IEEE 1904.2 PAR Discussion

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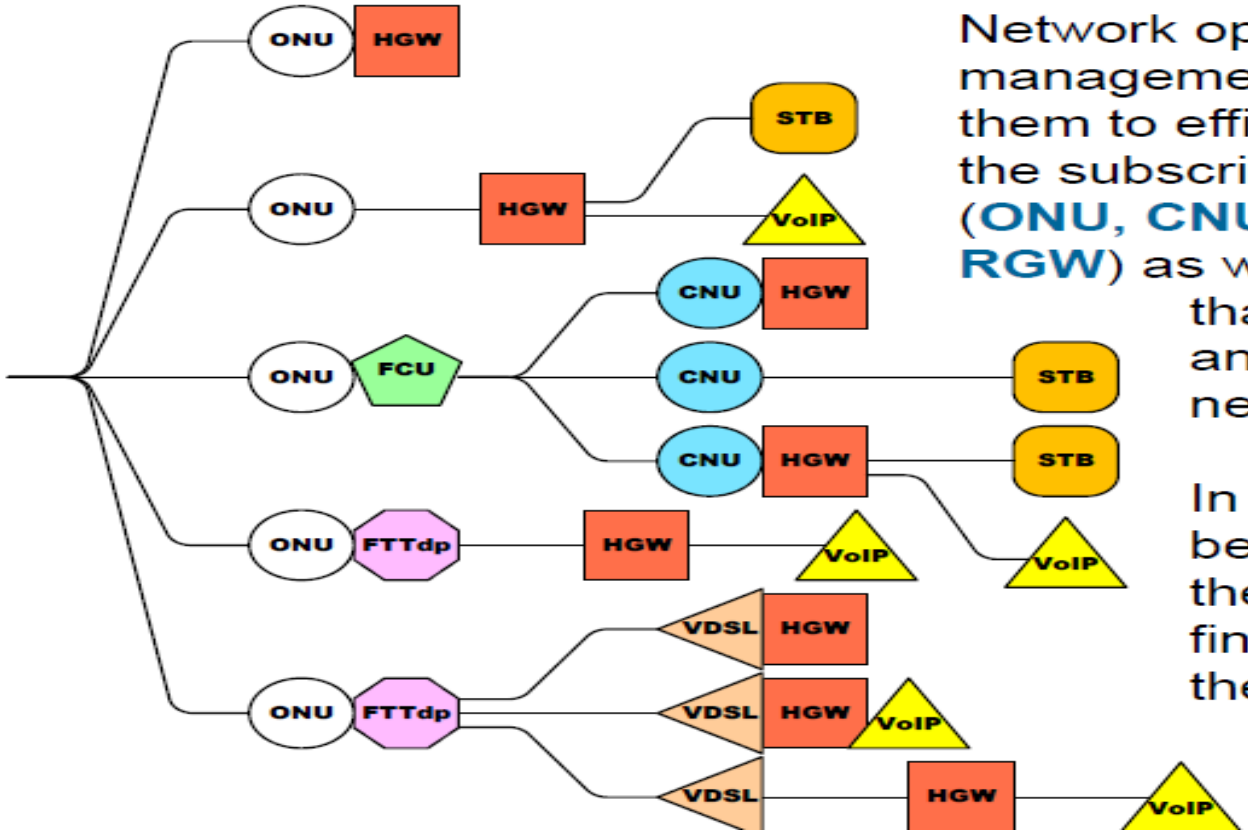
Objectives

- **Discuss the current goals and scope of IEEE 1904.2.**
- **Discuss the D-CCAP Use Case.**
- **Discuss new IEEE 1904.2 scope.**

Agenda

- **PON-Based Access Architecture**
- **Current IEEE 1904.2 Use Cases**
  - EPON, EPOC
- **Remote MAC & PHY (R-MACPHY)**
  - **New Use case for IEEE 1904.2**
  - Functional Modules of C-DOCSIS Distributed CMTS Architecture
  - R-MACPHY System Architecture
  - R-MACPHY Management Architecture
  - Application of IEEE 1904.2 to R-MACPHY.
- **Review IEEE 1904.2 goals.**
- **Review IEEE 1904.2 scope.**
  - New IEEE 1904.2 Scope.

