Dynamic spectrum sharing in Rel-17
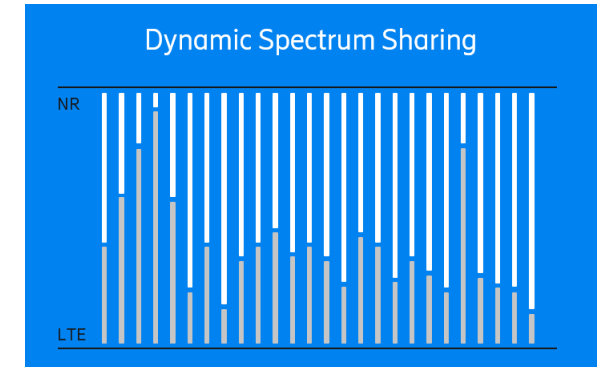
3GPP TSG RAN Meeting #84
Newport Beach, CA, USA
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Agenda Item: 8
Source: Ericsson
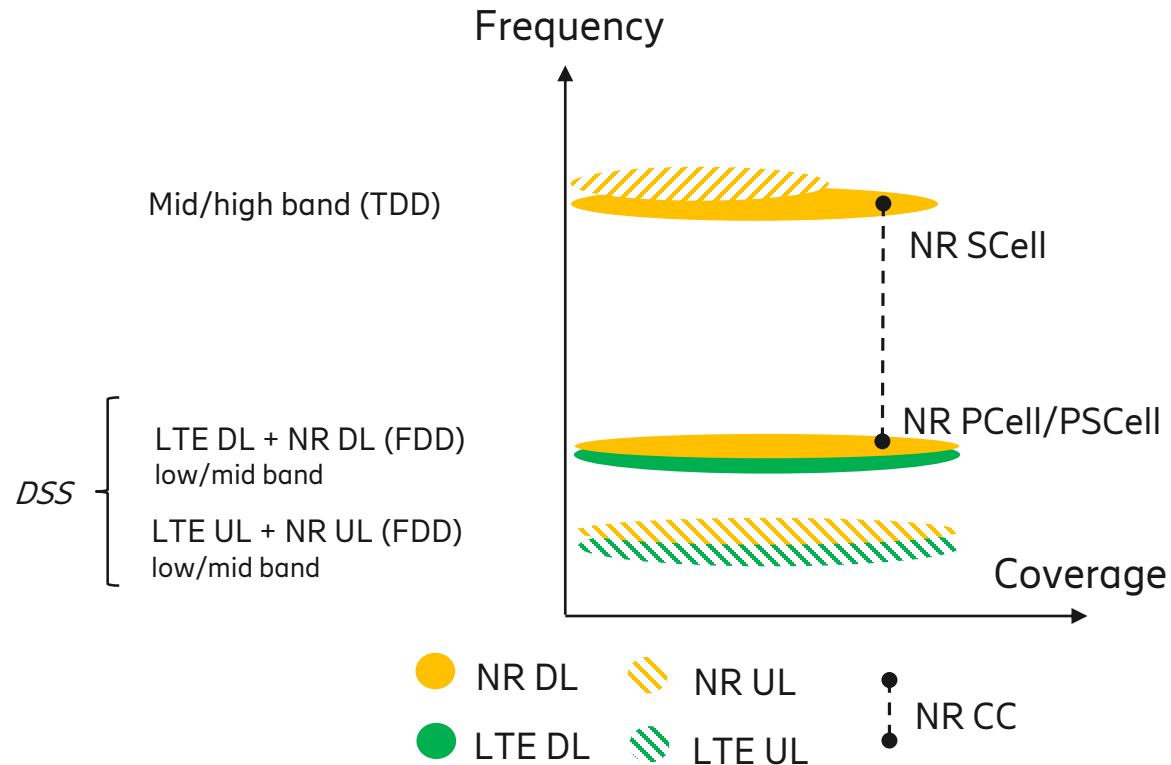Document for: information

Dynamic Spectrum Sharing (DSS)

— Features enabling Dynamic Spectrum Sharing (DSS) were introduced to enable LTE and NR in the same spectrum. With DSS, NR in LTE bands can efficiently share the same channel and dynamically allocate available resouces to NR and LTE on need basis.

