



IEEE P1904.1

Standard for Service Interoperability in Ethernet Passive Optical Networks (SIEPON)

Project Overview

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- *This document contains the personal opinions of the Author only, and it is not intended to represent any official position of the IEEE P1904.1 Working Group.*

□ EPON is being used in various environments

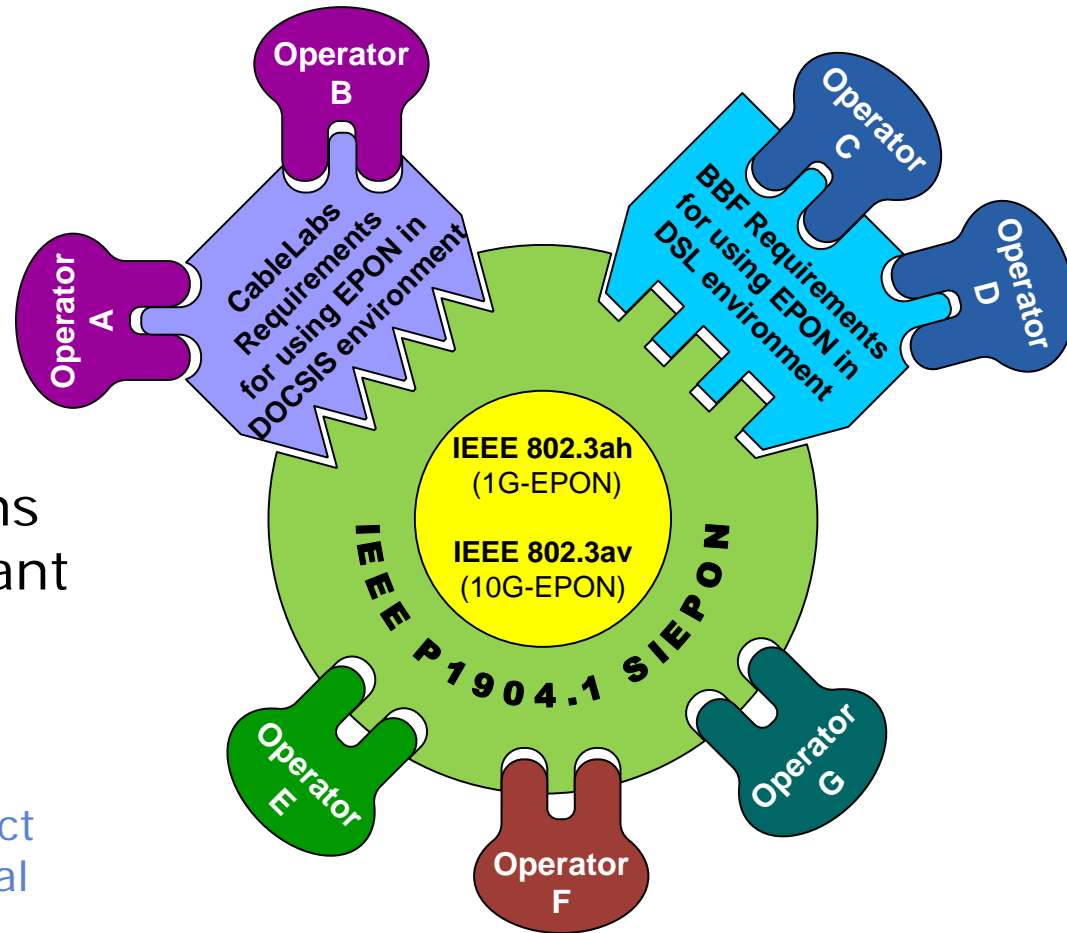
- Some would like to manage EPON as part of DOCSIS network
- Some would like to manage EPON like DSL network

□ Many external specifications supply requirements relevant to EPON technology

- BBF (WT-200)
- CableLabs (DPoE)
- Also, deployed solutions reflect different regulatory or national environments

□ **The goal of IEEE 1904.1 SIEPON project is to address these diverse requirements in a consistent and unified way**

- **Improve system-level interoperability by specifying common management and provisioning framework.**



IEEE P1904.1 PAR Purpose

To build upon the IEEE 802.3ah (1G-EPON) and IEEE 802.3av (10G-EPON) Physical layer and Data Link layer standards and create a system-level and network-level standard, thus allowing full plug-and-play interoperability of the transport, service, and control planes in a multi-vendor environment.