PON-Based Access Architecture



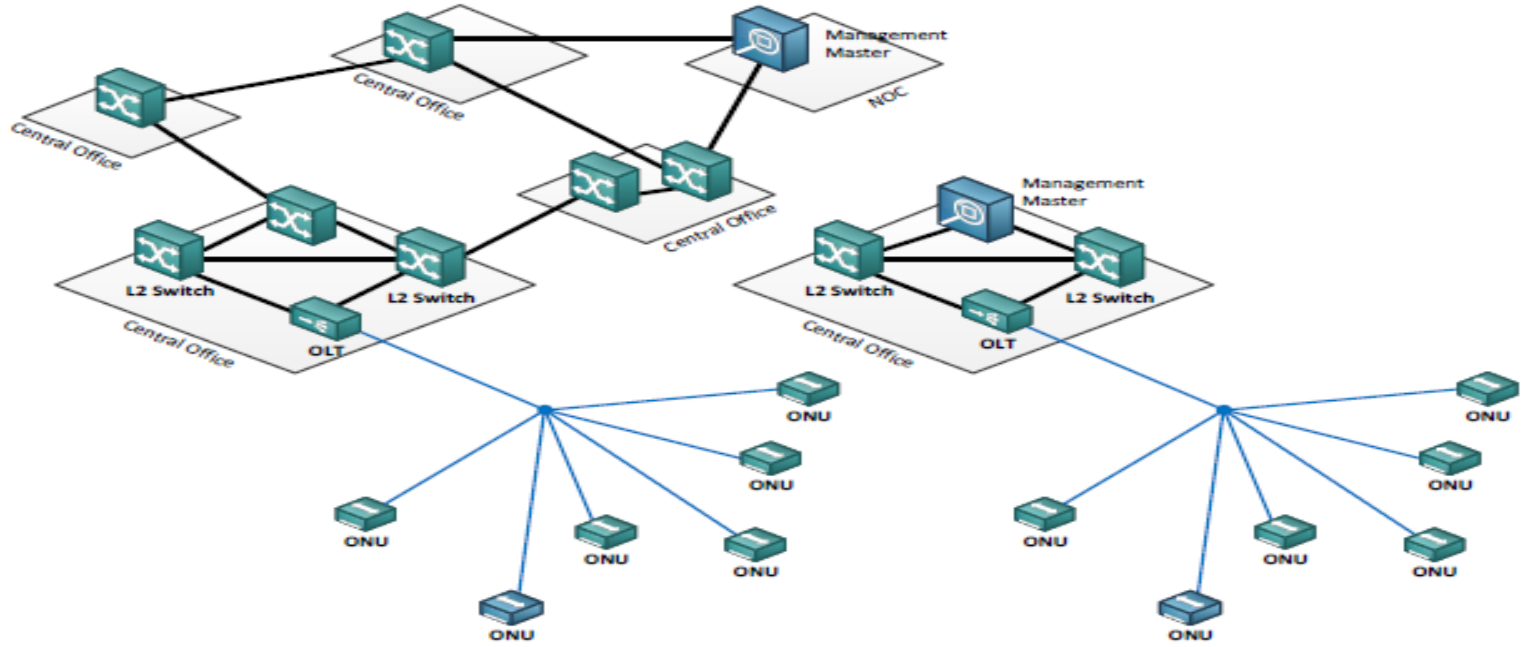
Network operators require a management system that would allow them to efficiently access and manage the subscriber demarcation device (**ONU, CNU, CM, DSL modem, or RGW**) as well as the various devices that interconnect their optical and copper sections of the network (**DPU or FCU**).

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.

- ❑Why only PON-Based Access Architecture is considered ?
- ❑We need to consider HFC networks

NMS/NOC Consolidation

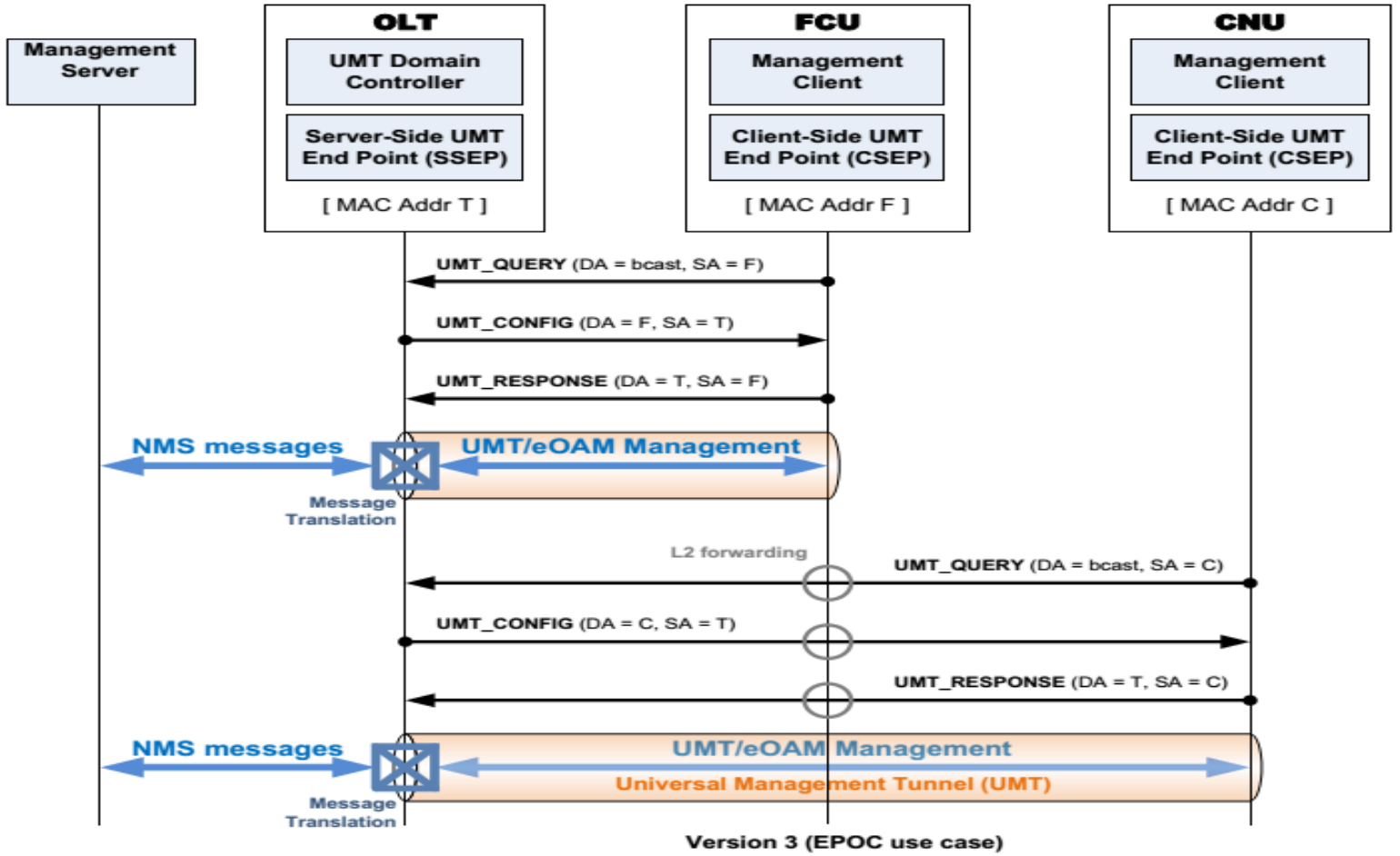
- There is a trend to consolidate management services within a CO, or even among multiple COs.



