

3GPP TSG RAN Meeting#82  
Sorrento, Italy, December 10-13, 2018

RP-182575 

Agenda Item: 9.2.1  
Source: Ericsson  
Document for: Discussion, Decision

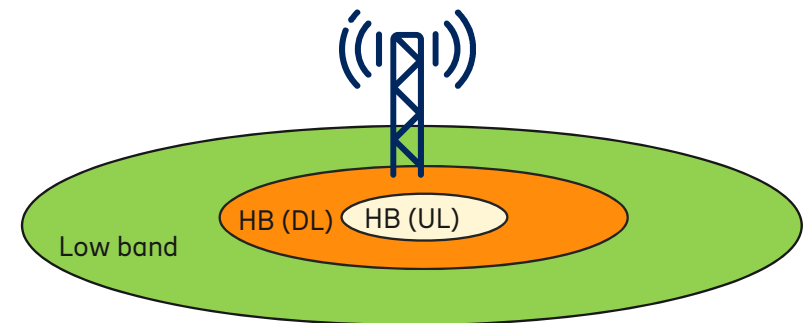
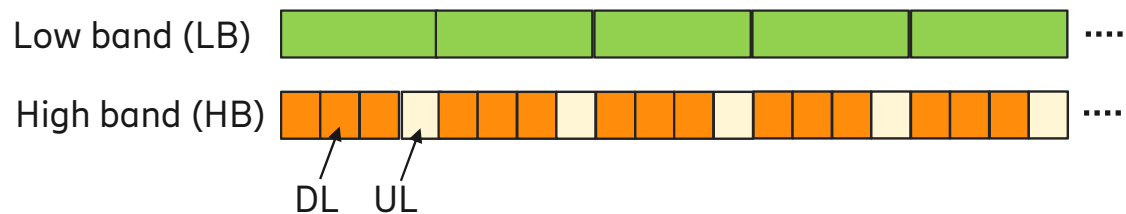
# Motivation for correction to aperiodic CSI-RS triggering with different numerology between PDCCH and CSI-RS

# Background



- In Inter-band CA between low band and high-band:
  - Channel measurements for high-band are crucial for meaningful DL throughput on high-band.
  - Uplink coverage in high-band is limited

For Inter-band CA operation between low band and high band, channel measurements on high-band should be reported via low band.



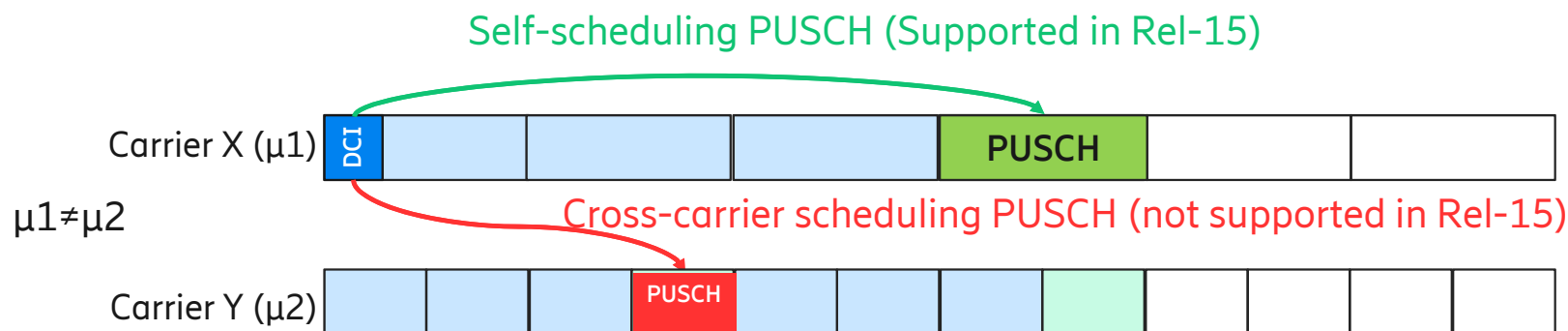
# Background



- Cross-carrier scheduling with mixed numerologies
  - At RAN plenary #81, cross-carrier scheduling with mixed numerologies was postponed to Rel-16 ([RP-182014](#))

