IEEE 1904 Access Networks Working Group

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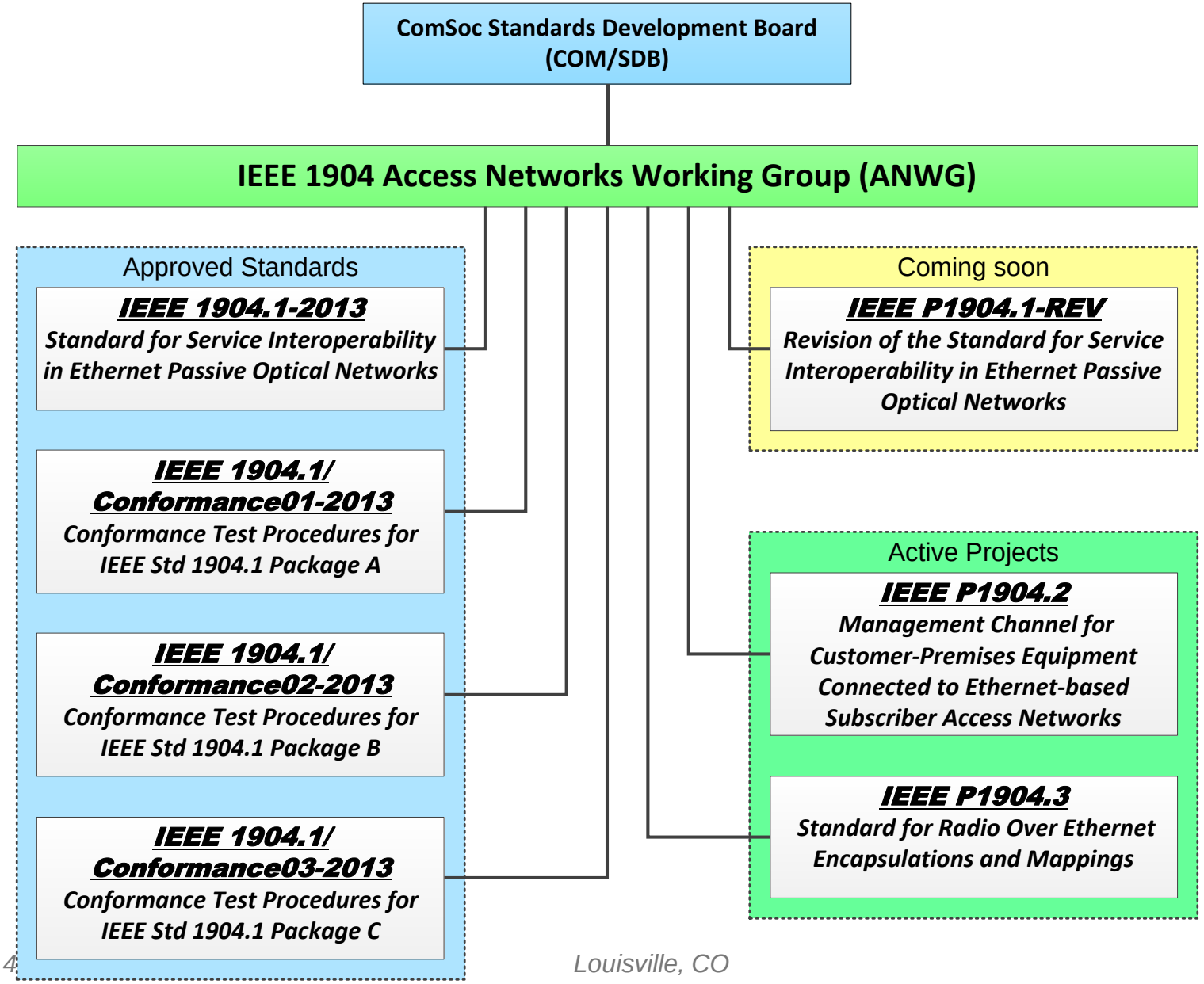
Optical Access? It's so 1904

- Access Networks Working Group (ANWG)
  - Embraces the system-level view of the access network
  - Builds on fundamental blocks provided by 802.3 and 802.1
  - Focuses on functions and protocols required for operating and managing the emerging multi-service and high-capacity communications networks.