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

- **Where is the boundary of the access network ?**
- **In EPON the discovery protocol is not needed, OAM discovery is enough.**

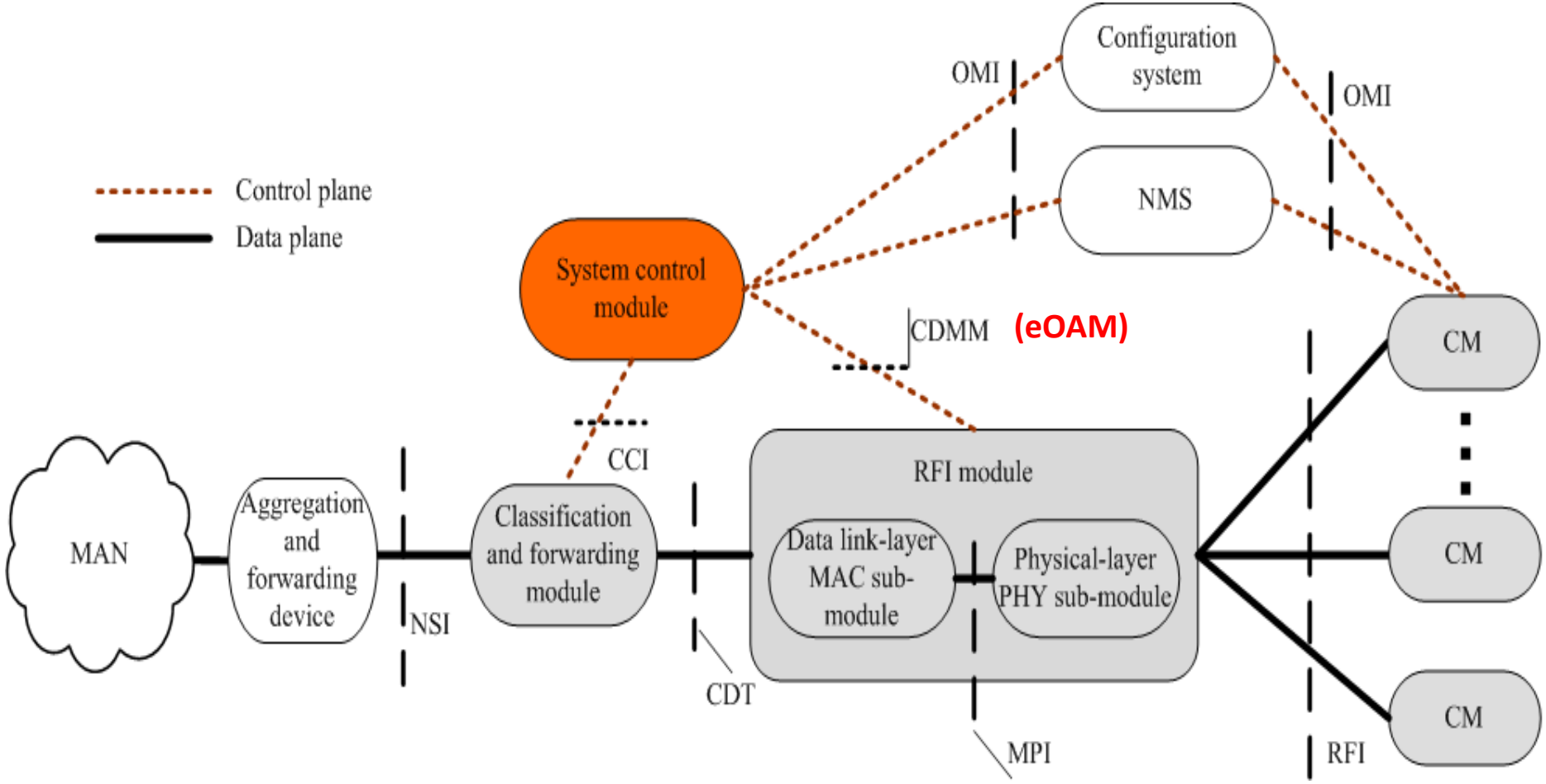
EPoC Use Case (?)



