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

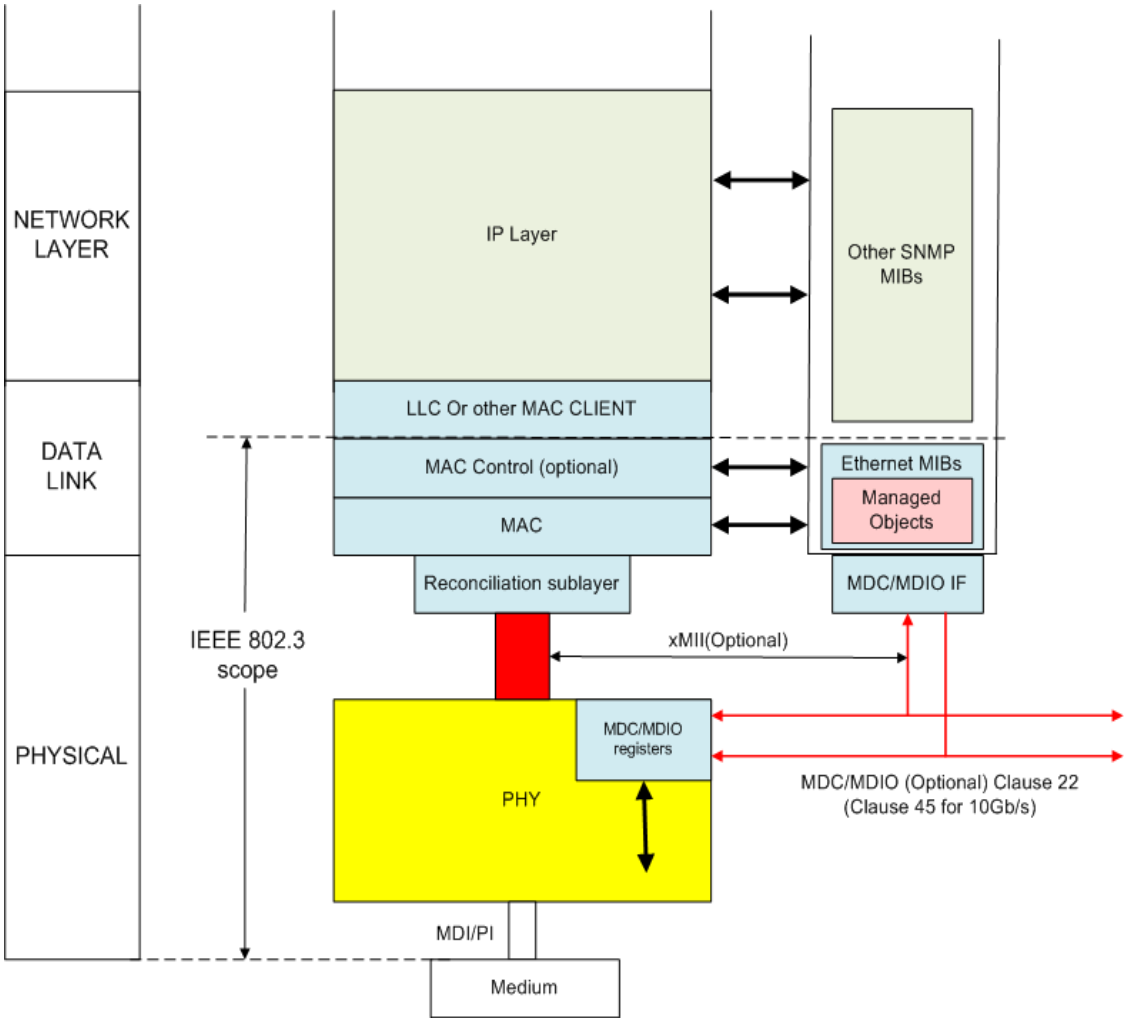
State of the Art:

Current IEEE 802.3 Ethernet Management Model

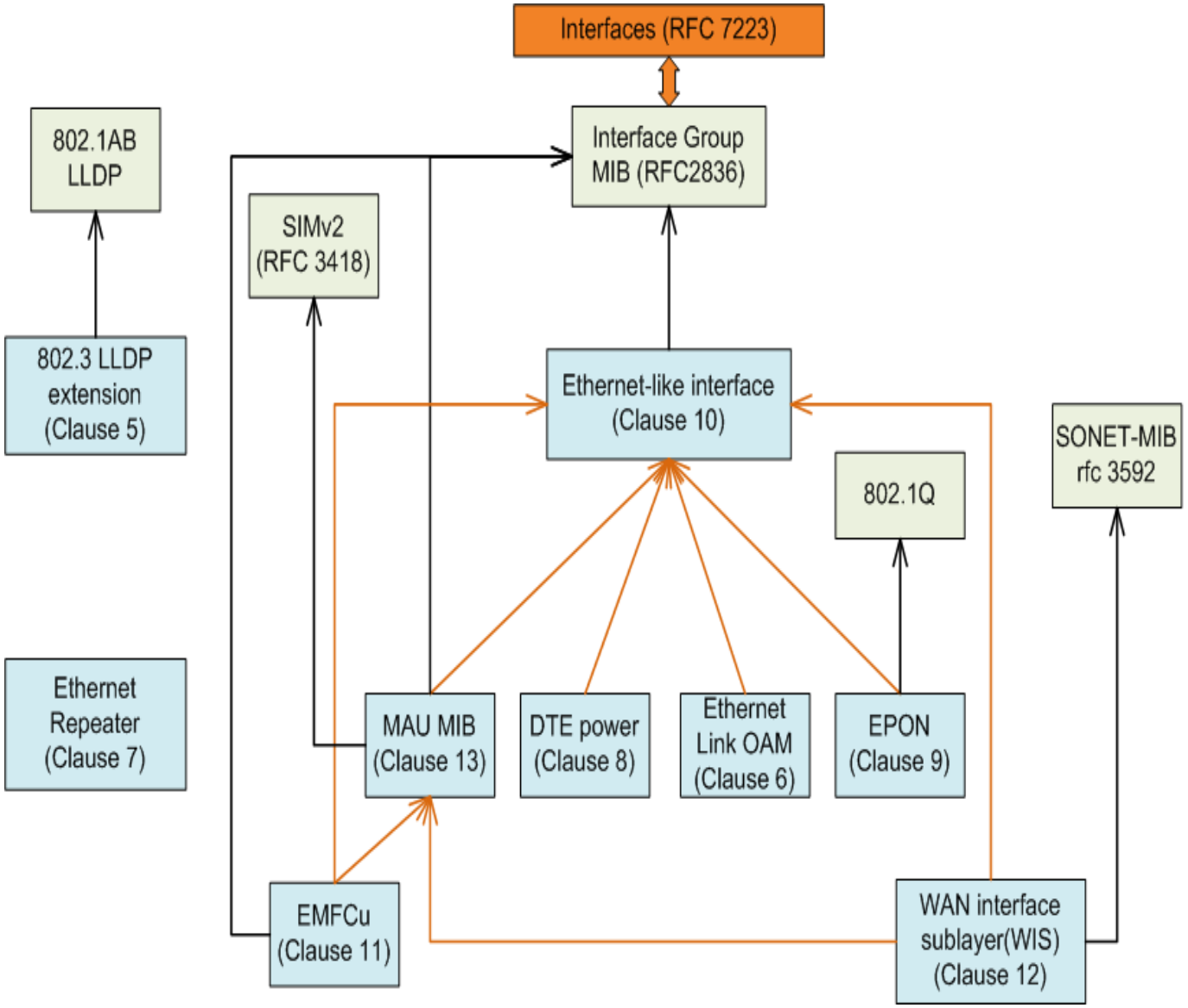
Current IEEE 802.3 Ethernet Management

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?