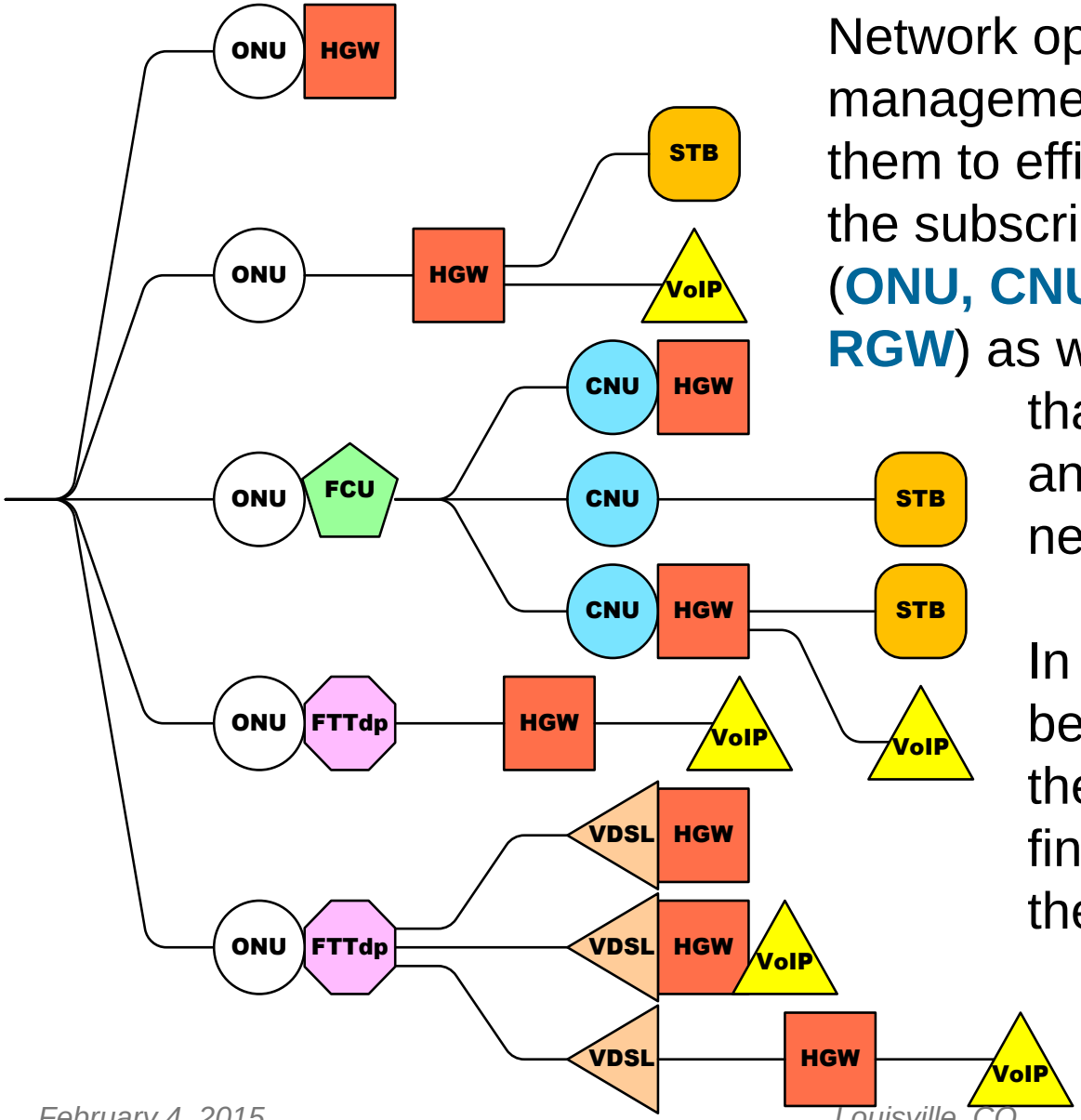
ANWG Organization



IEEE 1904.2

Standard for Management Channel for Customer-Premises Equipment Connected to Ethernet-based Subscriber Access Networks