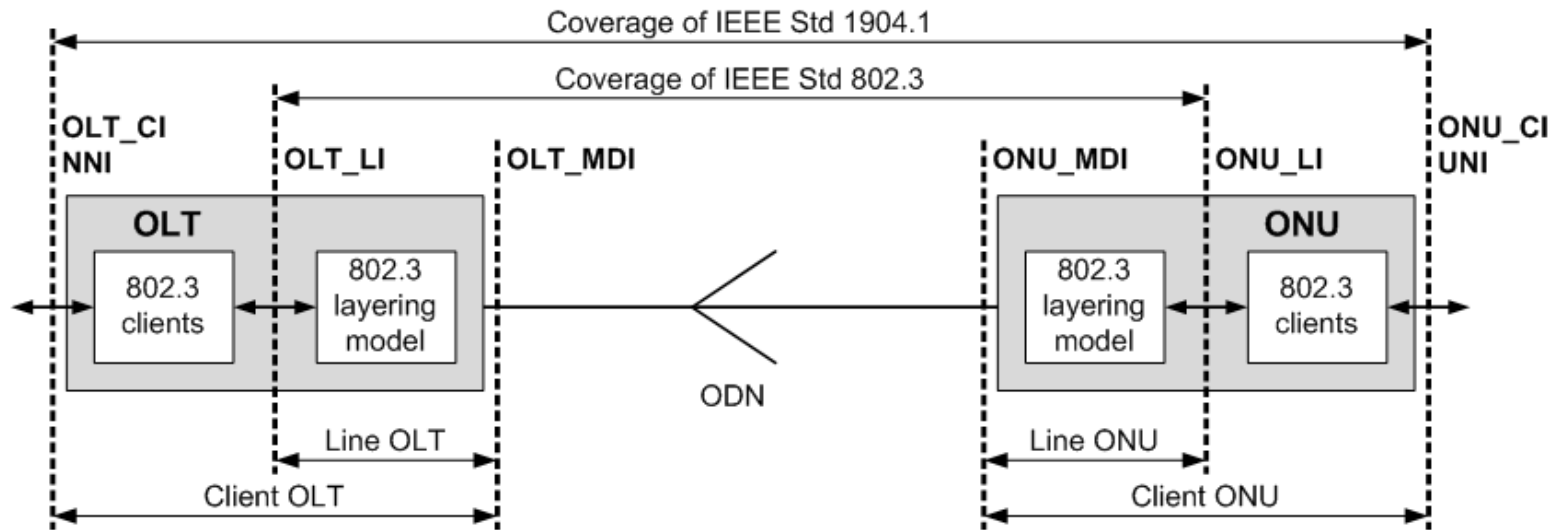
See 1904.1 PAR at

http://www.ieee1904.org/1/documents/P1904_1_PAR.pdf

This standard describes the system-level requirements needed to ensure service-level, multi-vendor interoperability of Ethernet Passive Optical Network (EPON) equipment. The specifications complement the existing IEEE Std. 802.3 and IEEE Std. 802.1 standards which ensure the interoperability at the Physical layer and Data Link layer. Specifically included in the proposed work are:

- EPON system-level interoperability specifications covering equipment functionality, traffic engineering, and service-level QoS/CoS mechanisms;
- Management specifications covering equipment management, service management, and power utilization.

- IEEE 1904.1 sits on top of 802.3
 - OLT Client Interface to ONU Client Interface
 - OLT NNI to ONU UNI, if no service-specific functions are in OLT and ONU



b) OLT and ONU without service-specific functions

MAC Client Reference Model

□ SIEPON provides unified provisioning model for the MAC Client data path:

- [C] = Classifier
- [M] = Modifier
- [PS] = Policer/Shaper
- [X] = CrossConnect
- [Q] = Queues
- [S] = Scheduler