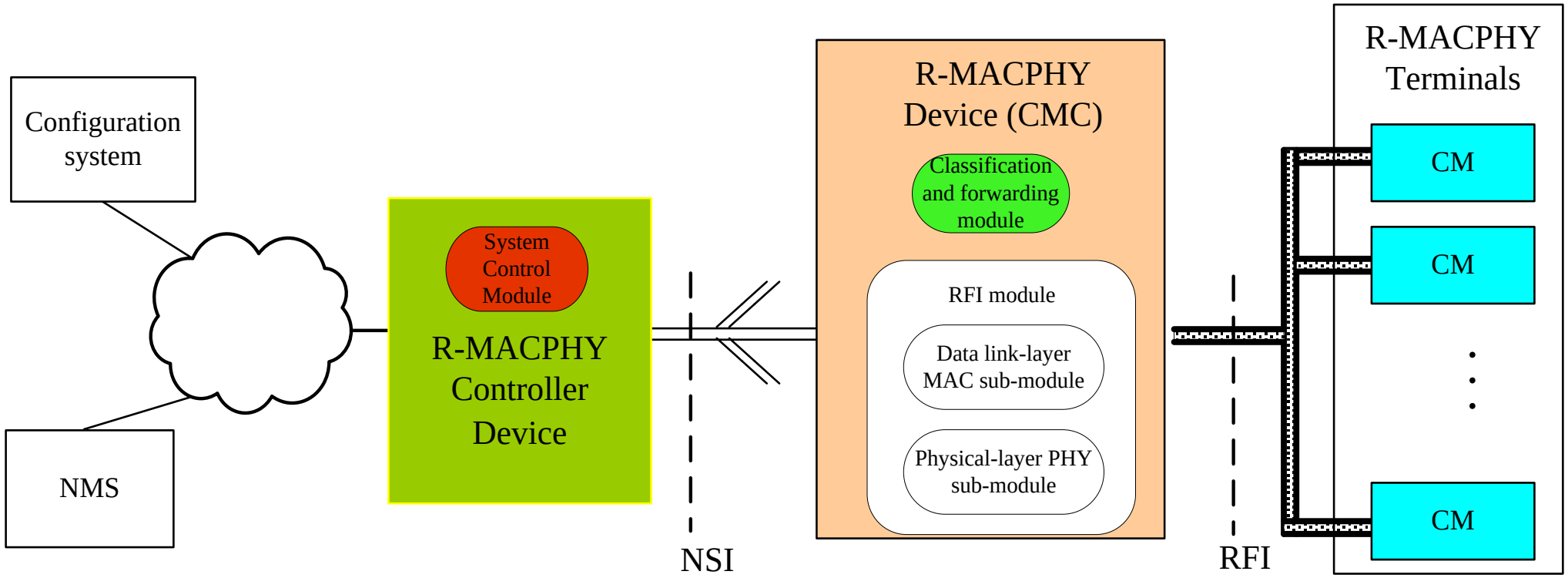
The future of EPoC is not certain even when the standard is published.

Distributed CMTS Architecture (C-DOCSIS)

System control module: This logical module is responsible for Configuration and management of the RFI module and the classification and forwarding module. For example, during CM registration, the system control module parses service flows and classification information reported by the CM and configures the classification and forwarding module accordingly. In addition, the system control module works with the NMS and the configuration system for service configuration and management.