PON-based Access Architectures

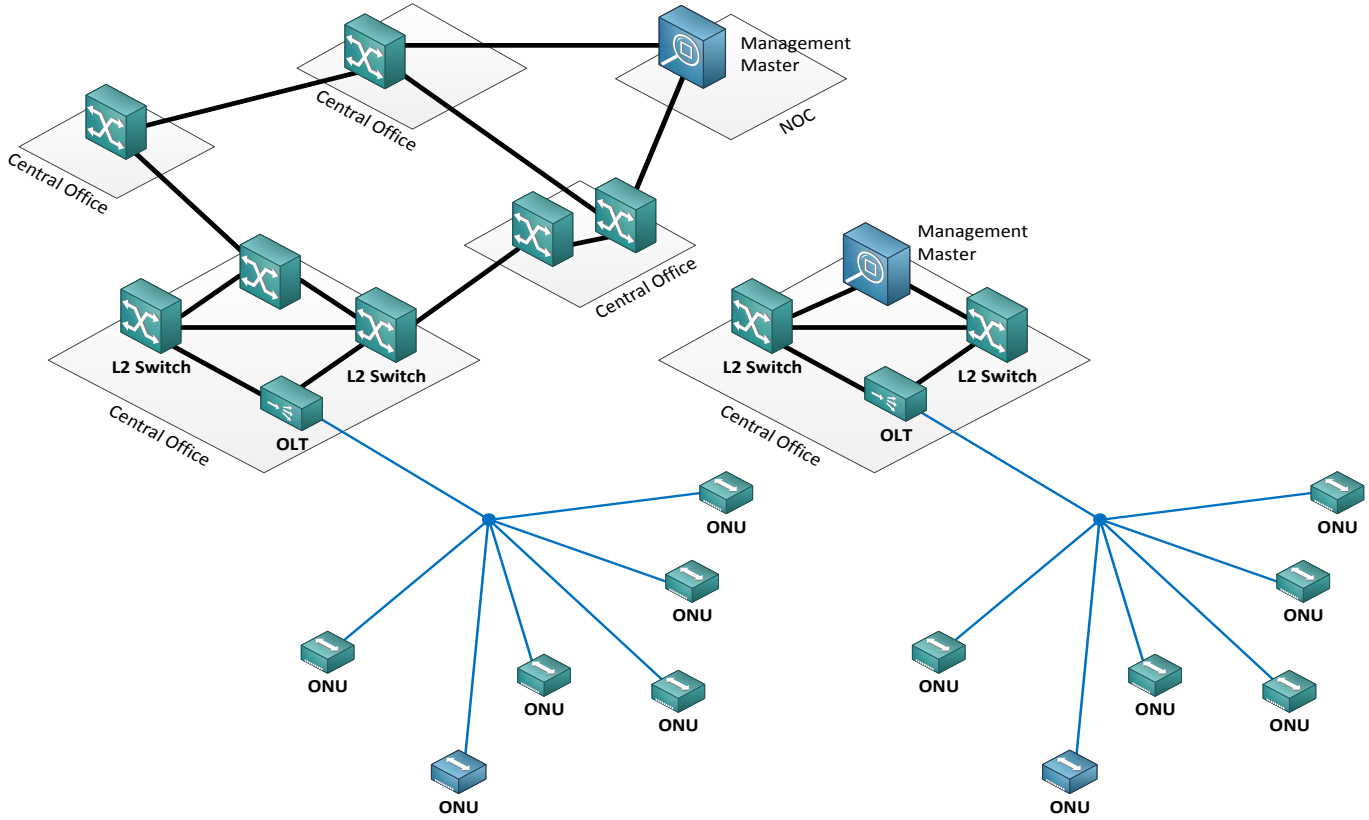


Network operators require a management system that would allow them to efficiently access and manage the subscriber demarcation device (**ONU, CNU, CM, DSL modem, or RGW**) as well as the various devices that interconnect their optical and copper sections of the network (**DPU or FCU**).

