NGFI COS specification

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Next Generation Fronthaul Interface - Use Cases & Scenarios			
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Background

NGFI Oct f2f meeting

- 1914.1 WG has agreed to a motion with the following key elements:
  - NGFI transport classes of service (COS) are defined according to priority, latency, and bandwidth criteria
  - Three main COS categories are assumed
    1. Control & management (RAN)
    2. Data-plane (RAN)
    3. Transport NW control & management (C&M)
  - Each category of COS may contain a number of sub-classes. Defining these sub-classes and associating them with specific class parameters (priority, latency, throughput, etc.) is for further study

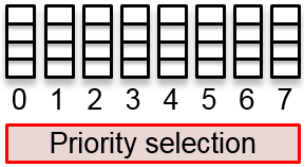
This contribution proposes the steps for moving forward on this topic.

Challenges NGFI is facing

- RAN interfaces are defined cross multiple standardization bodies (3GPP, SCF, CPRI, eCPRI, etc.). The possible future specifications may have large variations in terms of objectives and forms of transport requirement
- Data link layer of Ethernet/packet switch network is also evolving with new functionalities to adapt to 5G transport requirement (802.1CM, TSN, and MEF 5G Open CS, etc.)
- Function split, a dominant factor impacting transport requirement, has large number of options/sub-options. It is not clear in near future which ones will be standardized. Furthermore, it is likely standardization implementation for each of the selected options may be carried out in steps, spreading out to a long period.
- Transport latency requirement depends not only on standards but also on specific equipment implementations, another uncertainty factor not clear until the time of provisioning the deployment
- Large variation of transport throughput requirement is envisioned along the course of service deployment, where user data rate, signal bandwidth, and site dimensioning (number of sectors) etc. can vary significantly, so as the throughput requirement
- Transport latency variation (or jitter) requirement needs be further explored

Understanding the switched NW for fronthaul transport

- Priority queuing
  - Strict priority queuing used in Class 1 profile in 802.1CM



  - Other queuing features (weighted queuing, credit-based shapers, etc.)
  - Total of 8 QOS classes
- Transmission preemption/express forwarding (802.1Qbu)
  - Interrupt existing transmission from a frame with tight latency
  - Help on low latency data traffic
  - 1 level only
- Time-gated queuing (802.1Qbv)
  - A circular scheduler controls gates on each of 8 queues
  - Helps on jitter reduction
  - may not be suitable for fronthaul transport because it is not designed for high volume data traffic

➔ Fundamentally what is seen by NGFI:

- 8 NW QOS classes and & 1 level preemption

Proposed way forward for COS specification

1. Transport bandwidth not to be used as a primary factor in COS specification
   - Moving target as it is functions of function splits, channel BW, user data rate, order of massive MIMO, and site dimensioning, etc.
   - Network capacity issue resolved by network provisioning & planning
   - 802.1CM doesn't not consider it as requirement in the fronthaul profiles
2. Latency requirement to be directly linked to the priority levels
   - Lower latency data traffic assigned to higher priority level
   - Priority level 0 has highest priority and is ensured by preemption in TSN
   - Other priority levels to match switched network QOS priority classes
   - FFS ranges of the latency requirement of each priority level
3. For further study of other class parameters
   - Jitter
   - FLR (frame loss rate)
   - Other

Example of COS specification

Priority-latency profile

priority level	latency requirement
0 (express)	<100us
1	<1ms
2	<10ms
…	
7	

Latency values here are for illustration only

Class	Sub Class	Priority Level	Latency requirment
RAN control-plane	Synchronization		
	RAN C&M	1	<1ms
RAN data-plane	High priority	0	<100us
	Mid latency	1	<1ms
	High latency	2	<10ms
NW management	C&M	2	<10ms
Reserved			

Motion #1

- For COS specifiction, agree as ways forward to the proposed item 1 and item 2 of slide 7 of tf1_1702_cai_tazi_NGFI_COS_specification_1.pdf.

- Mover: Lujing Cai
- Seconder:

- Yes: ___ No: ___ Abstain: ___ (technical motion needs >= 2/3)