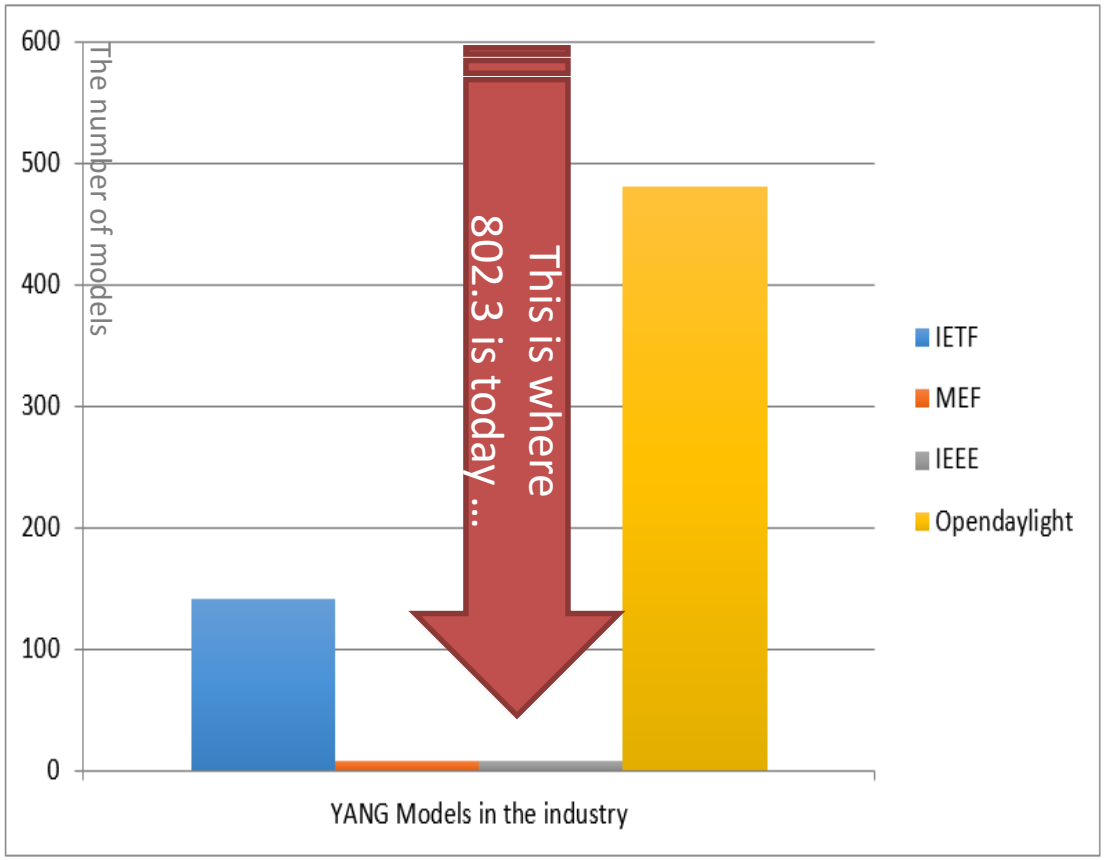
- YANG is …
  - a **flexible** and **extensible data modelling language**
  - describes configuration, monitoring, administration, and notification capabilities in a device-independent manner
  - a YANG data model is designed to include the common features and parameters/attributes of configuration and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

Comparison between SNMP/MIB and NETCONF/YANG

	SNMP/MIB	NETCONF/YANG
Granularity	Single device	End-to-end network function decoupled from underlying network element hardware
Human readable	No	Yes
Batch configuration	a single management element is configured at a time	a single configuration and state model for all involved devices
Operation Track	**No backup, no rollback, no state** information	provides a **transaction-oriented configuration flow, with roll-back, configuration backup and verification capabilities**
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. We need 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
- ….