Legend



Path for data frames



Path for control



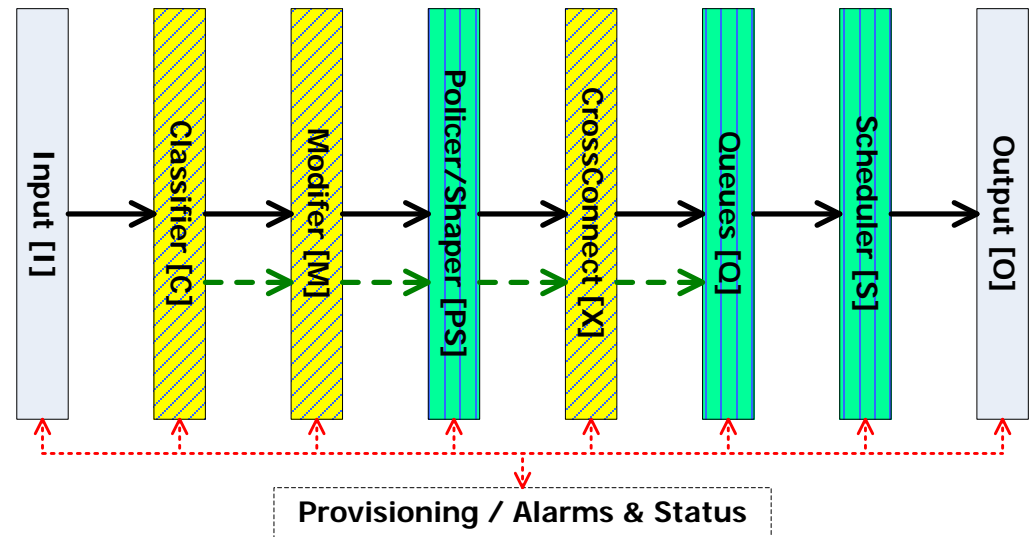
Path for management



Block controls connectivity



Block controls performance

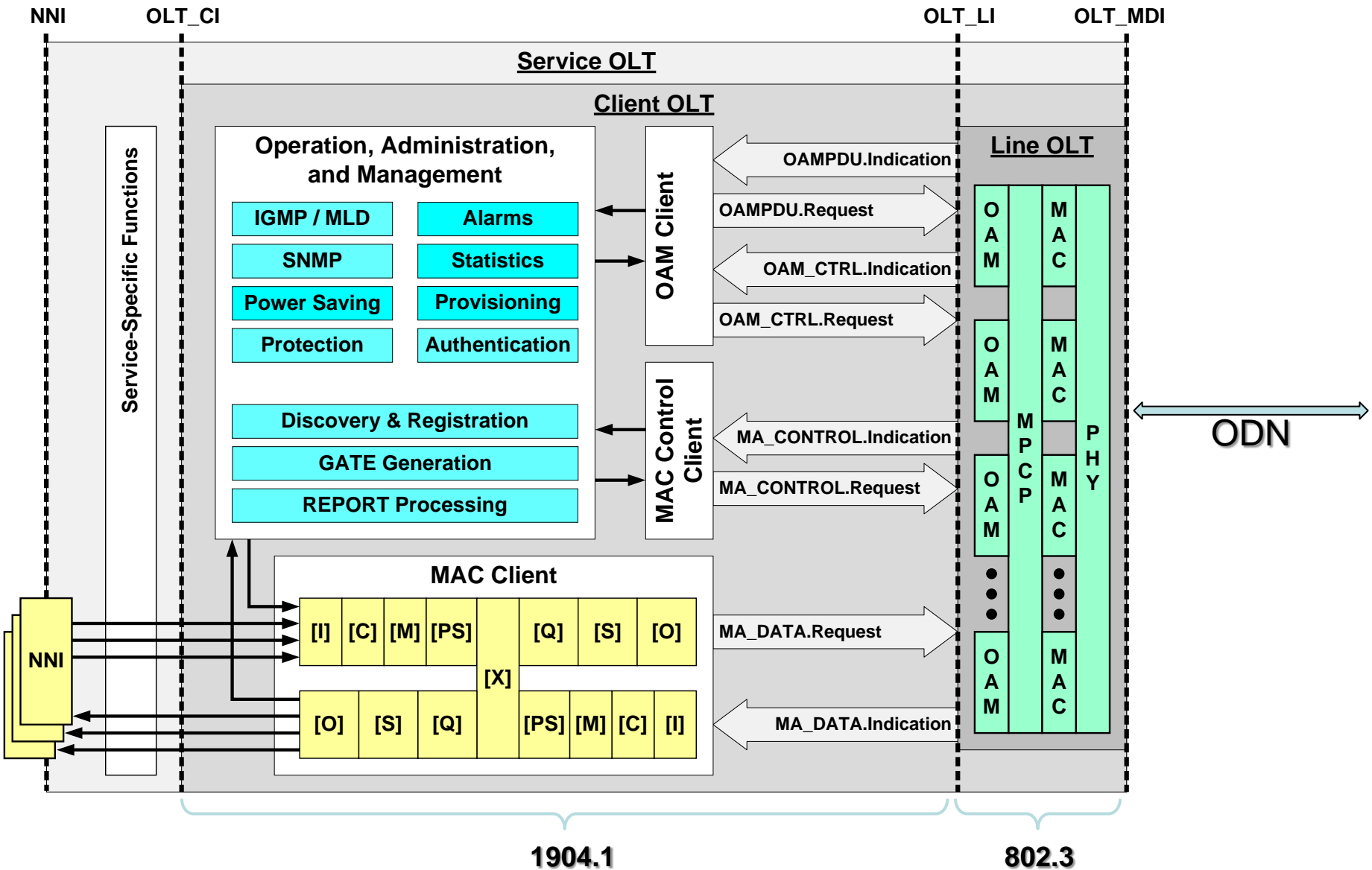


