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

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CFI Objectives

- To gauge the interest in developing YANG 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 models for IEEE 802.3 Ethernet PHYs

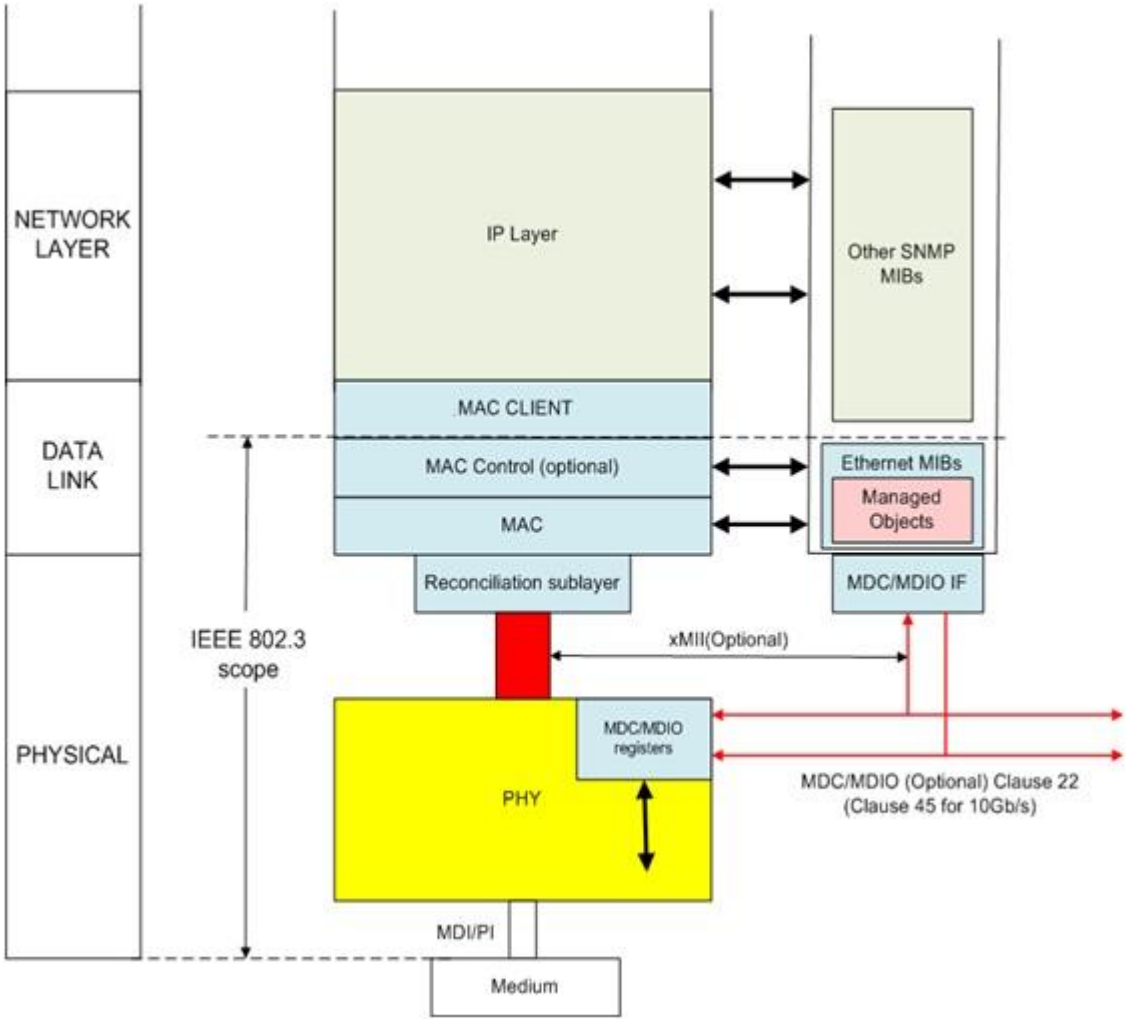
State of the Art:

Current IEEE 802.3 Ethernet Management

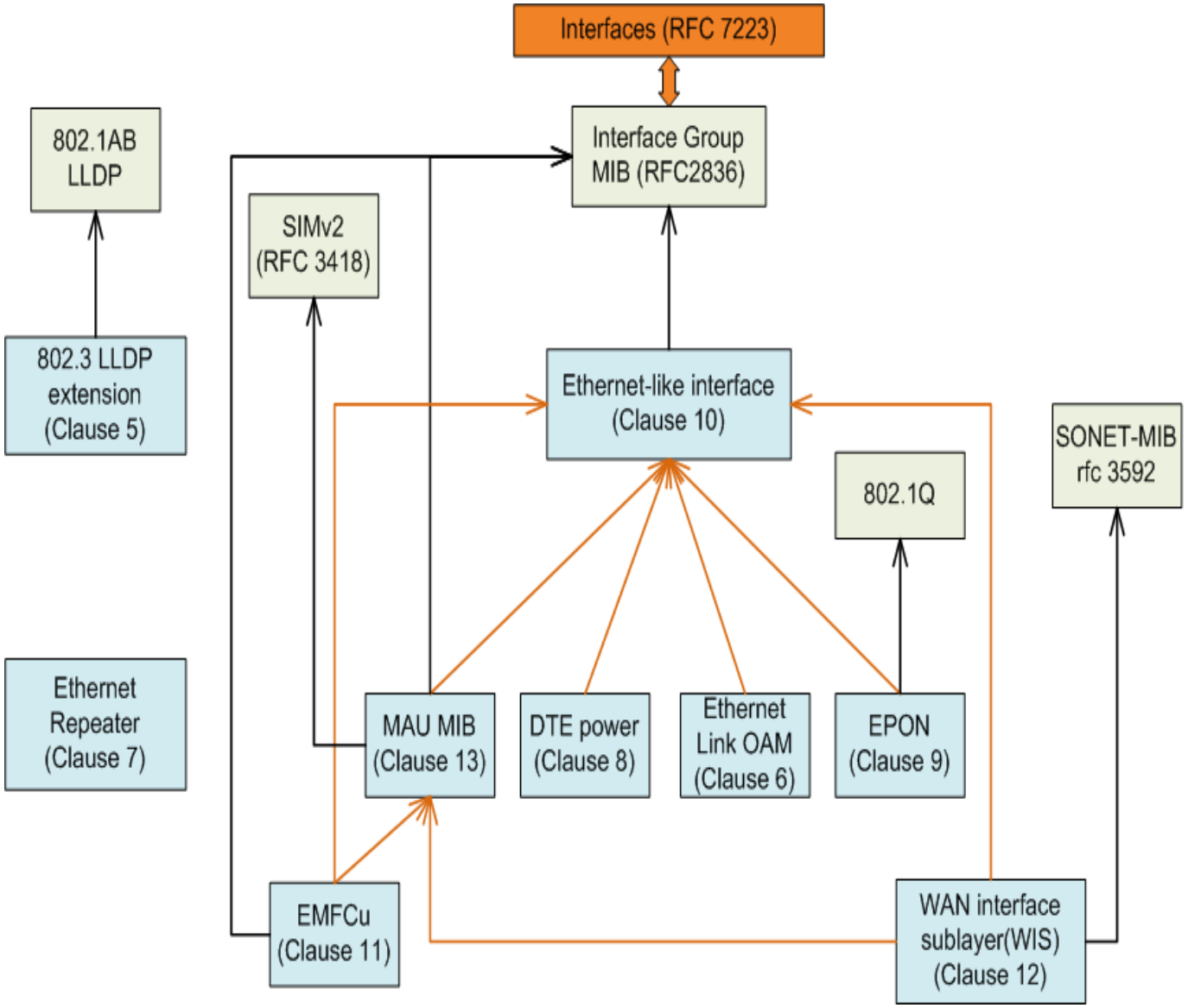
Current IEEE 802.3 Ethernet Management

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 do we need to change?

