

IEEE 802.1CM Time-Sensitive Networking for Fronthaul

János Farkas, IEEE 802.1 TSN TG Chair, P802.1CM Editor
janos.farkas@ericsson.com



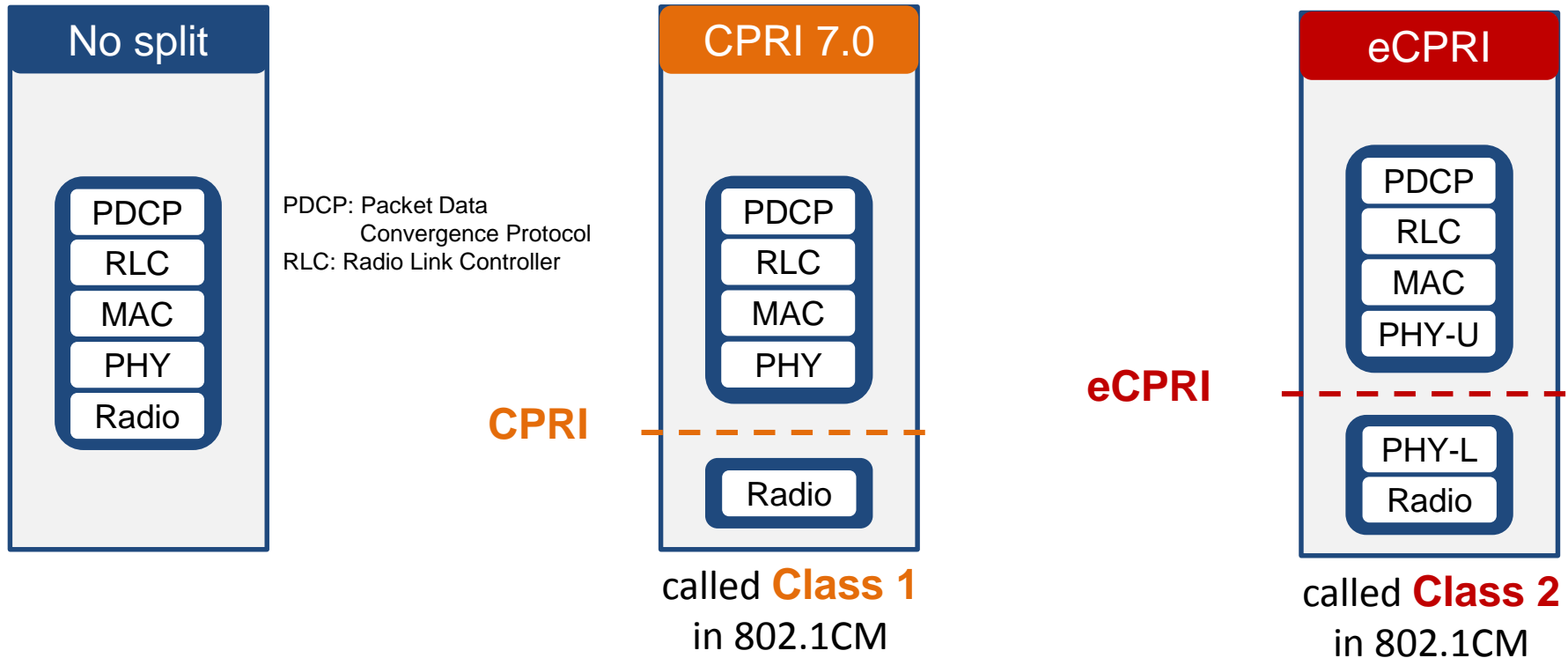
Geneva, 27 January, 2018



Outline

- Introduction
- Approach to Ethernet-based fronthaul
- Goals and objectives of IEEE 802.1CM
- Collaborative effort of CPRI Cooperation and IEEE 802.1
- Top Down Approach
- Fronthaul Profiles
- Summary