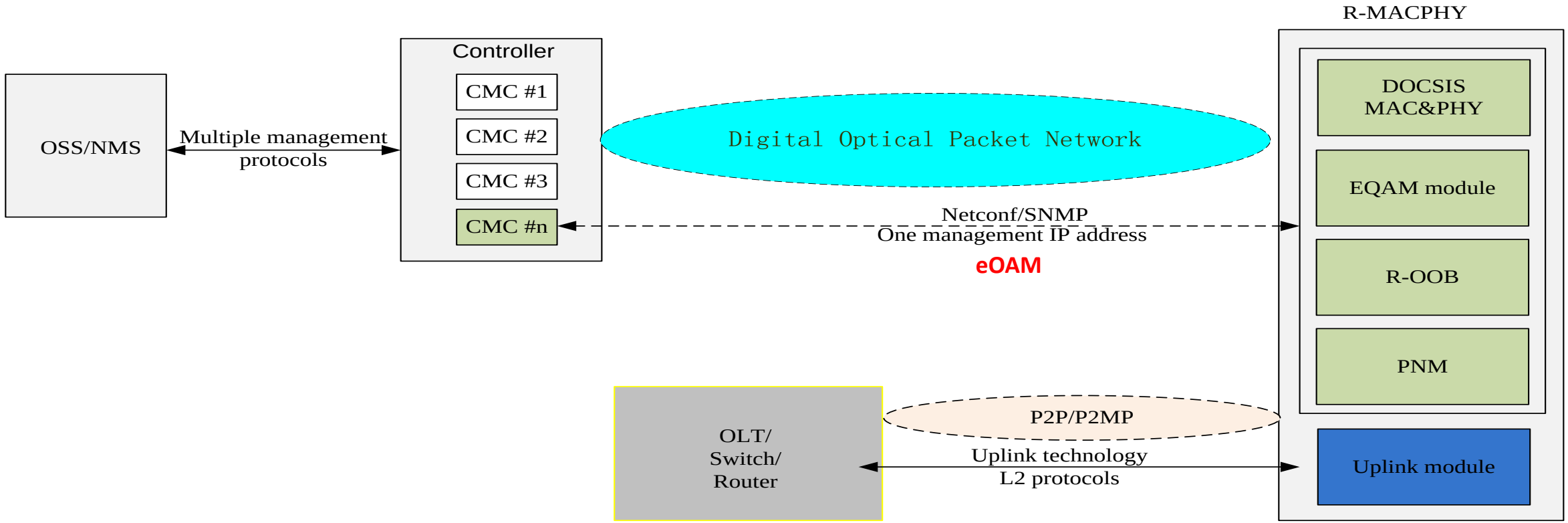


R-MACPHY Based on C-DOCSIS Architecture



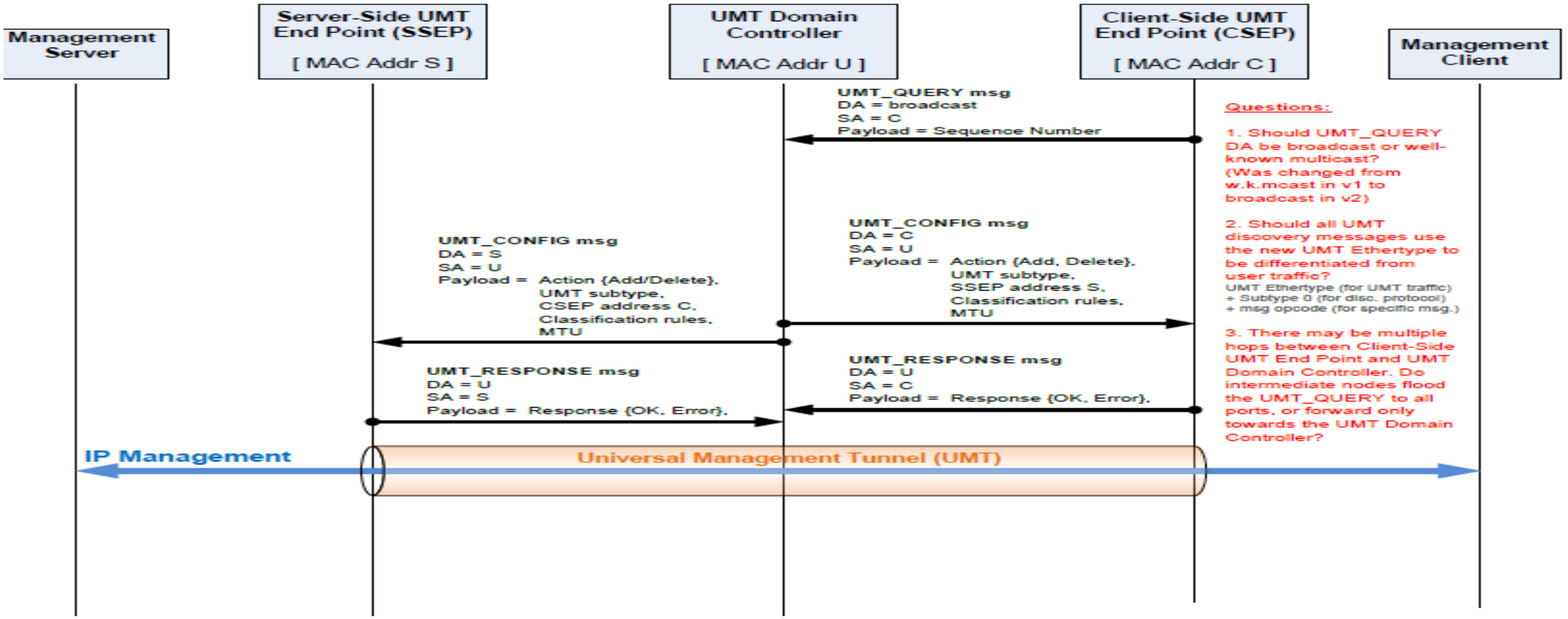
- **Good Use Case for IEEE 1904.2**
- R-MACPHY Controller manages the configuration of the of the R-MACPHY device.
- The Controller can be either a separate device or a component embedded in an aggregation and switching device, such as a router, a switch, or an OLT.