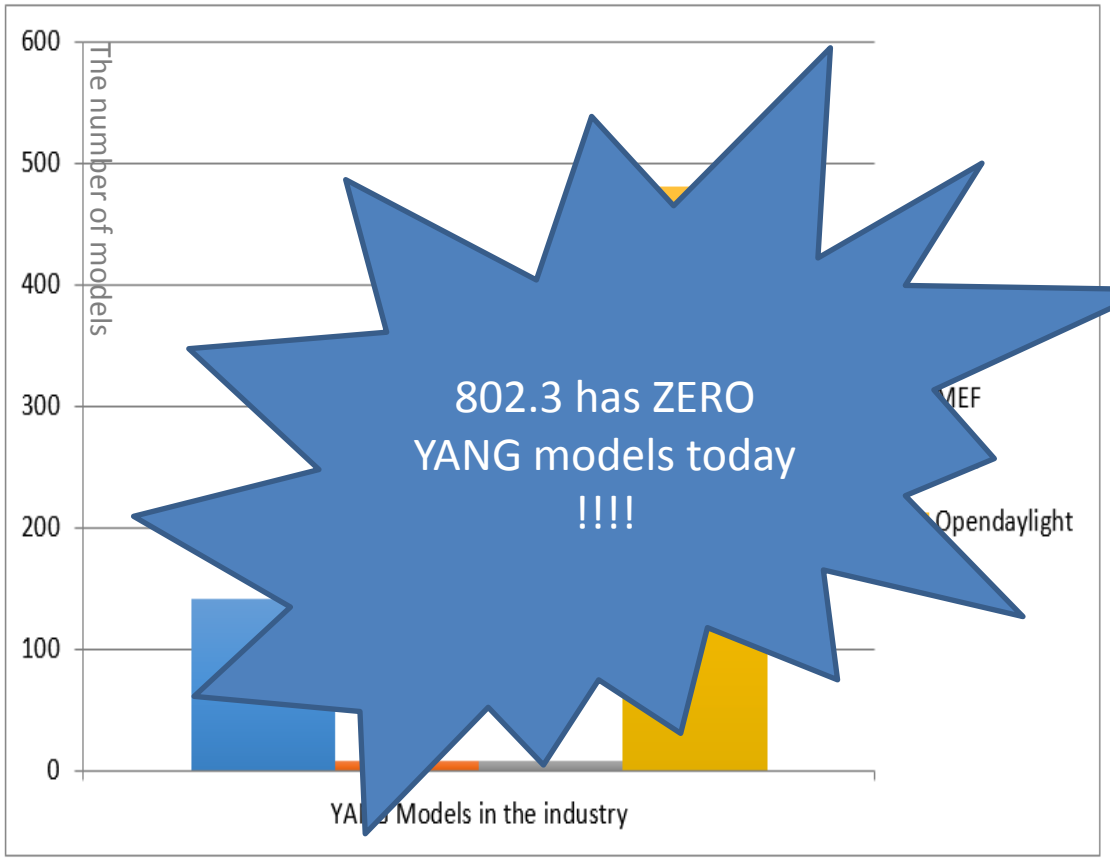
What is YANG?

- YANG is …
  - a **flexible** and **extensible** data modeling language
  - device model independent
- A YANG model includes …
  - common features and parameters/attributes of configuration and operational state for a type of devices or functions
  - **configuration**, **monitoring**, **administration**, and **notification** capabilities

SNMP time is over

- The use of SNMP for network management is decreasing quickly in the market
- SNMP/MIB is still used extensively for statistics purposes and data mining
- IETF recommends the use of YANG/NETCONF any new network development; see https://www.ietf.org/iesg/statement/writable-mib-module.html, dated 2014

Industry is developing YANG models



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

- IETF
- IEEE 802.1
- Metro Ethernet Forum (MEF)
- ITU-T
- Open Daylight (ODL)
- Broad Ban Forum (BBF)
- ….