a) Functional blocks

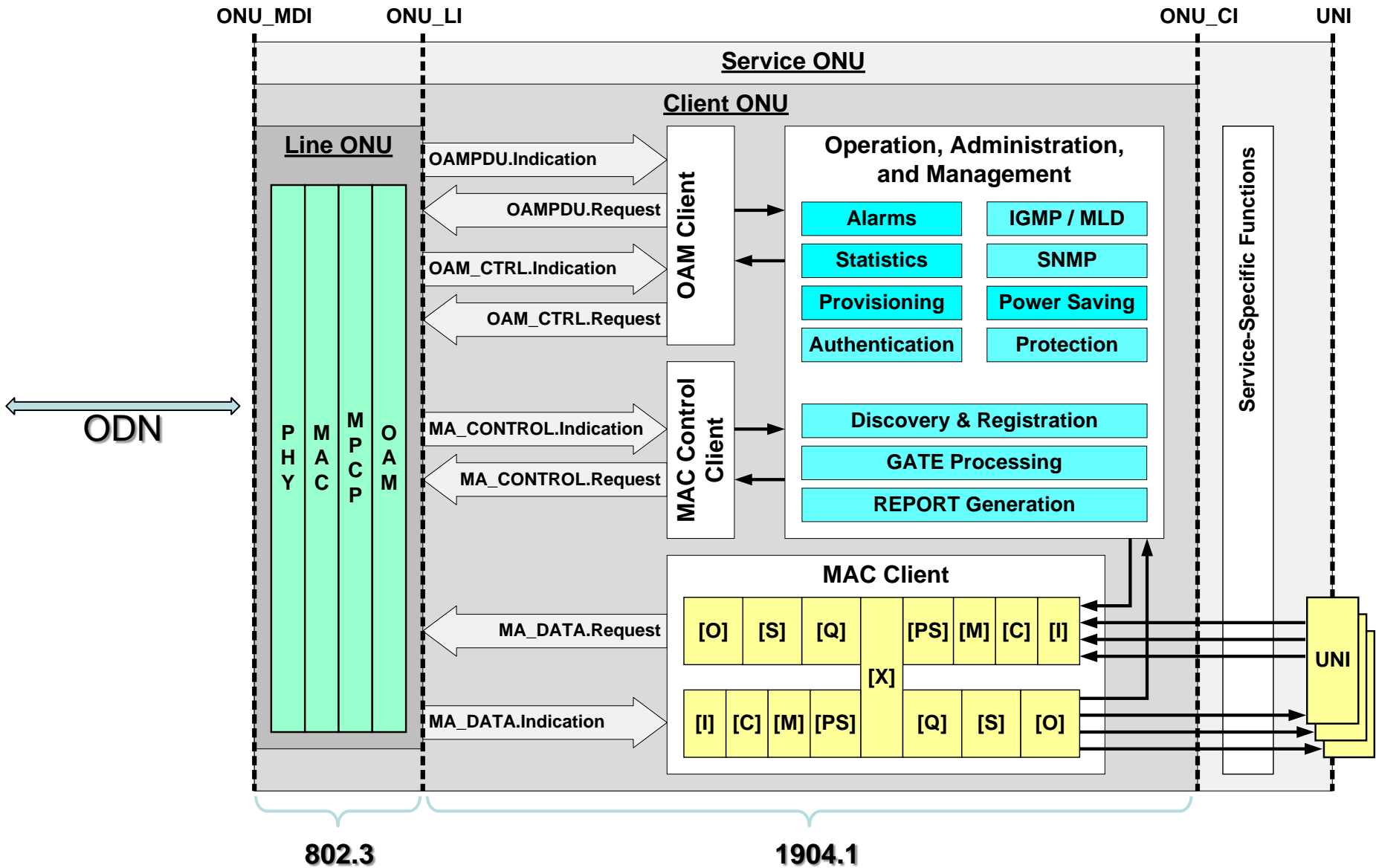


b) Compact representation

OLT Architecture



ONU Architecture



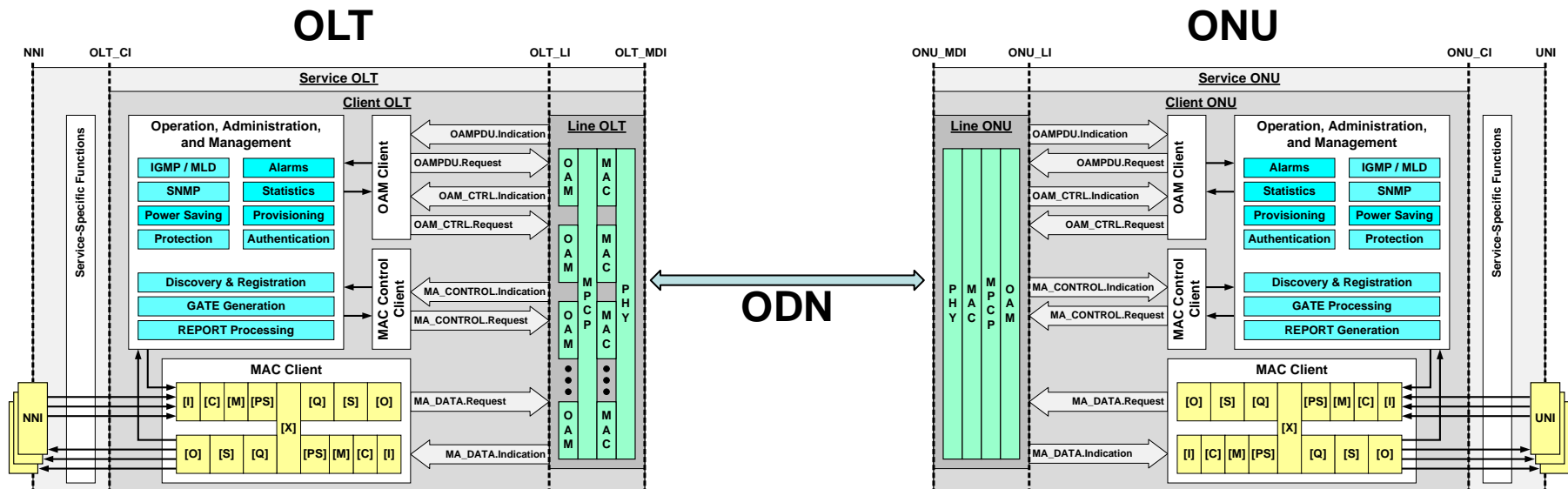
Connectivity, Functions, Features

Connectivity:

- VLANs
- Tunneling
- Multicast

Functions and Features:

- Power Saving
- Trunk and Tree ODN Protection
- Software Download
- Authentication
- IGMP/MLD
- MAC Learning