R-MACPHY Management Using the Controller



- OLT/Router/Switch is managed using existing management systems.
- CM is Managed using existing DOICSIS provisioning and NMS systems.
- R-MACPHY devices and their CM interfaces are managed like slots in CMTS Chassis.
- IEEE 1904.2 channel is needed to extend OAM over multiple L2 hops to manage CMC.

CMC Management Tunnel

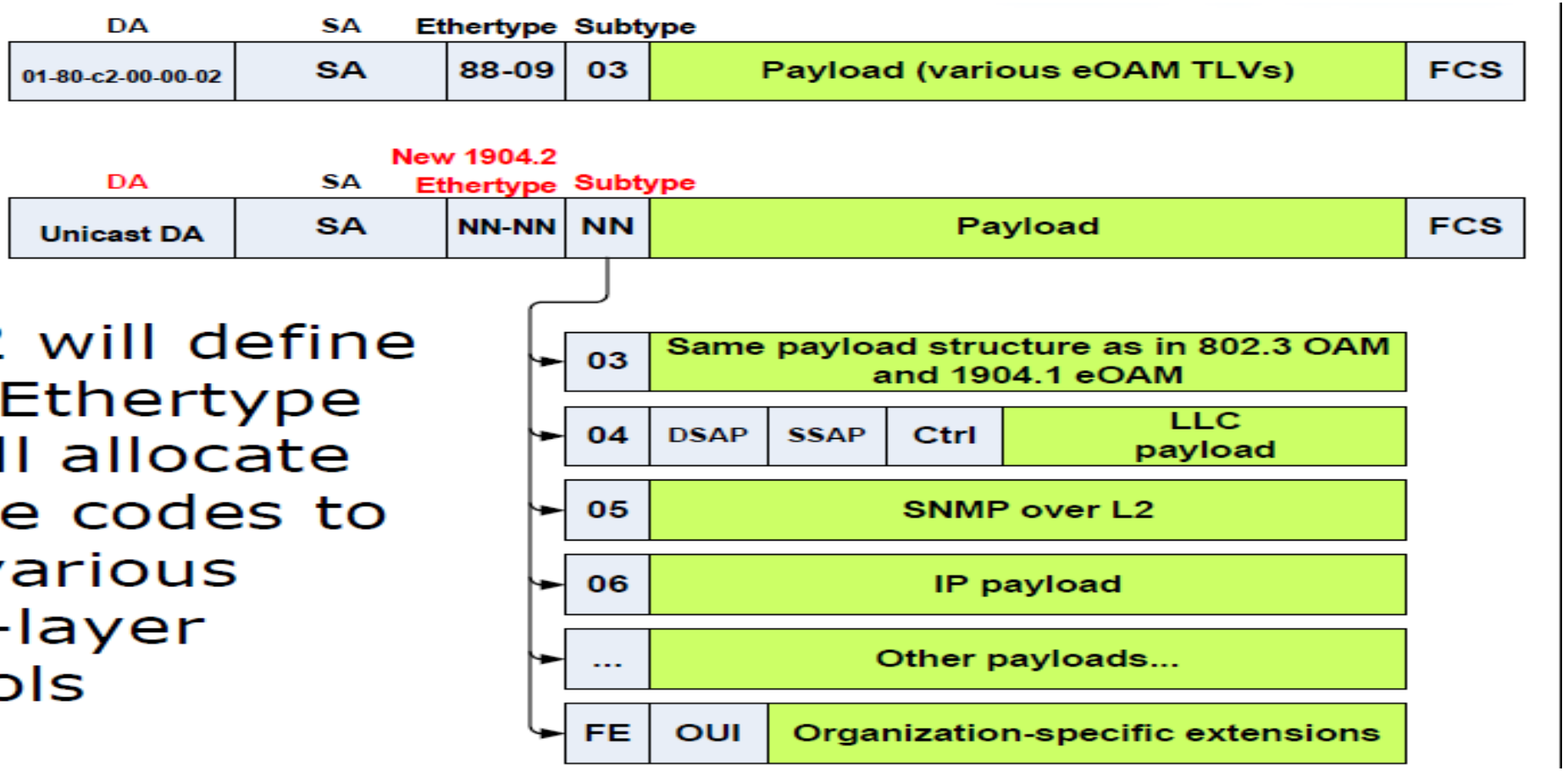


- CSEP is CMC
- SSEP can be the controller if it is connected to CMC using L2 Network

Current IEEE 1904.2 Key Goals

- **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)
- **Allow L2-only devices to identify and exclude the management traffic from subscriber's SLA quotas.**
- **Move "management" traffic in the access network out of the "user channel" – avoid impact to user traffic statistics.**
  - Management traffic is both L2 Ethernet (e.g., OAM) and L3 IP based
- **Impose minimal burden on the intermediate nodes**
  - The solution shall not require specialized hardware or software to process management frames in 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

Does IEEE 1904.2 create Tunnels or Channels ?