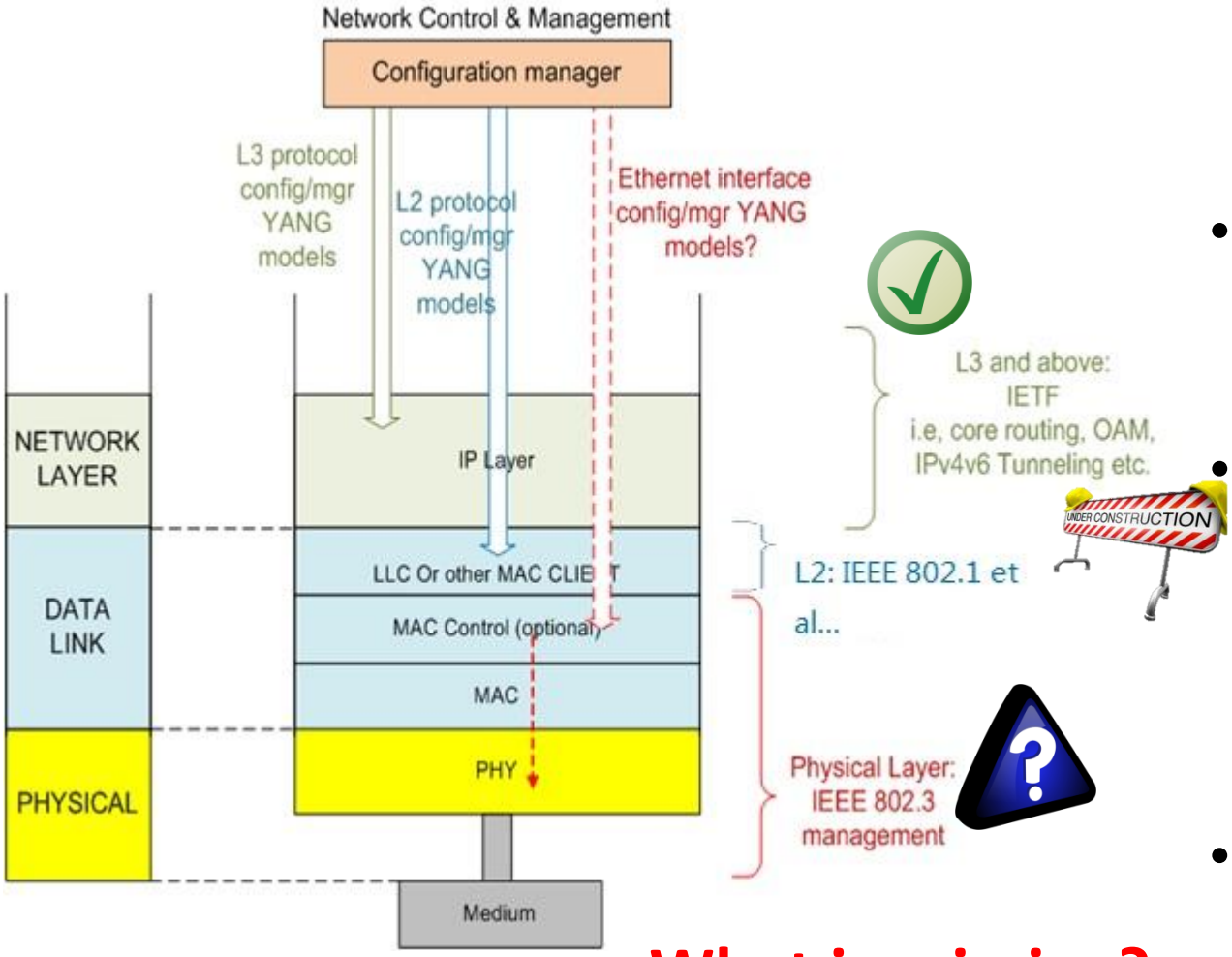
From **YANG and NETCONF/RESTCONF Gain Traction in the Industry: Latest Status**, in IETF Journal, for IETF 94.

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

Why and who needs YANG?

- NETCONF and YANG based on RFC 3535 and driven by operator requirements
- YANG allows automation via code generation.
  - Every network task must be automated
  - "If a feature can't be automated, it doesn't exist"
- Operators moving to YANG as the basis for network operations:
  - IETF developed a YANG model for Layer 3 VPN service for Orange/BT/Verizon/AT&T
  - MEF is producing YANG models for network operators.
- Ethernet is used pervasively in today's networks.
- The lack of standardized 802.3 YANG models will fragment the market.