Radio Base Station Splits in Scope



- These splits are in scope of 802.1CM
- Further splits can be addressed by an amendment to 802.1CM

Ethernet-based Fronthaul Approach

Radio Domain



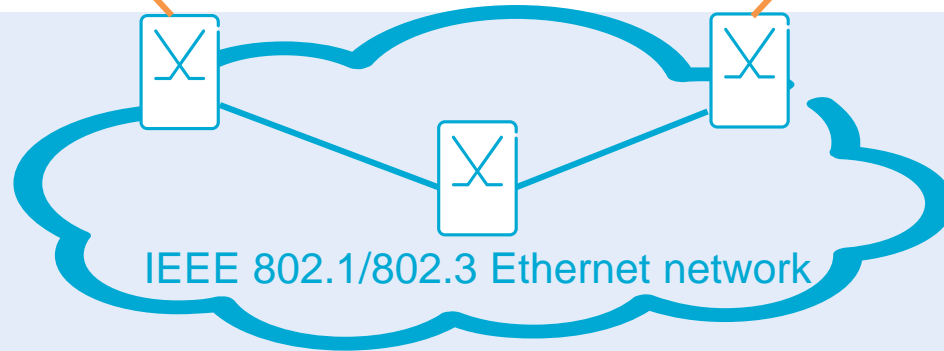
fronthaul

interface



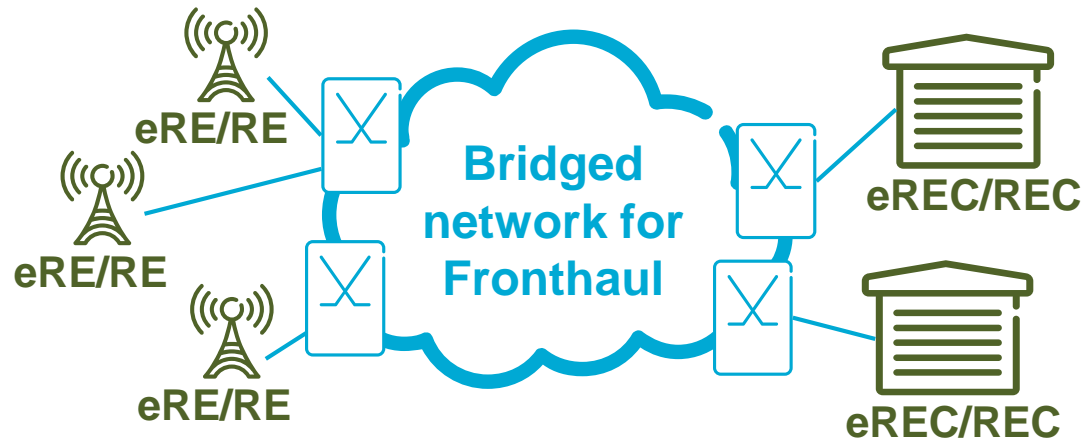
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Packet Domain (Ethernet-based)



**Ethernet networking
specified by IEEE 802.1CM TSN for Fronthaul**

Goals & Objectives of 802.1CM



- Standard TSN Profiles for fronthaul
 - Enable the transport of fronthaul streams in a bridged network
- A TSN Profile
 - Specifies aspects of bridge operation
 - Set of feature and option selections
 - Configuration guideline

Collaborative effort of CPRI Cooperation and IEEE 802.1

CPRI Cooperation

- <http://www.cpri.info>
- Fronthaul experts
- Continuous development of CPRI specifications
- eCPRI specification
- Both organizations have proven that they deliver
- P802.1CM TSN for Fronthaul is a collaborative effort
 - Joint sessions: face-to-face and virtual
 - Common members
- Ethernet-based packet fronthaul is on its way

IEEE 802.1

- <http://www.ieee802.org/1>
- Ethernet networking experts
- Packet networking standards for decades
- Time-Sensitive Networking

