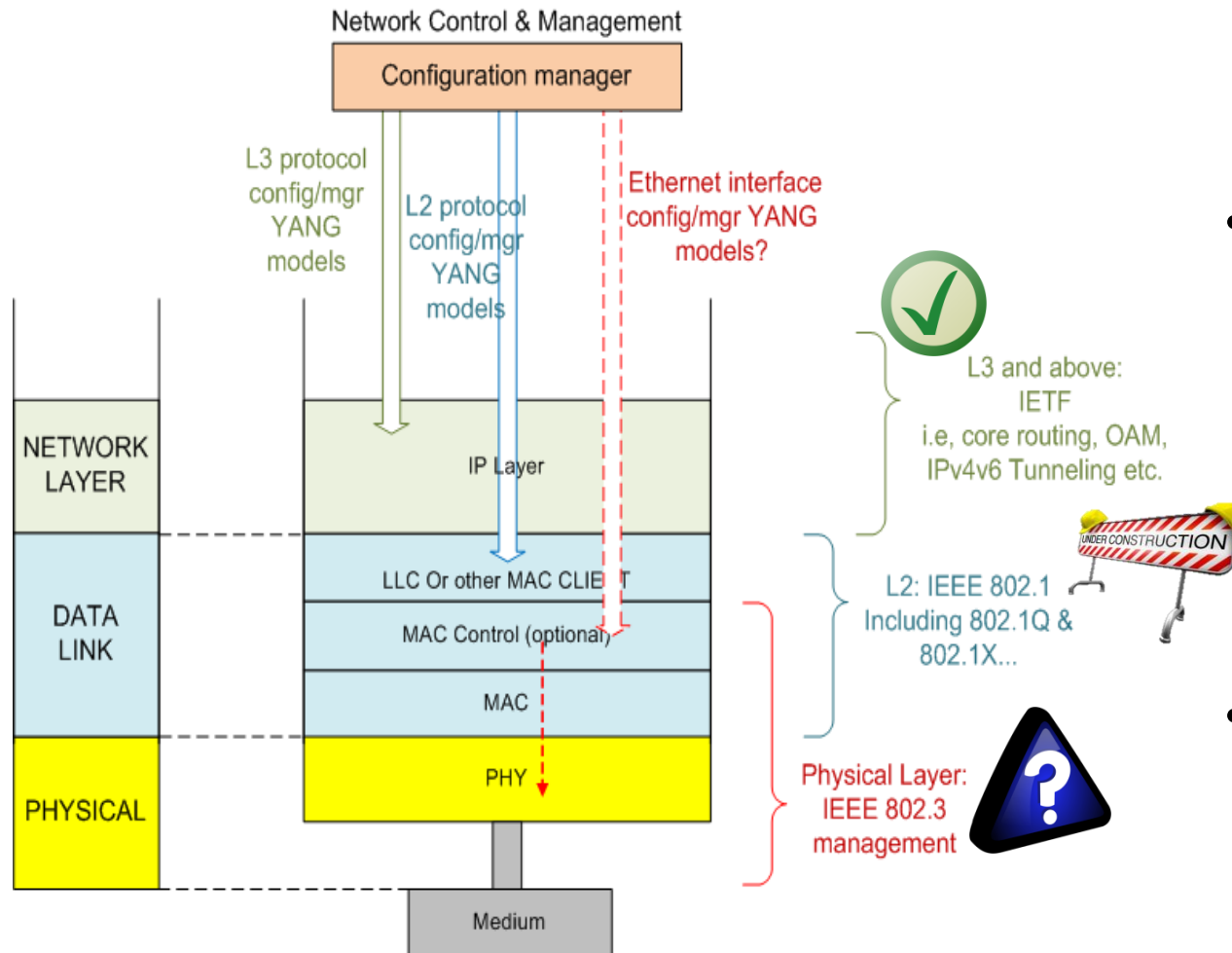
From **YANG and NETCONF/RESTCONF Gain Traction in the Industry: Latest Status**, in IETF Journal, for IETF 94.

(...) Given the pervasive character of 802.3 PHYs in different application areas, the availability of standardized YANG data models is critical for the future. If no standardized models are defined, private Ethernet-like YANG data models will be created by individual vendors, leading to interoperability problems. (...)

Why and who needs YANG?

- NETCONF and YANG have been specified based on the operators requirements (see RFC 3535)
- YANG as the data modeling language of choice allows automation via some code generation.
 - At the time of SDN, every network task must be automated
 - Customer feedback: "If a feature can't be automated, it doesn't exist"
- Operators works to make YANG the basis for their everyday network operations:
 - Development of Layer 3 VPN service model in IETF was driven by Orange/BT/Verizon/AT&T
 - Another example of network operators working to make YANG data models is in MEF
- IEEE 802.3 Ethernet is the transport layer used pervasively in today's networks.
- The lack of standardized 802.3 YANG data models will push operators to drive development in individual vendors, leading to vendor-specific Ethernet models and interoperability problems.

