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Strict Priority in P802.1CM

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Goals of this presentation

- Evaluate the updates needed in 802.1CM due to the recent changes in data flow requirements

Background – Former data flow requirements

› from http://www.ieee802.org/1/files/public/docs2016/cm-CPRI-functional-decomposition-requirements-0516-v01.pdf

Requirements summary

	Synchronization Stream	IQ Data	C&M data
Traffic QoS type	Very High	High	Best Effort
Security	Under study	Under study	-
End-to-End Latency	-	<100µs	-
FDV	-	Not specified	-
FLR	-	$<10^{-7}$	$<10^{-6}$

Current data flow requirements

› from Common Public Radio Interface: Requirements for the eCPRI Transport Network

4.1. Per flow requirements

4.1.1. Split E and splits ID, IID, IU when running E-UTRA

Table 1 is applicable for the functional decompositions splits E and I_D, II_D, I_U as defined in [1].

Table 1 Split E and splits I_D, II_D, I_U requirements

CoS Name	Example use	One way maximum packet delay	One-way Packet Loss Ratio
High	User Plane	100 µs	10^{-7}
Medium	User Plane (slow), C&M Plane (fast)	1 ms	10^{-7}
Low	C&M Plane	100 ms	10^{-6}

Implications

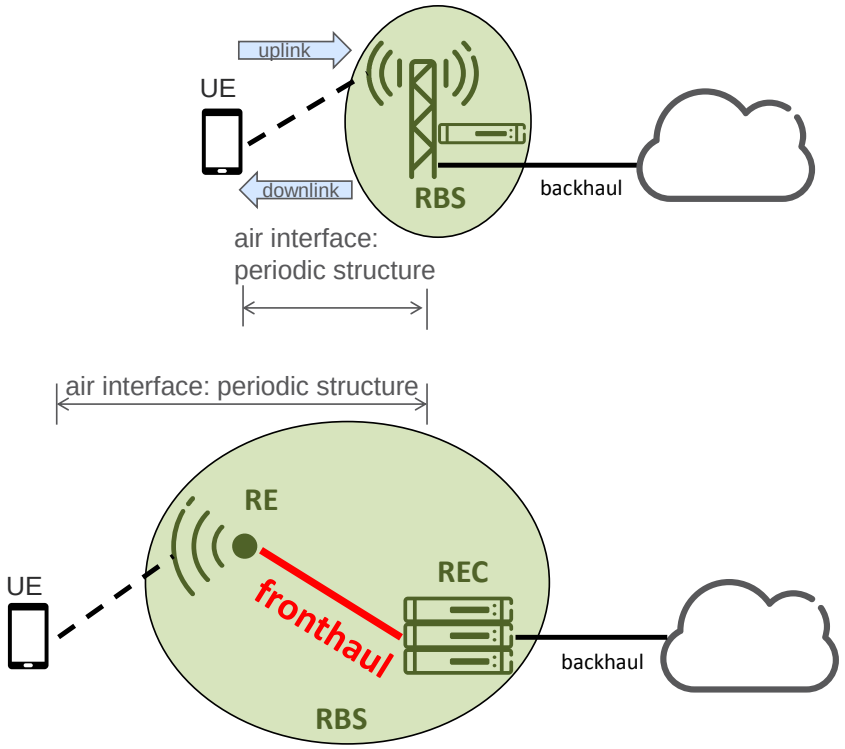
- Three traffic classes for fronthaul traffic
- Delay and loss requirements on all three fronthaul traffic classes
- More careful design needed for strict priority
  - Flow metering at ingress edge port to enforce traffic design is already there in the text, there may be updates for clarifications
  - Equations of Clause 7 still apply, explanation on queuing delay due to higher priority traffic can be added
  - Design for high priority already explained in Clause 8
  - Updates are required for medium and low priority in Clause 8
  - Example for queuing delay can be added to Annex B
- Only non-fronthaul data flows can be preemptable in case of Profile B