— Status

— In Rel 15

— CRS rate matching for NR

— Moved DMRS position for Type A scheduling

— Flexible PDCCH symbol allocation for Type B scheduling

— In Rel 16, it is proposed to further improve DSS NR capacity, see [1]

— multiple *LTE-CRS-RateMatch* pattern per carrier
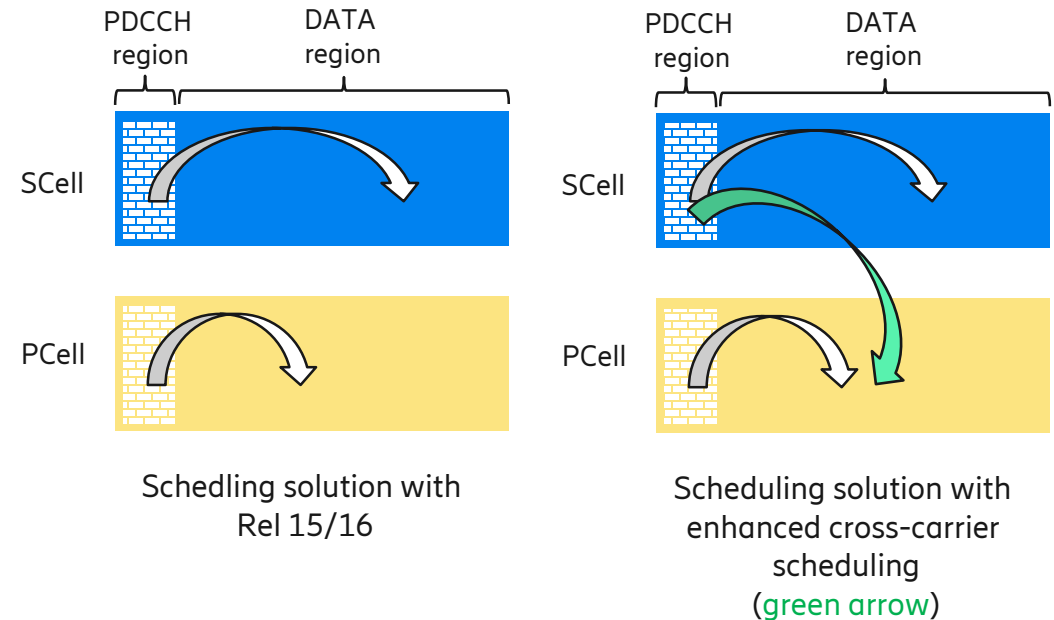
— additions to Type A and Type B PDSCH scheduling

[1] RP-191042, Enhancements for dynamic spectrum sharing in Rel-16, Ericsson, RAN #84, 3-6 June 2019

Offloading PDCCH

Frequency

Mid/high band (TDD)

NR SCell

DSS
- LTE DL + NR DL (FDD) low/mid band

NR PCell/PSCell

- LTE UL + NR UL (FDD) low/mid band

Coverage

- ● NR DL
- ⬤ LTE DL
- ▨ NR UL
- ▨ LTE UL
- ⋮ NR CC

— Rel15/Rel16 inter-band CA enables offloading of DL data to higher band in maximal coverage area.

— Offloading PCell/PSCell PDCCH by allowing PUSCH scheduling in the PCell/PSCell from the SCell is an interesting enhancement for Rel17.

  — This enhancement is especially useful when a single lower band PCell is used to extend the UL coverage of more than one higher band cell/TRP.

  — Note that this is relevant not only for DSS, but also for interband carrier agregation without DSS.

Cross carrier scheduling improvements

— Background
  — Cross-carrier scheduling already in Rel 15, but PDCCH on SCell not allowed to schedule PCell/PSCell