In addition, to achieve the best-possible service quality, the access network operators find it necessary to extend their management domains past the typical demarcation device.

NMS/NOC Consolidation

- There is a trend to consolidate management services within a CO, or even among multiple COs.



- Management traffic may need to traverse multiple hops to reach managed clients

Key Goals

1. Allow multiple L2 management channels (tunnels) reaching various levels of network hierarchy
   - Devices within CO (aggregation switches, OLT, CLT)
   - Devices in the access area (FCU, ONU/ONT, demark devices)
   - Operator-managed devices in customer premises (HGW, Firewalls, VOIP phones, STBs)

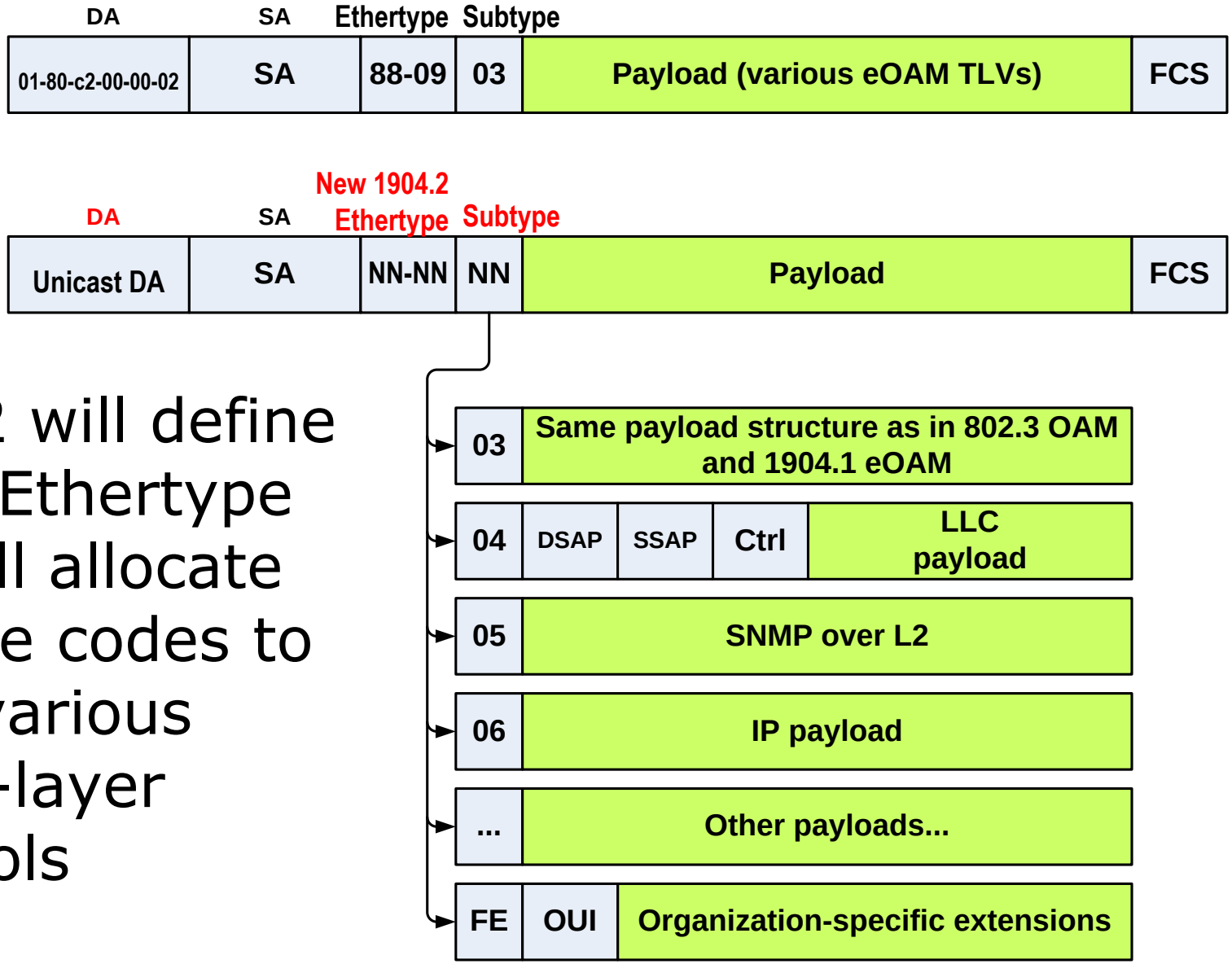
2. Allow L2-only devices to identify and exclude the management traffic from subscriber's SLA quotas