[“Cross-carrier scheduling with different numerologies is postponed to Rel-16.](#)

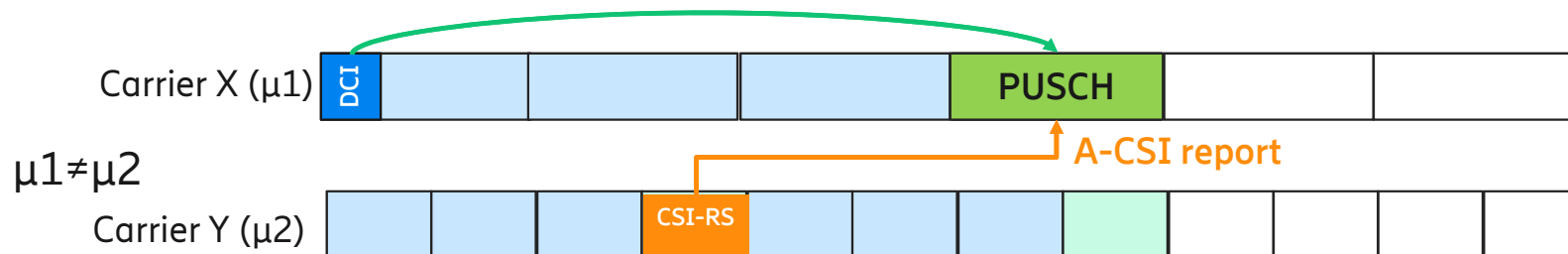
Already-agreed functionality for cross-carrier scheduling with different numerologies will not be removed from the Rel-15 specs, but will have a note added that the behaviour does not apply in this release.”



# Background



- In RAN1#92bis, open issues for CSI measurement for the following scenario were discussed:
  - DCI on Carrier X scheduling PUSCH on Carrier X with aperiodic CSI report for Carrier Y based on aperiodic CSI-RS

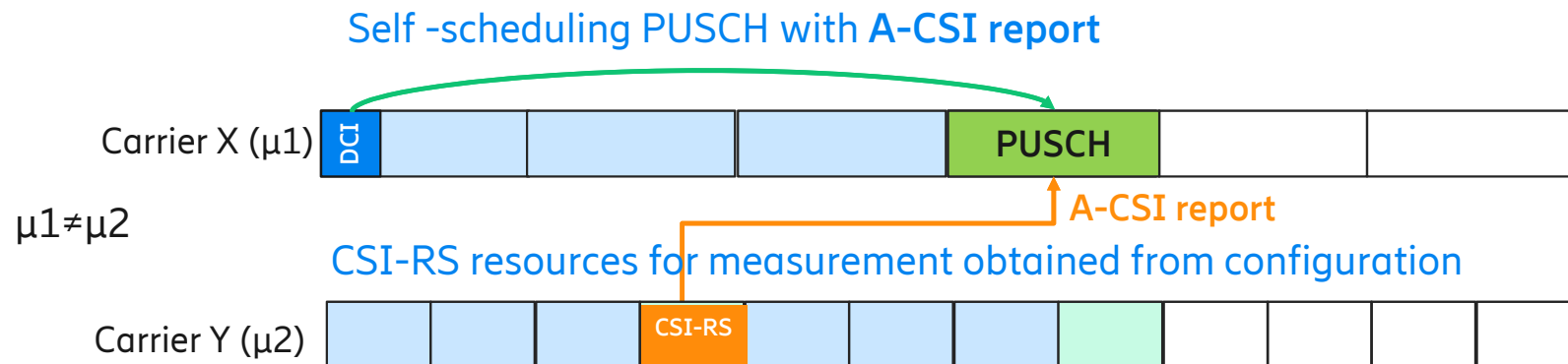


- In that discussion, the RAN plenary agreement was mis-interpreted due to the use of incorrect terminologies and incorrect association of measurement features to scheduling features
  - Triggering measurement resources on a different carrier was mis-interpreted as scheduling on a different carrier
- Hence, the following was concluded:
  - “Triggering A-CSI reports whose measurement resources are with different numerology from that with PDCCH is not supported in Rel-15.”

