Architecture considerations

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Next Generation Fronthaul Interface
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Architecture considerations			
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Introduction

Class	Sub Class (FFS)	Priority Level (FFS)	Latency upper bound requirement (FFS)	Throughput requirement (FFS)	Reserved	informative
control & 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 (option 4) = less than 20km (propagation only)

-> assuming FH 500us = less than 100km (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

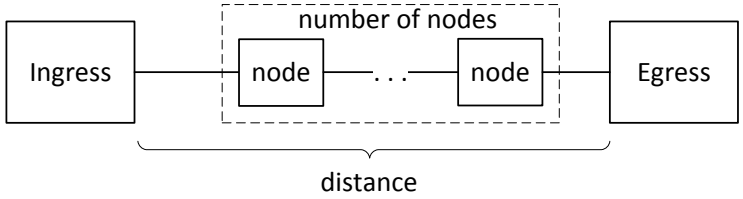
Topology and # of nodes

- All topologies should be considered
  - Ring/chain topology: all nodes add up to the latency
  - Tree/point-to-multipoint: aggregation nodes add to the latency

- 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?



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

	Number of intermediate nodes				
	0	**10**	**15**	**20**	**50**
Subclass 1	20	14	11	8	Na
Subclass 2	20-100	14-94	11-91	8-88	Na-70
Subclass 3	300-2000	294-1994	291-1991	288-1988	270-1970

→ Subclass 2 and 3 permit some queuing delay

Traffic multiplexing

- Options 1-5: multiplexing gain possible – bursty traffic
- Options 6-7.3 - dependent on user data rate
- Options 7.1, 7.2 and 8 – independent on user data rate

- **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

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