3. Impose minimal burden on the intermediate nodes
   - The solution shall not require specialized hardware or software to process management frames in the intermediate nodes.

Scope of 1904.2 Standard

- This standard will describe a management channel for customer-premises equipment (CPE) connected to Ethernet-based subscriber access networks. The key characteristics of the specified management channel are:
  - Multi-hop capabilities to allow management of various CPE devices located behind an Optical Network Unit (ONU), a Coaxial Network Unit (CNU), a Residential Gateway (RGW), etc.
  - Extensibility to accommodate new management protocols and/or new types of CPE devices.
  - Broadcast/multicast capabilities to allow simultaneous (synchronized) configuration of multiple devices.
  - Encryption capabilities to ensure secure access to managed CPE devices by the network operators.
- The standard will describe the message format as well as processing operations and forwarding rules at the intermediate nodes.

Extension of Ethernet Payload Type



- 1904.2 will define a new Ethertype and will allocate subtype codes to carry various higher-layer protocols

IEEE 1904.3

Standard for Radio Over Ethernet Encapsulations and Mappings

Need for the project

- Today's platforms cannot scale to meet the next generation cellular architecture requirements:
  - 10Gbps uplink per base station
  - 6+ sectors with channel bandwidths >200MHz per base station.
  - >100 antennas per sector
- A networked solution is required to enable:
  - Load balancing / resource pooling.
  - Cooperative-mode operation (multiple antenna systems, beam-steering)
  - Dynamic power management
  - Flexible mapping of the Radio over Ethernet (RoE) traffic between baseband unit (BBU) pools and remote radio unit
- The Radio over Ethernet (RoE) project will take advantage of the Ethernet's ubiquity, cost and power efficiency, and scalability to specify a scalable and streamlined solution that complements the existing CPRI radio transport specification based on fixed time division-multiplexing.

Scope

This standard will specify:

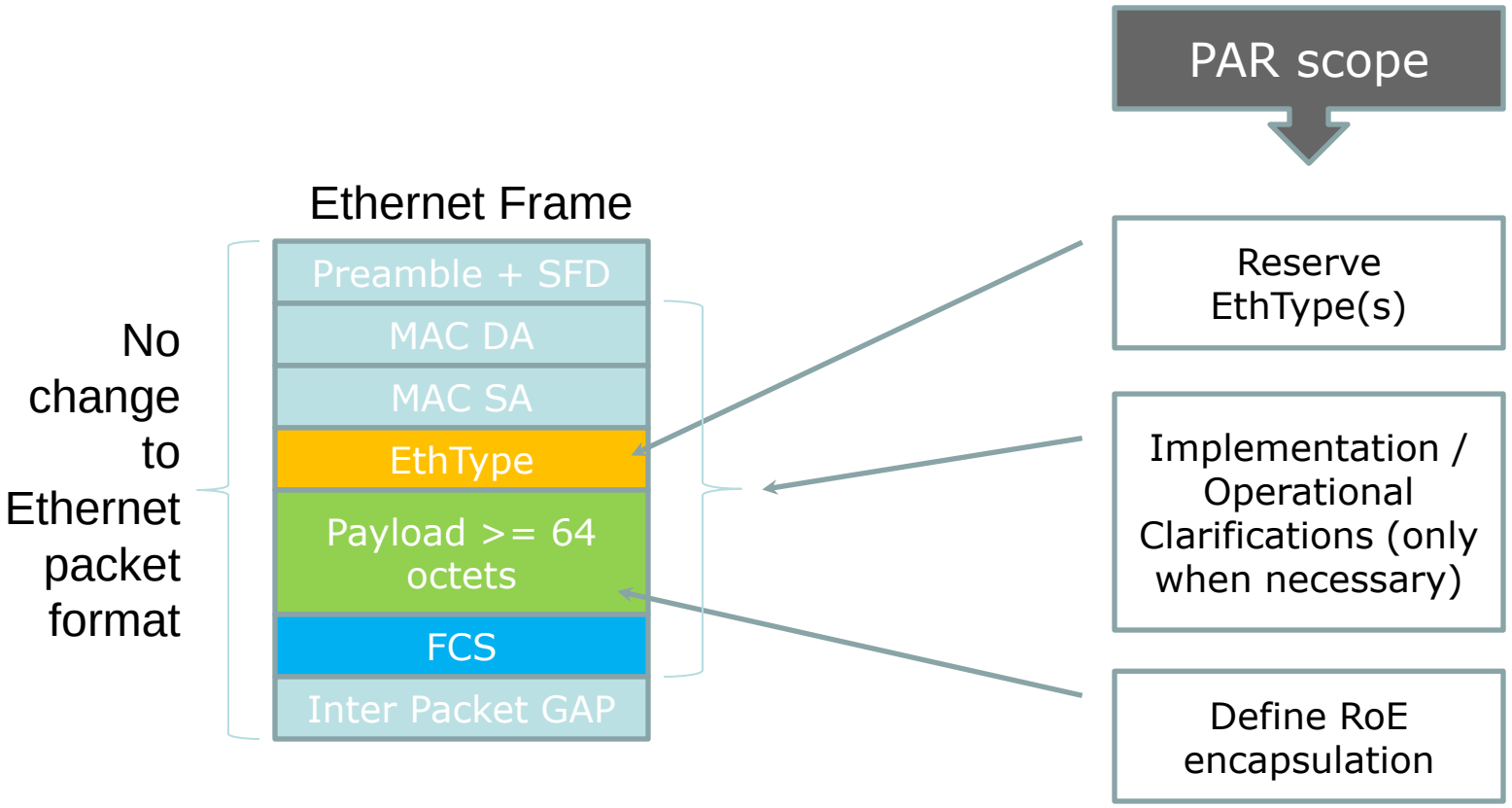
- The encapsulation of digitized radio In-phase Quadrature (IQ) payload, possible vendor-specific and control data channels/flows into an encapsulating Ethernet frame payload field.
- The header format for both structure-aware and structure-agnostic encapsulation of existing digitized radio transport formats.
  - The structure-aware encapsulation has detailed knowledge of the encapsulated digitized radio transport format content.
  - The structure-agnostic encapsulation is only a container for the encapsulated digitized radio transport frames.
- A structure-aware mapper for Common Public Radio Interface (CPRI) frames and payloads to/from Ethernet encapsulated frames. The structure-agnostic encapsulation is not restricted to CPRI.

What is not part of the PAR

- No changes to Ethernet Packet format
- No changes to MAC
- No normative queuing, timing and synchronization definitions. Only ensure that:
  - Desired RoE traffic fits into the available link capacity with the encapsulation overhead.
  - Desired RoE traffic (structure aware or agnostic flows) have a realistic chance to meet their respective timing budgets.
  - 802.1 TSN task force may be interested in developing RoE Timing and synchronization specification

RoE encapsulation overview

Ethernet packet remains unchanged



Website and Email

- **1904 WG Website**
  - URL: http://www.ieee1904.org
  - All contributions are public
- **1904 WG Reflector**
  - Used for general discussions/announcements
  - Archive is public: http://www.ieee1904.org/wg_pub_archive.shtml
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Thank You