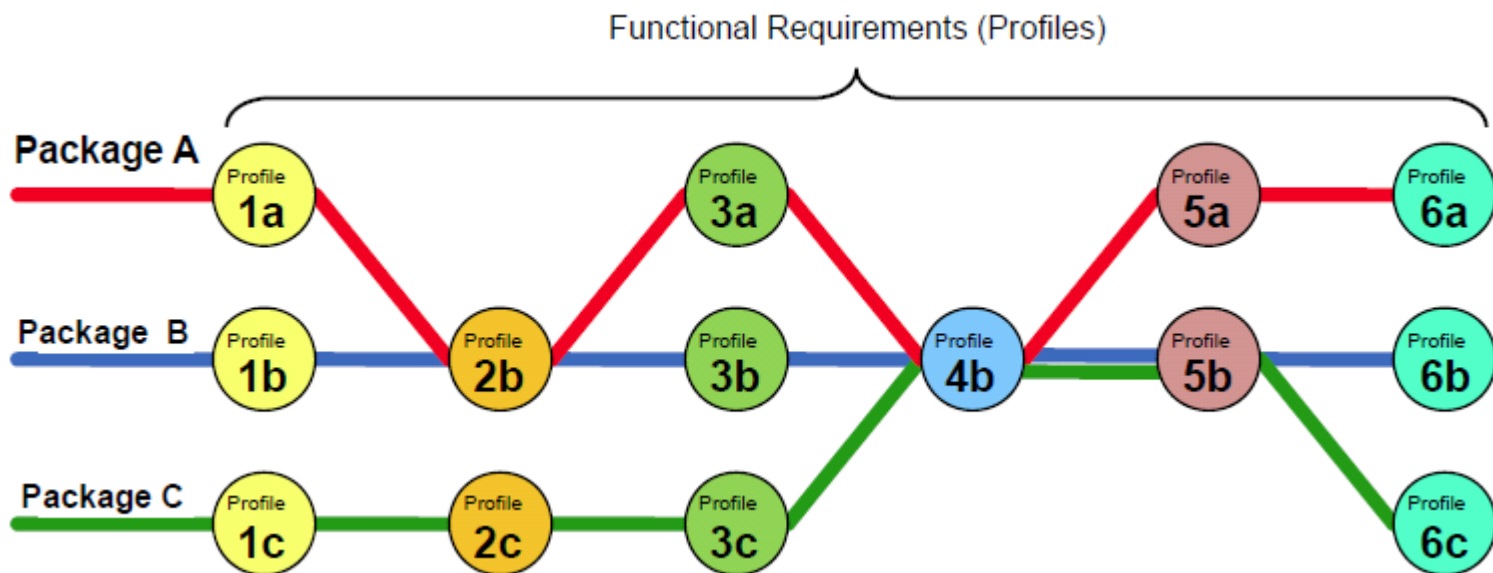
Features, Profiles, & Packages

	Item	Feature	Package		Package
			A	B	C
	EDP	support for EDP	N/A	N/A	shall implement EDP per Annex 7A
	RF	REPORT MPCP format	shall implement REPORT MPCPDU format per 8.4.1.3	shall implement REPORT MPCPDU format per 8.4.3.3	shall implement REPORT MPCPDU format per 8.4.2.3
	RLC	report queue length calculation	shall implement queue length calculation per 8.4.1.2	shall implement queue length calculation per 8.4.3.2	shall implement queue length calculation per 8.4.2.2
Profile	QSD	queue service discipline	shall implement queue service discipline per 8.4.1.1	shall implement queue service discipline per 8.4.3.1	shall implement queue service discipline per 8.4.2.1
	USM	ONU transceiver status monitoring	shall implement transceiver status monitoring per 9.1.3	should implement transceiver status monitoring per 9.1.5	shall implement ONU transceiver status monitoring per 9.1.4, associated alarms and warnings per 9.1.6 and management per 9.1.7
	TSM	OLT transceiver status monitoring			shall implement OLT transceiver status monitoring per 9.1.4
	PLD	UNI port loop detection	N/A	N/A	shall implement UNI port loop detection per 9.1.8
RPC	remote ONU transmitter power supply control	N/A	N/A	shall implement remote ONU transmitter power supply control function per 9.4	
	E	events	shall implement events per 9.2.6	shall implement events per 9.2.6, 9.2.7 and 9.2.8	shall implement events per 9.2.3, 9.2.4, 9.2.5, and 9.2.6, with the event set/clear operation per 9.2.2.1
	LPTK	optical link protection, trunk type	N/A	should implement trunk optical link protection per 9.3.7	should implement trunk optical link protection per 9.3.5
	LPTE	optical link protection, tree type	N/A	N/A	should implement tree optical link protection per 9.3.6
Feature	DE	data encryption	shall implement data encryption and integrity protection mechanism per 11.2.2	shall implement data encryption and integrity protection mechanism per 11.2.3	N/A
	AU	ONU authentication	shall implement ONU authentication and secure provisioning per 11.3.3	shall implement ONU authentication and secure provisioning per 11.3.4	shall implement ONU authentication and secure provisioning per 11.3.2
	MG	management	shall implement eOAM based management per 13.3.4	shall implement eOAM based management per 13.3	shall implement eOAM based management per 13.2
	DCD	device and capability	shall implement device discovery and	shall implement device discovery and	shall implement device discovery and