Background – E-UTRA fronthaul traffic is inherently periodic

› http://www.ieee802.org/1/files/public/docs2017/cm-farkas-eCPRI-support-0917-v01.pdf

Periodic Framing Structure on Radio Interface

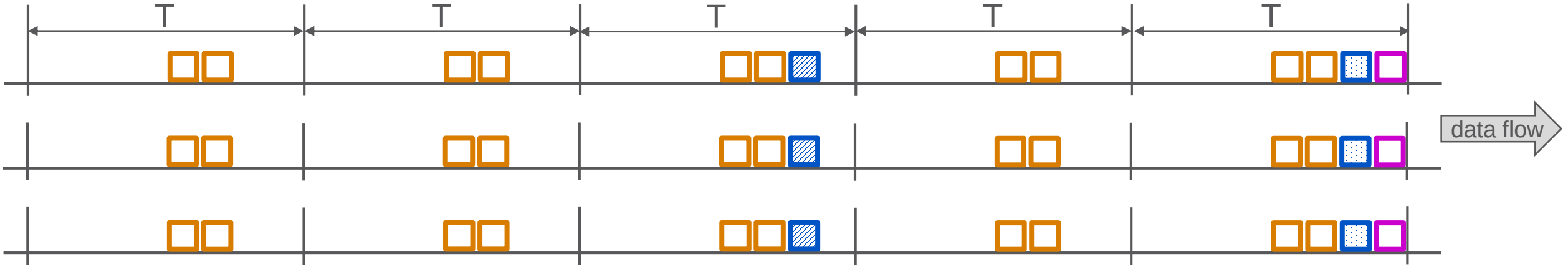
- Ultimately, the framing is periodic on the air interface, i.e., radio samples are periodic
- Air interface traffic samples transmitted via fronthaul
  - **Class 1**
    CPRI IQ data traffic is CBR, not correlated with the traffic of the User Equipment (UE)
  - **Class 2**
    User Data is correlated with UE traffic
    (e.g., (approximately) no data transmitted via fronthaul if UE does not transmit/receive data)

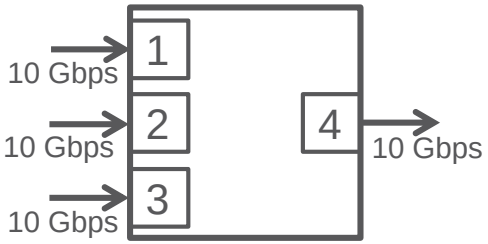


- Class 1
  - Same amount of data in each period, i.e., CBR
- Class 2
  - There can be periods with no data
- Approach chosen in September Interim
  - Treat Class 2 as if it was CBR
  - Empty periods can be used by non-fronthaul traffic

Strict priority example for three CBR flows

Traffic at the input ports (period = T):



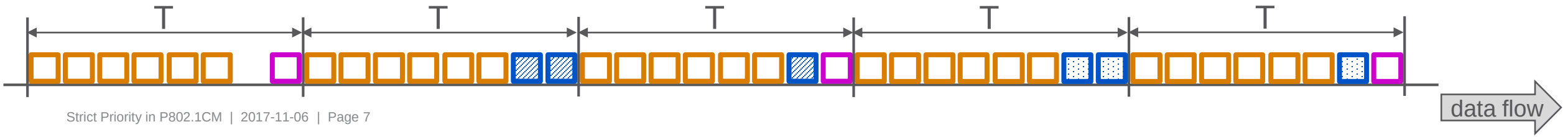


high priority

medium priority

low priority

Traffic at the output port (port 4):



Suggested updates

- 5.5
  - item b): replace “two” with “three”
- 7.2
  - Add queuing delay explanation for non-high priority traffic class
- 8.1 Profile A
  - Add description on medium and low priority traffic classes
- 8.2 Profile B
  - Update such that all fronthaul traffic is express, only non-fronthaul traffic is preemptable
- Annex B
  - Add example for the queuing delay of non-high priority traffic class along the one shown in previous slide