P802.1CM Project Takes Top Down Approach

1. Collect requirements
 - Provided by CPRI Cooperation
2. Collect packet networking and synchronization features
 - Bridging features and characteristics
 - Time-Sensitive Networking features
 - Synchronization solutions and approaches
 - ITU-T Q13/15 contributes
(e.g., how to leverage the Telecom profile of IEEE 1588)
3. Specify solution details
 - Profiles specify how to meet the fronthaul requirements in an Ethernet network

Fronthaul Profiles

- Profiles are engineered taking into account the worst-case
- Two Profiles applicable to both Class 1 (CPRI) and Class 2 (eCPRI)
- Profile A
 - Keep it as simple as possible
 - Based on strict priority
 - User data (IQ data) → high priority traffic class
 - C&M data → lower priority traffic class
 - Max frame size for all traffic: 2000 octets (IEEE 802.3)
- Profile B
 - Leverage a simple TSN feature: frame preemption (802.3br & 802.1Qbu)
 - Strict priority + frame preemption
 - Fronthaul traffic → high priority traffic class; express traffic
 - Non-fronthaul traffic → lower priority traffic class; preemptable traffic
 - Frame size maximized for fronthaul traffic (2000 octets)
 - Frame size is flexible for non-fronthaul traffic

Ethernet-based Fronthaul Details

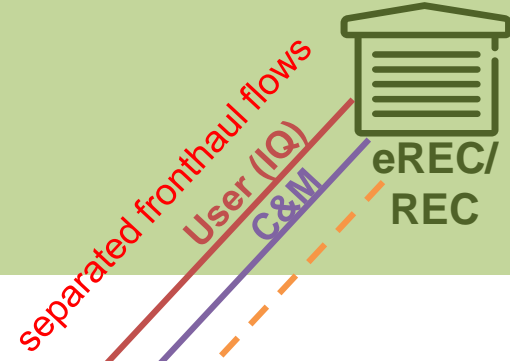
Radio Domain

- › Separate fronthaul flows
- › separate synch provided other means



separated fronthaul flows
User (IQ)
C&M

fronthaul interface
eCPRI (CPRI)



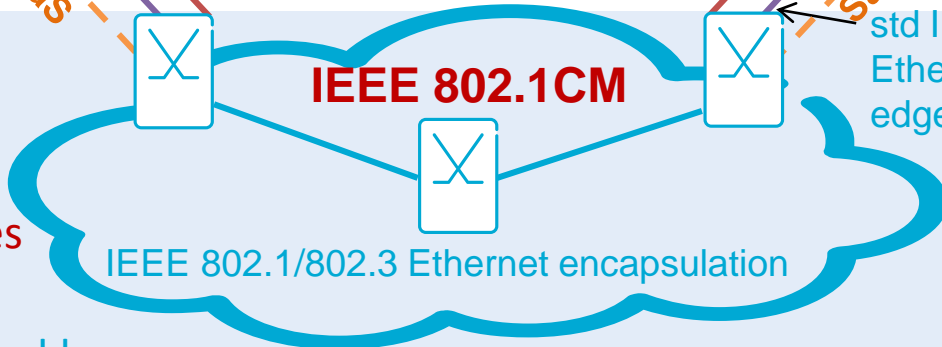
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SaaS

SaaS

Packet Domain

- › IEEE 802.1CM Fronthaul Profiles
 - meet fronthaul requirements
- › Synchronization may be provided by packet network, e.g., Sync as a Service (SaaS)



std IEEE 802.1/802.3 Ethernet frames via edge ports

Summary

- IEEE 802.1CM specifies TSN Profiles for Fronthaul
- It is a collaborative effort of CPRI Cooperation and IEEE 802.1
- The project takes top down approach: requirements → solution
- Requirements are provided by CPRI Cooperation
- Two Fronthaul Profiles are specified in 802.1CM
- Both eCPRI and CPRI splits are supported