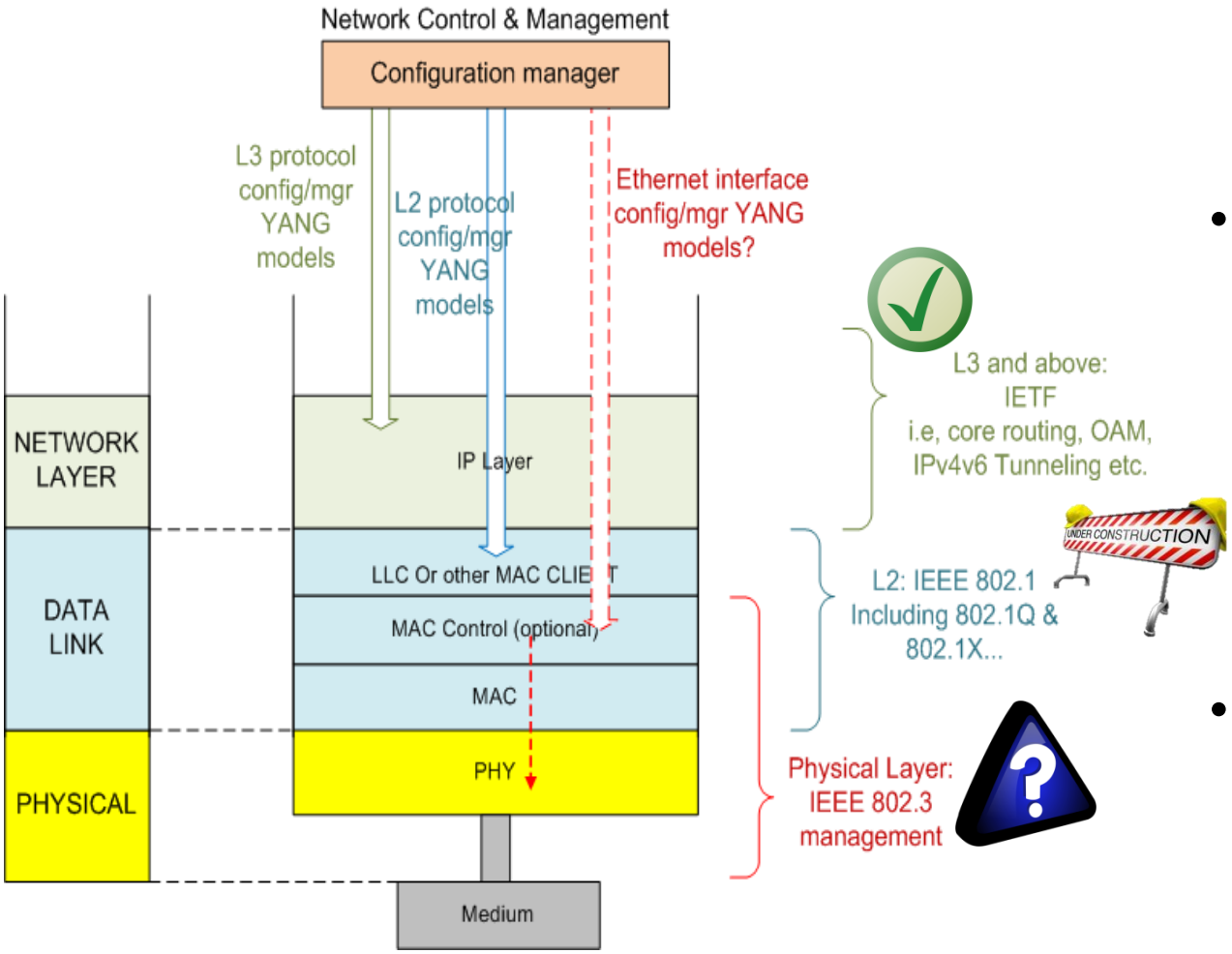
From **YANG and NETCONF/RESTCONF Gain Traction in the Industry: Latest Status**, in IETF Journal, for IETF 94.

(…) 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. (…)

Who needs YANG?

- YANG provides end-to-end and device-independent network management.
- YANG will simplify network management operations
- Network operators work 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/ATT
  - Another example of network operators working to make YANG data models is in MEF - where MEF Services are being realized in YANG modules.
- 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 resulting interoperability problems.

YANG-based management map



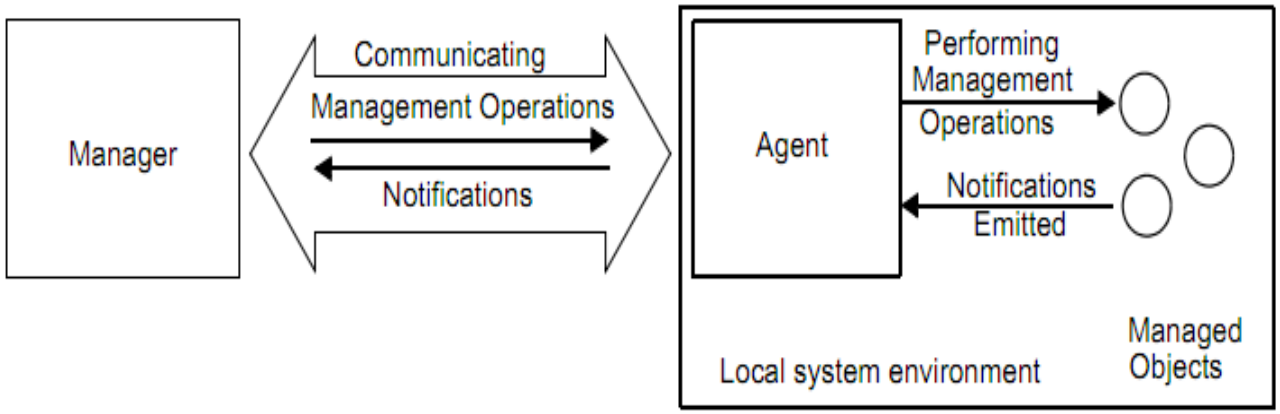
What is missing?