YANG-based management map



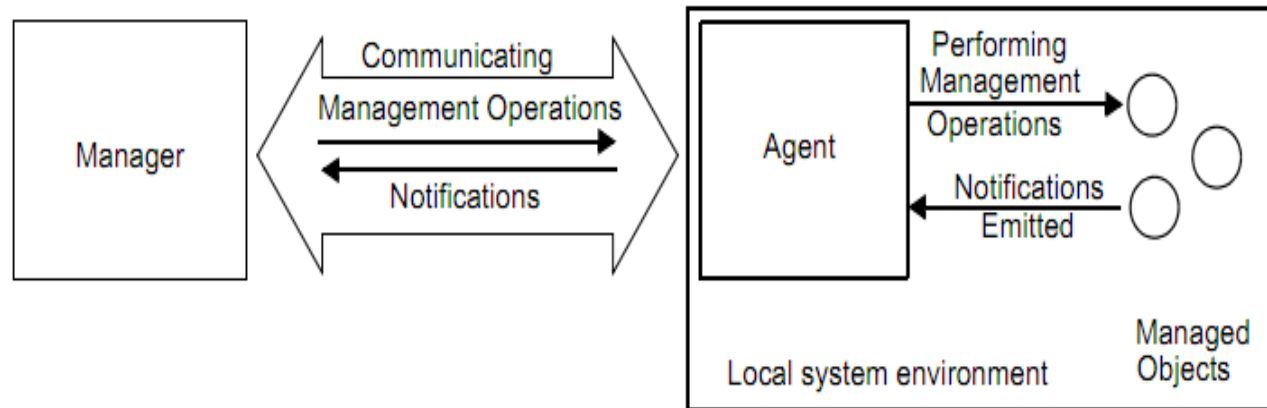
What is missing?

- IETF already defines a number of YANG data models for different L3+ protocols
- 802.1 and 802.3 layers today modelled only with generic interface YANG data models (very limited, no Ethernet specific content)
- 802.1 is working on YANG data models for their standards (802.1Qcp and 802.1Xck)

Technology Feasibility:

