

# Architecture considerations

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**IEEE 1914**  
**Next Generation Fronthaul Interface**  
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**Architecture considerations**

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# Introduction

Class	Sub Class (PCC)	Priority Level (PCC)	Latency upper bound requirement (PCC)	Throughput requirement (PCC)	Reserved	Informative
contrò. & management	synchronization	0		LoW BW		
	Low latency RAN control-plane	1		Low BW		
data-plane	Subclass1	2		R3_low - R3_high		3GPP model Option 6,7,8
	Subclass_2	3		R4_low - R4_high		3GPP model Option 4,5
	Subclass_3	4		R5_low - R5_high		3GPP model Option 1,2,3
Transport NW control & management		?	?	Low BW		
Reserved						

Way forward [1]:

- Need to fill in the transport class table
  - What are they? What are their properties? Are they technology-specific?
- Requirements (following Prof. Choi's contribution, Transport requirements for different splits (ATT) )
- Need architecture (following Jouni's contribution)

[1] 201610 IEEE 1914 f2f meeting summary

# Agenda

- Architectural considerations – contribution to the discussion
  - Towards requirements definition
  - Configuration of traffic classes towards meeting latency targets

# ARCHITECTURAL CONSIDERATIONS

Data-plane related

# Distance for p2p links

- Most stringent requirement for subclass 1:

User-plane eMBB 4ms -> FH 100us = 20 km (propagation only)

User-plane URLLC 0.5ms -> FFS

- Most stringent requirement for subclass 2:

User-plane eMBB 4ms -> assuming FH less than 100us = less than 20km (propagation only)

User-plane URLLC 0.5ms -> FFS

- Most stringent requirement for subclass 3:

User-plane eMBB 4ms -> assuming FH 1.5ms-10ms = 300-2000 km (propagation only)

User-plane URLLC 0.5ms -> FFS

**Topology changes the maximum distance**

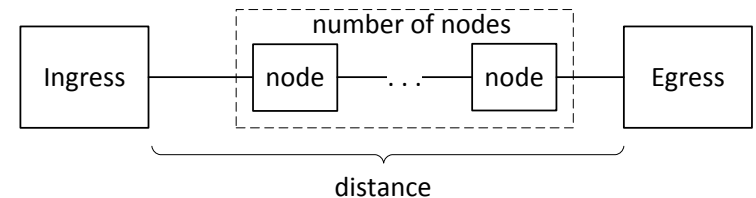
# Topology and # of nodes

- All topologies should be considered
  - Ring/chain topology: all nodes add up to the delay
  - Tree/point-to-multipoint: aggregation nodes add to the delay
- The # of nodes is dependent on topology and allowed distance between nodes



# # of nodes impact on distance

- Assuming processing delay at each node of 3usec.
- Assuming ring/chain topology
- What is the maximum distance between ingress and egress node?



distance (km) for 4ms eMBB user plane latency as a  $f(\#nodes)$

	Number of intermediate nodes				
	0	10	15	20	50
Subclass 1	20	14	11	8	Na
Subclass 2	20	14	11	8	Na
Subclass 3	300	294	291	288	270

# Traffic multiplexing

Options 1-5: multiplexing gain possible – bursty traffic

- **Subclass 1** (Options 1,2,3) – **higher** multiplexing gain
- **Subclass 2** (Options 4,5) – **lower** multiplexing gain

**Subclass 3** (Options 6,7,8): **small/no** multiplexing gain

- 6-7.3 - dependent on user data rate
- 7.1, 7.2 and 8 – independent on user data rate

**Hybrid splits supported at one physical node**  
**– traffic multiplexing at each stage (FH; MH; BH)**

# Configuration of traffic classes towards meeting latency targets

1. Which classes can be preempted before others?

Should priorities from NGFI classes of service be used?

2. How to prioritize

- between fronthaul traffic classes: should priorities from NGFI classes of service be used?

- with backhaul/midhaul (shared FH/MH and MH/BH):  $FH > MH > BH$ ?

3. Is there a need for source scheduling requirements?

- for streams with the same priority (e.g. the same class)

# Summary

- Architectural considerations
  - Requirements
    - Distance
    - Topologies
    - Number of nodes
    - Traffic multiplexing
  - Configuration of traffic classes towards meeting latency targets