- 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

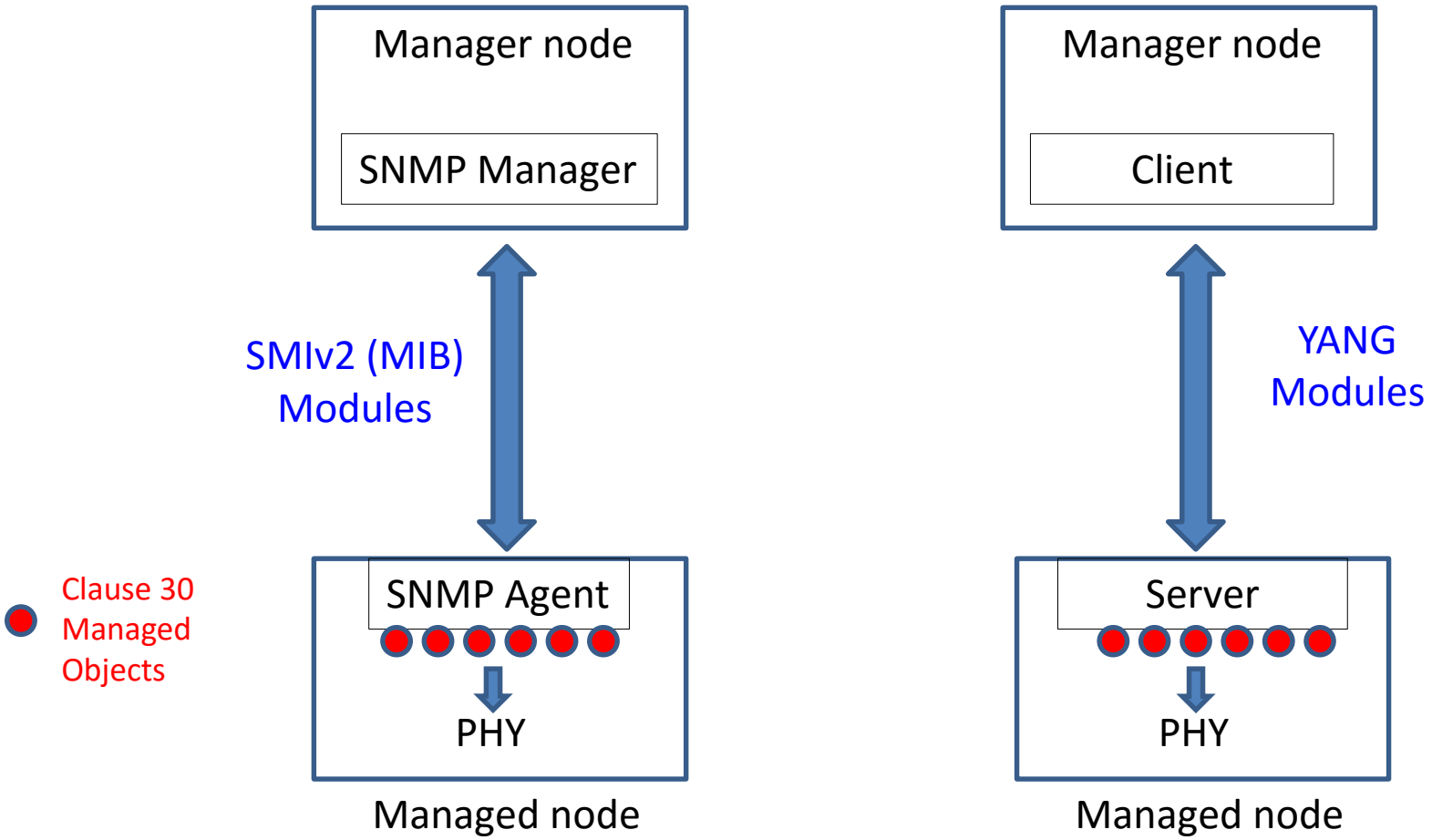
Reference model for 802.3 management



Interaction between manager, agent, and objects, adapted from [802.3] Figure 30-1