No change on existing
management model within PHY

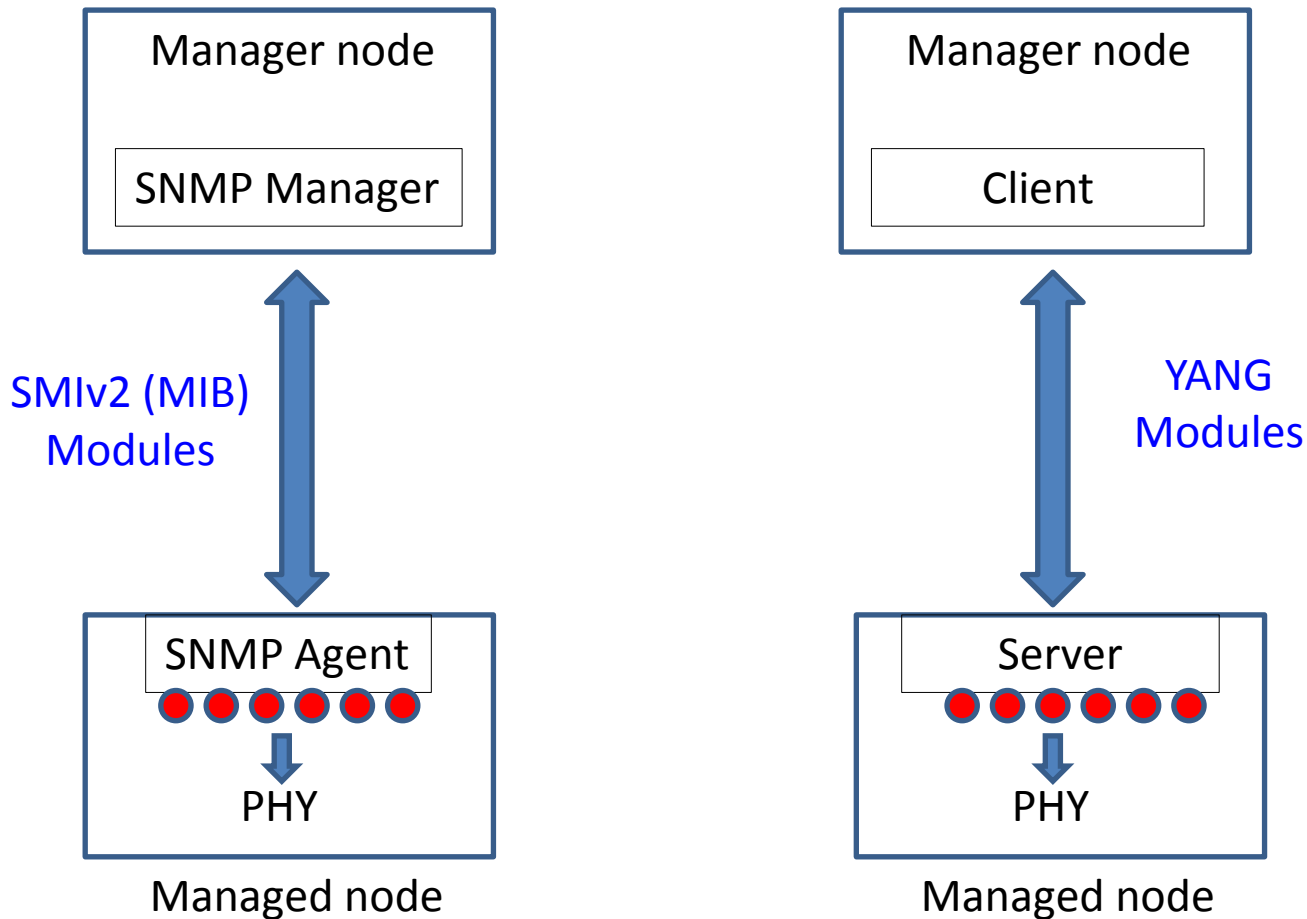
Reference model for 802.3 management



Interaction between manager, agent, and objects, adapted from IEEE Std 802.3, Figure 30-1

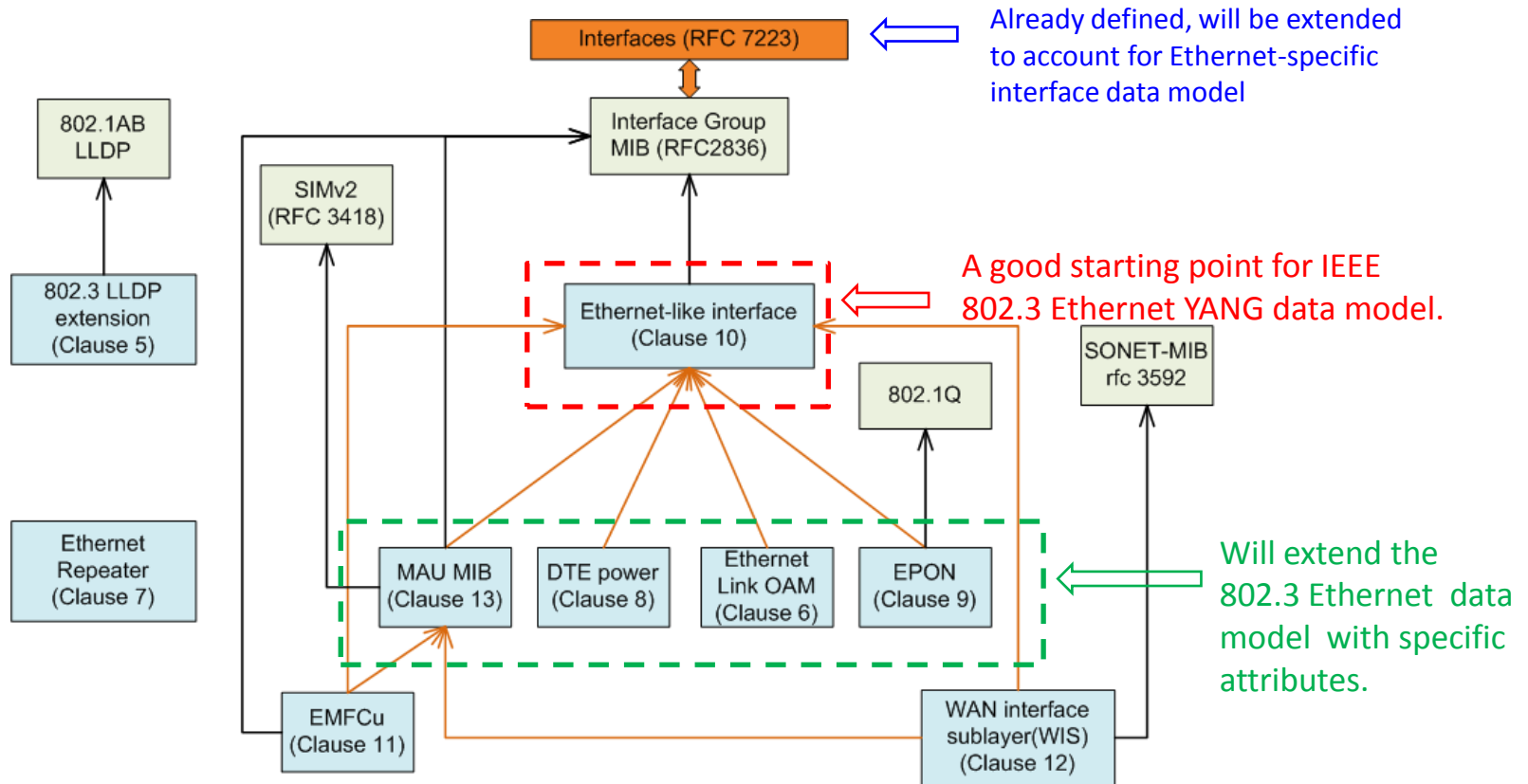
- The reference model: An agent is accessed by the remote manager via communication channel to configure and monitor local attributes/functions.
- In case of MIB/SNMP, the communication channel is SNMP while the managed objects are encoded by MIB.
- At high level, YANG/NETCONF is identical to MIB/SNMP
 - SNMP protocol is replaced with NETCONF
 - MIB encoded data is expressed with more extensible YANG modules