# Triggering and Scheduling Clarifications



- In this scenario, the DCI achieves the following
  - Self-carrier scheduling: DCI on Carrier X schedules PUSCH on Carrier X to carry “A-CSI report”
  - Triggering “A-CSI report”: Provides link to a CSI-RS configuration for measurements
    - Occasion of CSI-RS is obtained from the configuration (*DL BWP* and *Offset*)

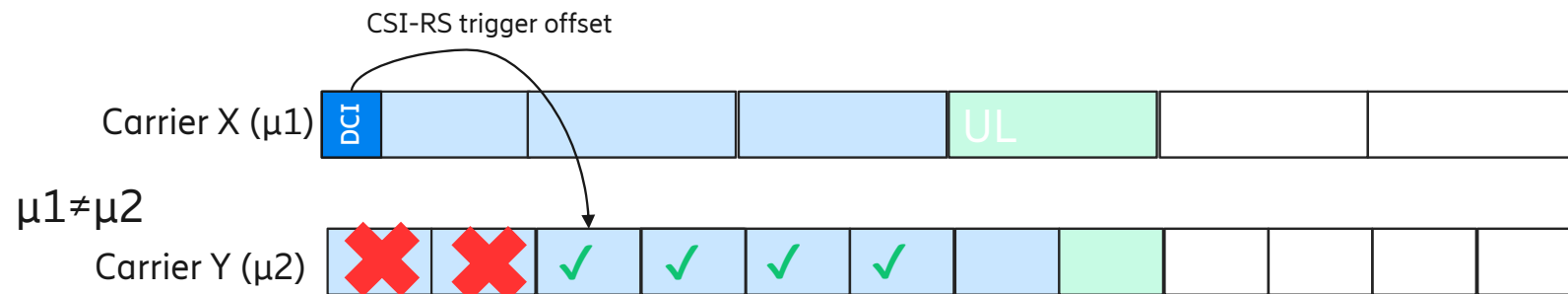


**This scenario does not involve “cross-carrier scheduling”**

# Limitations to avoid excessive UE buffering



- In order to not require UE to buffer data for slots in a higher numerology in anticipation of potential aperiodic CSI-RS trigger from a lower numerology, it is reasonable to limit possible CSI-RS triggering offsets to only occur later slots than the last slot overlapping the PDCCH slot



# Proposals



## Adopt the following proposals

- **Proposal:**

- Clarify that scheduling PUSCH on Carrier X carrying an aperiodic CSI report for Carrier Y with carriers X and Y having different numerologies is not considered cross-carrier scheduling
  - This feature should not be excluded from Rel-15.

- **Proposal:**

- Adopt the companion CR (RP-182574) aligning the procedure for determining CSI-RS resource for measurement with already existing behavior in Rel-15 (e.g. PDCCH and PUCCH with different numerologies)

# CR for Determination of CSI-RS Resource (RP-182574) ≡

- Determination of the CSI-RS resource needs clarification on the reference slot from which the slot offset obtained from CSI-RS configuration is to be applied
- The CR aligns the procedure for determining the reference slot with the already existing behaviour in Rel-15 (e.g. PDCCH and PUCCH with different numerologies)
  - The reference slot on the carrier with CSI-RS resources is the latest slot that overlaps with the slot containing DCI
  - The slot offset is based on the numerology of the carrier with CSI-RS
  - A non-zero slot offset is required if CSI-RS SCS > PDCCH SCS