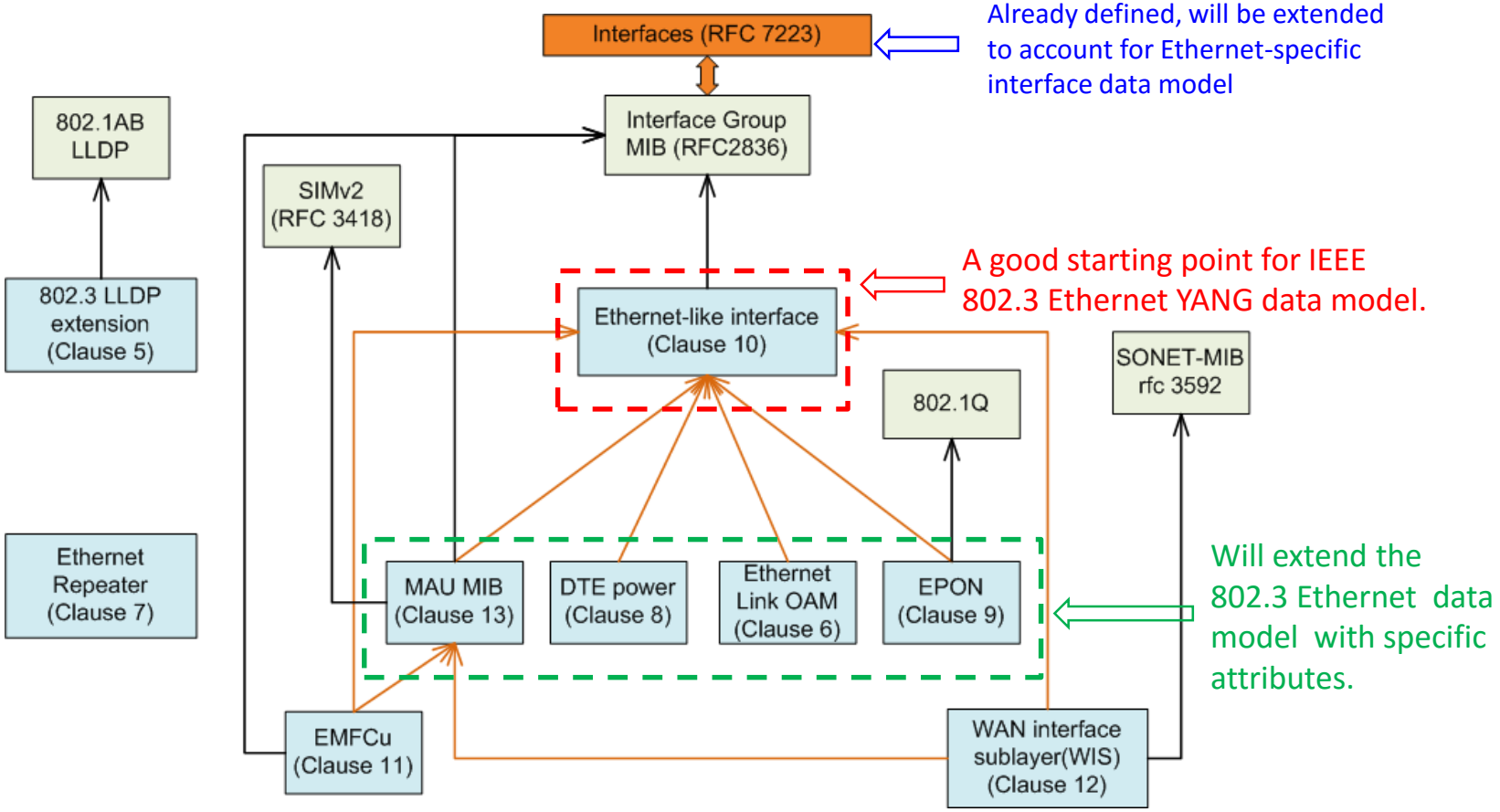
- The reference model: An agent is accessed by the remote manager via communication channel to configure and monitor local attributes/functions.
- In case of MIB/SNMP, the communication channel is SNMP while the managed objects are encoded by MIB.
- At high level, YANG/NETCONF is identical to MIB/SNMP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

Impact on PHY projects



- No impacts! MIB and YANG have different module structure / schema but based on the same group of managed objects defined in IEEE 802.3.
- YANG does not modify existing [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 (defined in RFC7223) with Ethernet specific data to generate the Ethernet data model as a base model for 802.3;
- Ethernet-like MIB functionality [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 attributes/values. 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
  - Given simpler language syntax, no special 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 data models for IEEE 802.3.

Why now?

- YANG is the future management schema for operators.
- YANG provides 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.

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 [802.3] Clause 45 registers and how PHYs interact / are designed
- YANG data models will be developed based on objects from [802.3] Clause 30, augmented with extensions from [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

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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Kim Yong – Broadcom