Excerpt from draft D2.3, a portion of Table 4-1 (total 27 rows)

A Package is like a "set menu"

- ❑ Reducing the number of functional *Requirements (Profiles)* is a good thing.
- ❑ If a *Requirement* is similar in multiple *Packages*, fewer *Profiles* may be defined



IEEE P1904.1 WG Membership

- Chair: Glen Kramer, Broadcom Corporation
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- Oliver Solutions
- PMC-Sierra, Inc.
- Qualcomm Inc.
- Sumitomo Electric
- Victor Blake (*)
- ZTE Corporation

Work Divided among Task Forces

Task Force	TF1: Service Configuration and Provisioning	TF2: Performance Requirements and Service Quality	TF3: Service Survivability	TF4: System/Device Management
Focus	<p>Requirements and features that affect connectivity, i.e., <u>non-real-time</u> control mechanisms for:</p> <ul style="list-style-type: none"> • VLAN • encapsulation • multicast <p>e.g., rules for frame:</p> <ul style="list-style-type: none"> • classification • modification • forwarding 	<p>Requirements and features that affect service performance, i.e., <u>real-time</u> control mechanisms for:</p> <ul style="list-style-type: none"> • delay • packet loss • BW guarantees 	<p>Requirements and features that affect availability of services, e.g.,</p> <ul style="list-style-type: none"> • device monitoring • diagnostics • protection • power saving. 	<p>Requirements and features to operate EPON as a managed public network, e.g.,</p> <ul style="list-style-type: none"> • authentication • SW update • device capability discovery
Chair	Lior Khermosh, PMC-Sierra	Curtis Knittle, Cablelabs	Seiji Kozaki, Mitsubishi Electric	James Chen, Hitachi
Editor	Alan Brown, Aurora Networks	Jeff Stribling, Hitachi	Hesham Elbakoury, Huawei	Fumio Daido, Sumitomo Electric

SIEPON Draft D2.3 (February 2012)

Page count: 770

Clause 1	Overview
Clause 2	Normative references
Clause 3	Definitions, acronyms, and abbreviations
Clause 4	Specification packages
Annex 4A	Protocol implementation conformance statement (PICS) for Package A (normative annex)
Annex 4B	Protocol implementation conformance statement (PICS) for Package B (normative annex)
Annex 4C	Protocol implementation conformance statement (PICS) for Package C (normative annex)
Clause 5	Scope and Architecture
Annex 5A	Relation to other architecture models (informative annex)
Clause 6	MAC Client Reference Model
Clause 7	Connectivity configurations
Annex 7A	EPON Data Path (EDP) of BBF TR-200 (normative annex)
Clause 8	Service Performance and QoS Guarantees
Clause 9	Service availability
Annex 9A	Dual-homing protection in EPON (informative annex)
Annex 9B	Measurement of the b-RTT in Trunk-protected EPON (informative annex)
Clause 10	Power saving
Clause 11	Security-oriented mechanisms
Clause 12	Discovery and Maintenance
Clause 13	Extended OAM for EPON
Annex 13A	Examples of eOAM message flows (informative annex)
Clause 14	Management entities

Task Force	TF5: Conformance Test Procedures
Focus	Suite of conformance tests for EPON system-level requirements for: <ul style="list-style-type: none">• Package A• Package B• Package C
Chair	Toshihiko Kusano, Oliver Solutions
Co-Editors	Motoyuki Takizawa, Fujitsu Liu Qian, RITT

SIEPON Conformance Tests

- ❑ **P1904.1 WG is interested in specifying Conformance Tests as companion standard(s)**
 - P1904.1/Conformance01 – for Package A
 - P1904.1/Conformance02 – for Package B
 - P1904.1/Conformance03 – for Package C

- ❑ **Benefits of the process**
 - Developing test specifications and procedures often identifies omissions or ambiguities of the main specification. Development of test cases will help us improve the main specification.