IEEE 1904.2 Key Goals (1)

- **Allow multiple L2 management channels (tunnels?) reaching various levels of network hierarchy**
  - Devices within CO (aggregation switches, OLT, CLT)
    - **Devices within the CO are not part of the access network**
    - **CO is not part of IEEE 1904.2 domain.**
  - Devices in the access area (FCU, ONU/ONT, demark devices)
    - **Access Network extends from demarcation devices to the Access Network Gateway**.
  - Operator-managed devices in customer premises (HGW, Firewalls, VOIP phones, STBs)
    - **Currently the channel does not terminate at these devices.**
    - **Usually these devices are managed using IP.**
- **L2 management is needed to avoid using IP stack.**
  - Management server and clients should be in the same L2 network (VLAN)
  - CPE devices (HGW, STB, ..) are not in the same VLAN as management servers.
- **The L2 Management tunnel is needed if the L2 management protocol has link scope**

IEEE 1904.2 Key Goals (2)

- **Allow L2-only devices to identify and exclude the management traffic from subscriber's SLA quotas.**
  - **Do we need a tunnel to achieve the above goal or special marking is enough ?**
  - **The new IEEE 1904.2 Ethertype is actually used to mark the management traffic.**
- **Move "management" traffic in the access network out of the "user channel" – avoid impact to user traffic statistics.**
  - Management traffic is both L2 Ethernet (e.g., OAM) and L3 IP based
  - **This goal can be achieved using IEEE 802.1 standards (e.g. IEEE 802.1Qca).**

Current Scope of IEEE 1904.2 Standard

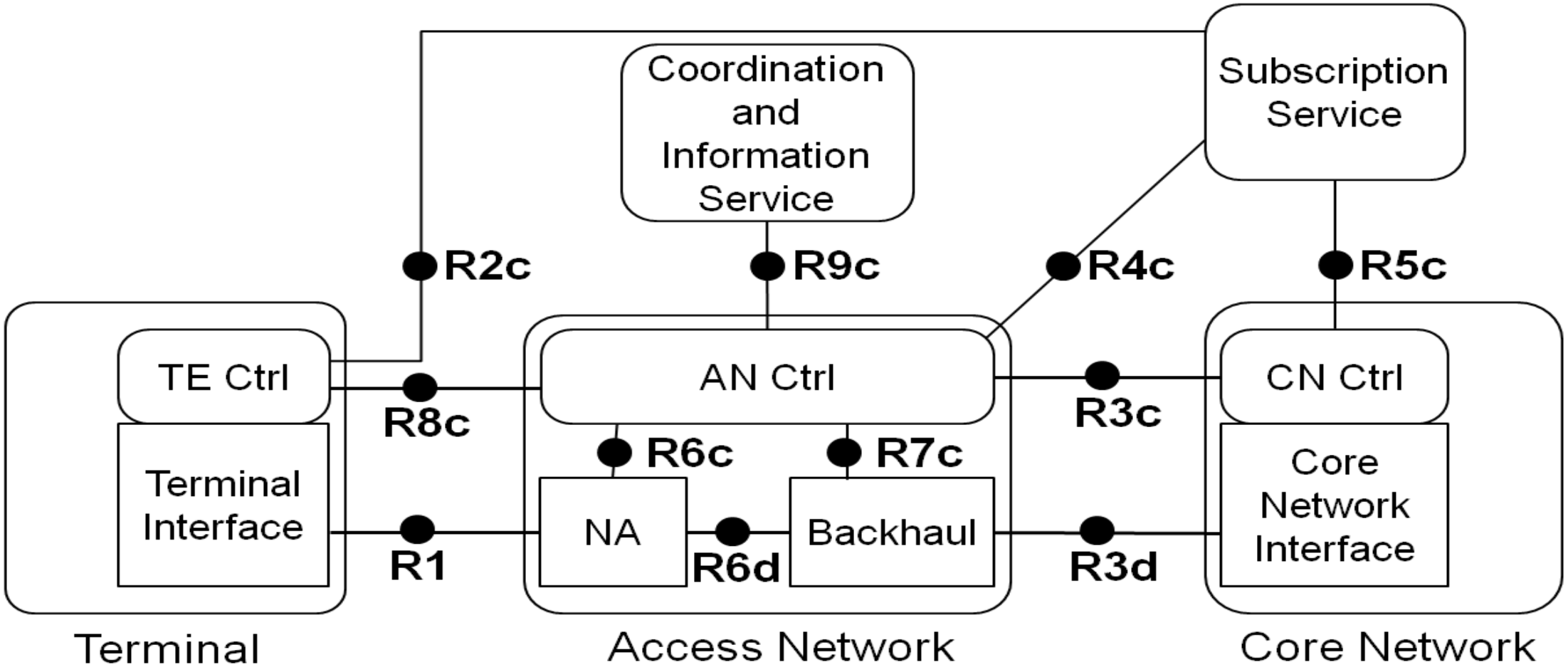
- **This standard will describe a management channel for customer-premises equipment (CPE) connected to Ethernet based subscriber access networks.**
- **The key characteristics of the specified management channel are:**
  - Multi-hop capabilities to allow management of various CPE devices located behind 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**