Impact on PHY projects



- MIB and YANG have different module structure / schema but based on the same group of managed objects defined in IEEE Std 802.3.
- YANG does not modify existing IEEE Std 802.3, Clause 45 registers within PHY but only modifies expression of managed objects exposed to remote management station.

What will we do in 802.3?



- Extend existing interface YANG data model (see RFC 7223) with Ethernet specific data to generate the Ethernet data model as a base model for 802.3;
- Ethernet-like MIB functionality (IEEE Std 802.3.1) can be the start point to define the Ethernet data model.
- Other MIB functions for EPON, OAM, DTE Power, EFM, etc. will extend the base Ethernet data model with their specific attributes and features.
- For future projects, you might need to maintain these models by adding new parameters/values for configuration and monitoring. For example, for 50G, we have to add new rates to the Ethernet data model to provide 50G ports.

Scope of the project

- YANG model development in 802.3 will be part of larger undertaking in 802 as a whole
 - 802.1 is already working on their YANG models
 - 802.11 has some proprietary models in place already
- A small project (similar to 802.3.1) will be needed in 802.3 to develop YANG data models and have them vetted by Ethernet community
 - Simpler language syntax, no knowledge of SMIv2/MIB is required
 - **Focus on** providing all necessary **statistics, state information, and configuration hooks required by operators**
 - This is not an exercise in translating 1:1 existing 802.3.1 and/or IETF MIB into YANG!
- Outcome of this project (similar to 802.3.1) will be a separate document including defined YANG models for IEEE 802.3.

Why now?

- YANG is the future management schema for operators.
- YANG provides automation, as well as much needed functionality and operational consistency across different platforms, vendors, and implementations
- Development of proprietary Ethernet-like models is already under way, leading to interoperability problems.
- dot1Q and dot1X already on board with YANG, why not 802.3?

IEEE 802.3 Working Group is *the* group responsible for development of Ethernet technology and *should* provide a standardized YANG data model for the industry

Takeaways

- YANG will not change IEEE Std 802.3, Clause 45 registers and how PHYs interact / are designed
- YANG data models will be developed based on objects from IEEE Std 802.3, Clause 30, augmented with objects from IEEE Std 802.3.1 MIBs where and if needed
- No translation of existing MIBs into YANG will be done
- YANG/NETCONF will replace MIB/SNMP for remote station management
- IEEE 802.3 Working Group is the right place to source standardized Ethernet model to encourage interoperability for next-gen NMS platforms

For reference, a YANG tutorial from 2014

http://www.ieee802.org/802_tutorials/2014-07/Tutorial_Berman_1407.pdf

Questions and Discussion

Straw Polls

Call-for-Interest Consensus

- Should a study group be formed for “IEEE 802.3 YANG data model(s)”?
- Y: N: A:
- Room count:

Participation

- I would participate in a “IEEE 802.3 YANG data model(s)” study group in IEEE 802.3
 - Tally:
- My company would support participation in a “IEEE 802.3 YANG data model(s)” study group
 - Tally:

Future Work

- Ask 802.3 at Thursday's closing meeting to form study group
- If approved:
 - Request 802 EC to approve creation of the study group on Friday
 - First study group meeting would be during May 2016 IEEE 802.3 interim meeting

Thank You!

Contributors/Supporters

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Jacky Chang – HPE

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