YANG-based configuration



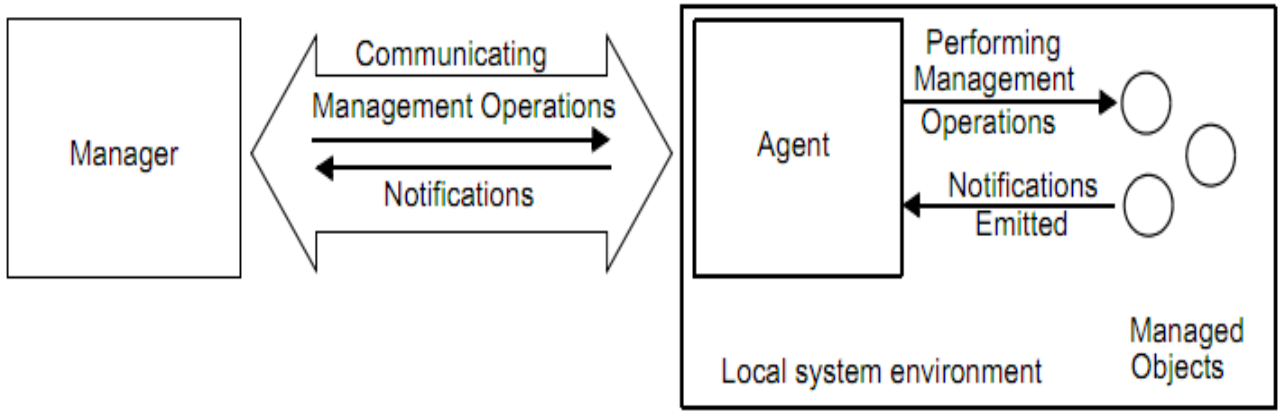
- IETF already defines a number of YANG models for different L3+ protocols
- 802.1 is working on YANG models for their standards
- 802.1 and 802.3 layers today modelled only with generic interface YANG models
- No Ethernet specific models exist today

What is missing?

Feasibility:

No change of existing management model

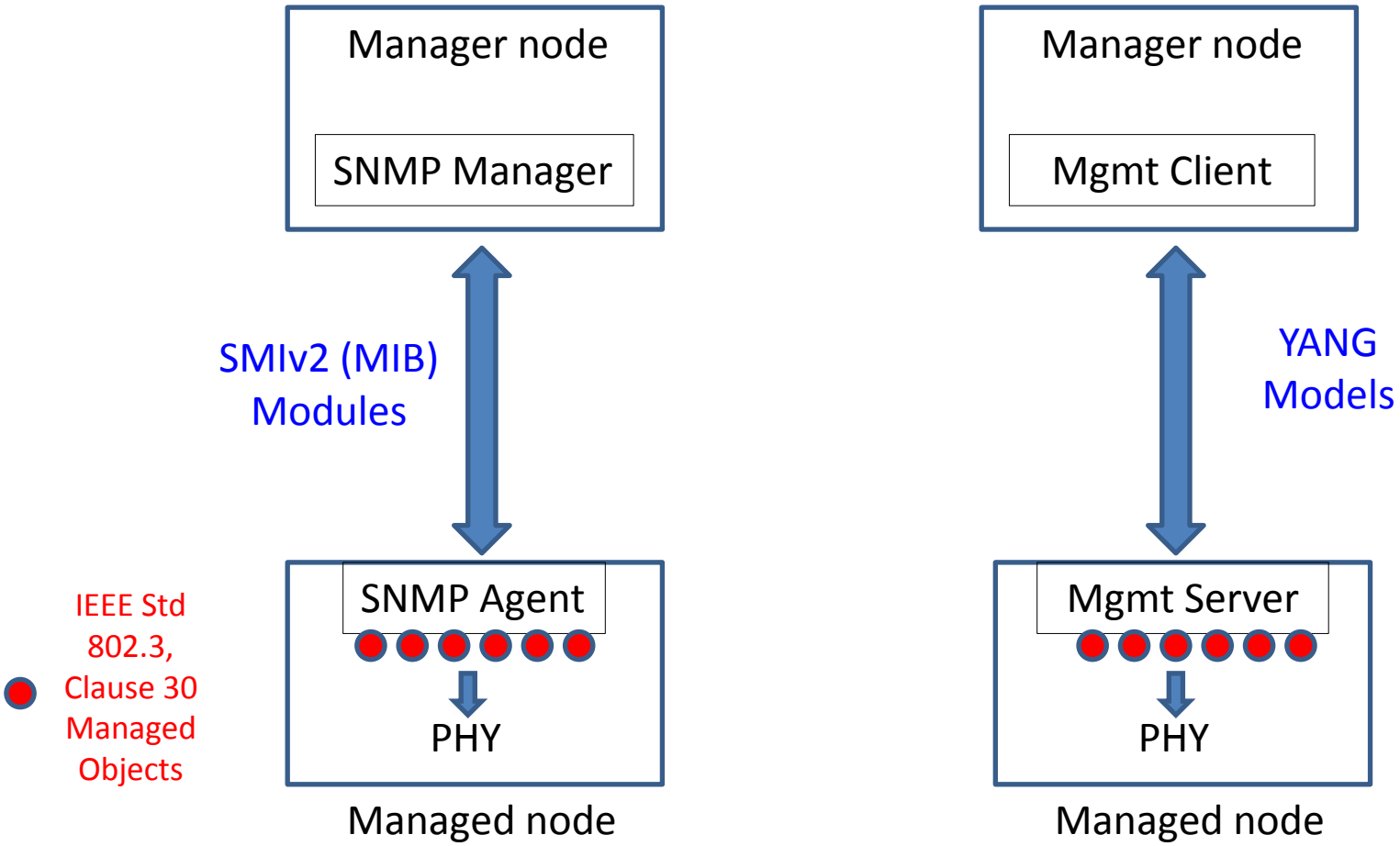
Reference model for 802.3 management



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

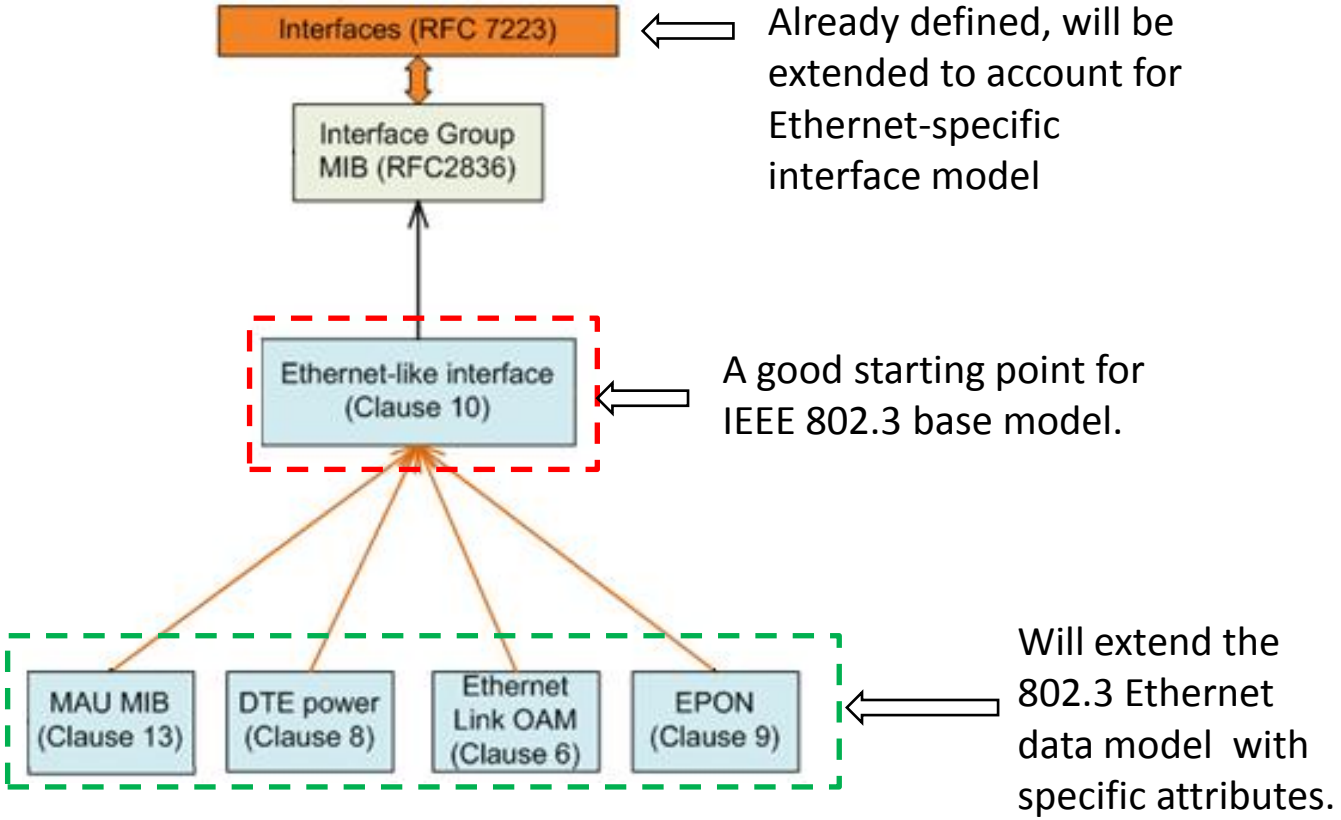
- The reference model: An agent is accessed by the remote manager via communication channel to configure and monitor local attributes/functions.
- In case of MIB/SNMP, the communication channel is SNMP while the managed objects are encoded by MIB.
- At high level, YANG/NETCONF is equivalent to MIB/SNMP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