- ❑ **Benefits of the result**
 - The available test cases will allow vendors, network operators, and independent testing facilities to produce consistent results when testing EPON equipment for conformance with 1904.1.
 - Can become foundation for a future certification program

6 Meetings per Year

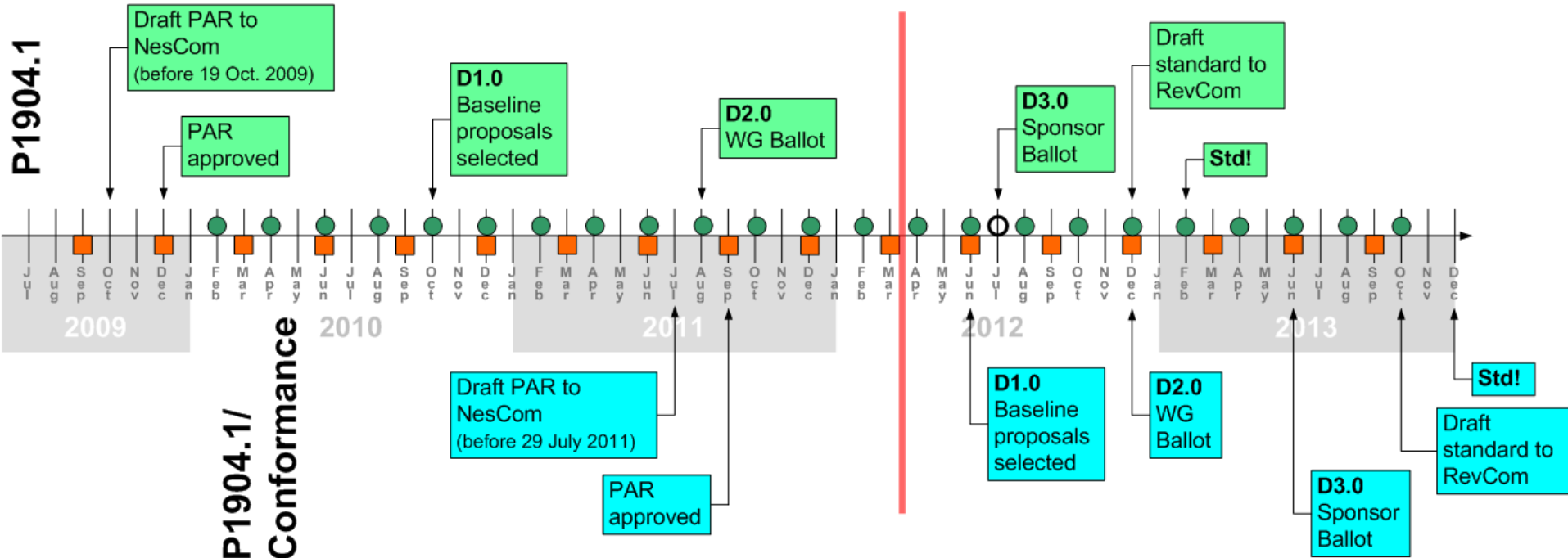
Past Meetings

Date	Location	Host
Feb 2010	Piscataway, NJ	IEEE-SA
Apr 2010	Shanghai, China	ZTE
Jun 2010	Busan, S. Korea	Korea Telecom
Aug 2010	Beijing, China	Fiberhome
Oct 2010	Tokyo, Japan	NTT
Dec 2010	Santa Monica, CA	Broadcom + RITT
Feb 2011	Vancouver, Canada	PMC Sierra
Apr 2011	Louisville, CO	CableLabs
Jun 2011	Shenzhen, China	Huawei
Aug 2011	Kobe, Japan	Sumitomo
Oct 2011	Kamakura, Japan	Mitsubishi
Dec 2011	Shanghai, China	China Telecom
Feb 2012	Palo Alto, CA	Hitachi

Future Meetings (*) tentative

Apr 2012	Prague, Czech Rep	IEEE-SA & ICAP
Jun 2012	Louisville, CO	CableLabs
Aug 2012	Sapporo, Japan (*)	Fujitsu (*)
Oct 2012	Beijing, China	RITT & Fiberhome
Dec 2012	Shanghai, China (*)	Qualcomm

Project Timeline



Where to Get More Information

- **P1904.1 website is located at**
<http://www.ieee1904.org/1/>
 - Information about IEEE SA Corporate membership program
 - Contact Information for WG Officers and IEEE SA Project manager

- **Public e-mail reflector is used for various announcements and reminders**
 - Instructions on how to subscribe:
http://www.ieee1904.org/1/subscribe_pub.html

 - Archive:
<http://www.ieee1904.org/1/email/index.html>