New Scope of IEEE 1904.2 Standard

- **This standard will describe an Ethernet compatible L2 management channel that allow the management of a variety of devices in access network and in subscriber premises.**
- **The key characteristics of the specified management channel are:**
  - Multi-hop capabilities to allow management of various access network devices and CPE devices located behind an access network demarcation device (e.g. Optical Network Unit (ONU), CM, Coaxial Network Unit (CNU), a Residential Gateway (RGW), etc.
  - Extensibility to accommodate new management protocols and/or new types of CPE and access network devices.
  - Broadcast/multicast capabilities to allow simultaneous (synchronized) configuration of multiple devices.
  - Authentication and Encryption capabilities to ensure secure access to managed devices by the network operators.
- **The standard will describe the message format as well as processing operations and forwarding rules at the intermediate nodes.**

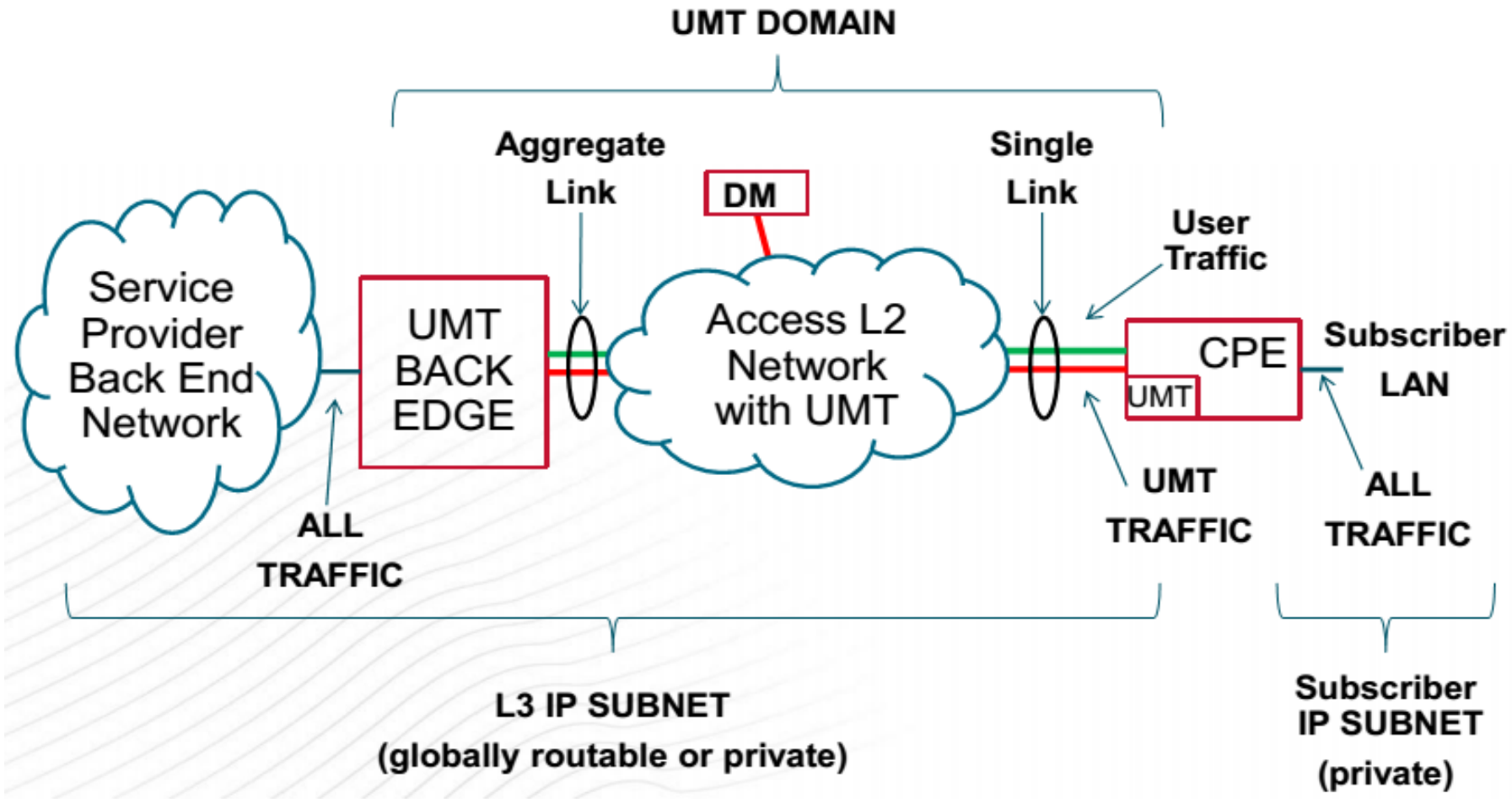
THANK YOU

IEEE 802 Access Network Reference Model



R6D does not have to be Ethernet. It can be DOCSIS

General UMT Architecture – A SCENARIO



Distributed Access Architectures