No Impact on other 802.3 projects



- MIB and YANG have different structure but both are derived from Clause 30.
- YANG does not modify existing IEEE Std 802.3, Clause 45 registers within PHY.

What could we do in 802.3?



- Extend existing interface YANG model (see RFC 7223) with Ethernet specific data.
- Start from Ethernet-like interface in IEEE Std 802.3.1.
- Other functions will extend the base data model.

Need for a Study Group

- Other 802 groups developing YANG models.
  - 802.1 is already working on their YANG models
  - 802.11 has some proprietary models in place already
- A project (similar to 802.3.1) will be needed in 802.3
  - Provide **statistics, state information, and configuration hooks required by network management system**
- Not an exercise in 1:1 translating existing 802.3.1 MIB into YANG!
- The outcome of this project should be a separate document defining YANG models for IEEE 802.3.

Why now?

- YANG is the future of management for users.
- YANG provides automation, as well as functional and operational consistency across different platforms, vendors, and implementations
- Development of proprietary Ethernet-like models is already under way.

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

Takeaways

- YANG will not change IEEE Std 802.3, Clause 45 registers and how PHYs interact / are designed
- YANG models will be developed based on objects from IEEE Std 802.3, Clause 30.
- 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 produce standardized Ethernet models.

For reference, a YANG tutorial from 2014
http://www.ieee802.org/802_tutorials/2014-07/Tutorial_Berman_1407.pdf

Contributors/Supporters(1)

53+individuals
31+companies

Kevin D'Souza – AT&T
Derek Cassidy – ICRG
Mikael Abrahamsson - Deutsche Telekom AG
Brad Booth – Microsoft
Tom Issenhuth – Microsoft
Mahesh Jethanandani – Cisco
Robert Wilton – Cisco
Dan Romascanu – Avaya
Paul Unbehagen – Avaya
Nilesh Simaria – Juniper
David Ofelt – Juniper
Jeffery Maki – Juniper
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Ghani Abbas – Ericsson
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Michael Klempa – UNH-IOL
David Lewis – Lumentum

Arthur Marris – Cadence
Ralf-Peter Braun – Deutsche Telekom
Kent Lusted – Intel
Hossein Sedarat – Aquantia
Ramin Shirani – Aquantia
David Estes – Spirent

Q&A

Straw Polls

Call-for-Interest Consensus

- Should a study group be formed for “IEEE 802.3 YANG model(s)”?

- Y: 47 N: 0 A: 6

- Room count:24+33=57

Participation

- I would participate in a “IEEE 802.3 YANG model(s)” study group in IEEE 802.3
  - Tally: 19

- My company would support participation in a “IEEE 802.3 YANG model(s)” study group
  - Tally:14

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!

Comparison between SNMP/MIB and NETCONF/YANG

	SNMP/MIB	NETCONF/YANG
Operation Track	**No backup, no rollback, no state** information	Network-wide **transaction-oriented configuration flow, with roll-back, locking, configuration backup and verification capabilities**
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