  — Cross-carrier scheduling for mixed numerology being added in Rel-16

— Proposal
  — Offload the PCell PDCCH
  — Enhanced cross-carrier scheduling; allow, in addition to self scheduling, also NR PDCCH on SCell to schedule NR data on PCell/PSCell.
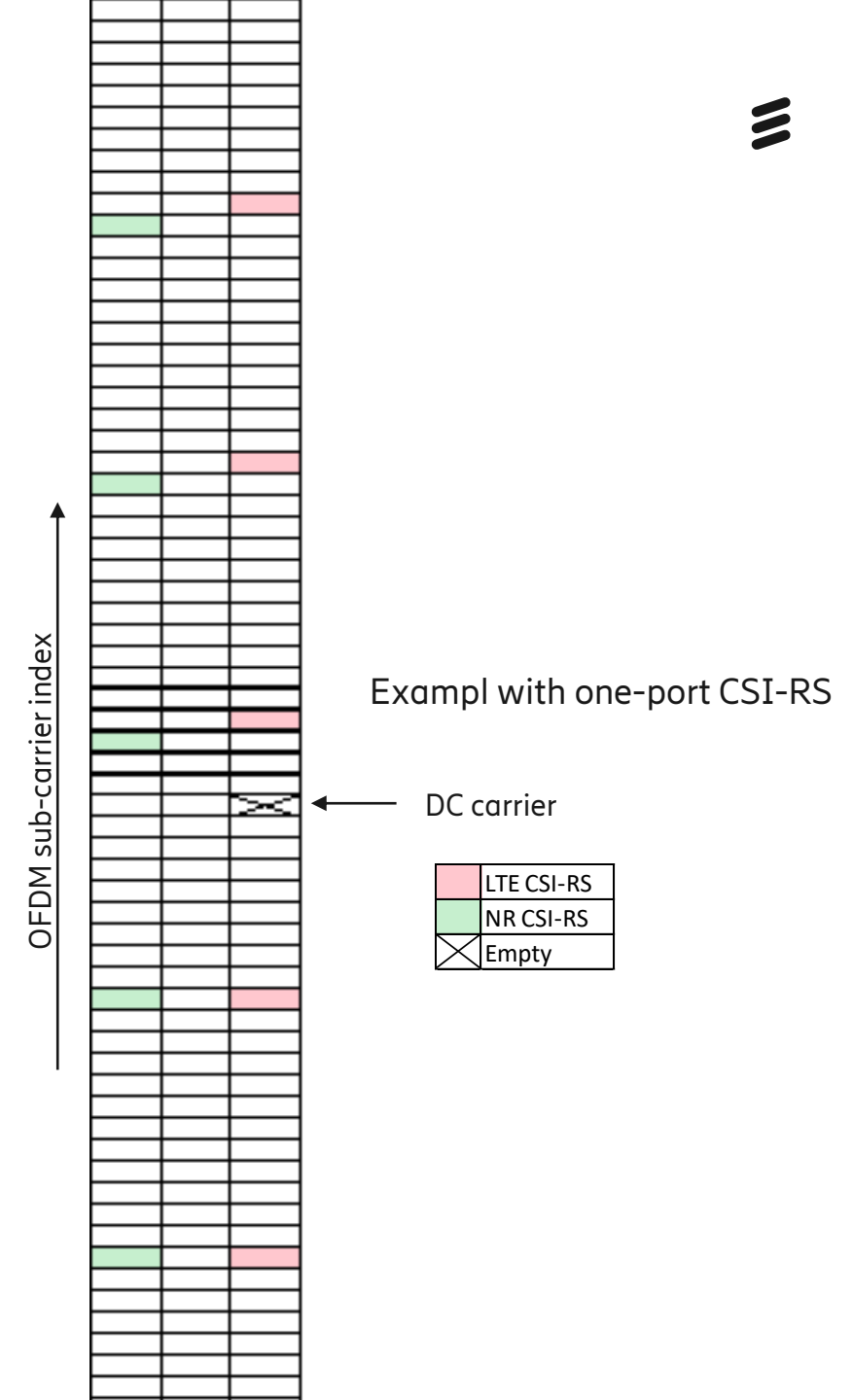
Schedling solution with Rel 15/16

Scheduling solution with enhanced cross-carrier scheduling (green arrow)

Usage of NR ZP-CSI-RS for rate matching of LTE CSI-RS

— Background

  — Due to that the handling of the DC carrier in LTE differes from how it is handled in NR, the NR ZP-CSI-RS can not be used to rate match around LTE CSI-RS in the complete channel BW.

  — Thus, there is a potential to further improve NR capacity by improving rate matching by adding configurations for NR ZP-CSI-RS to match LTE CSI-RS.

— Proposal

  — Add configurations for NR ZP-CSI-RS to match LTE CSI-RS.

  — Enable NR ZP-CSI-RS with single-RE comb on odd subcarriers

Exampl with one-port CSI-RS

DC carrier

▨	LTE CSI-RS
▨	NR CSI-RS
⊠	Empty

OFDM sub-carrier index

Proposals for enhancements in Rel-17

1. Enhanced cross carrier scheduling
   — Allow, in addition to self scheduling, also NR PDCCH on SCell to schedule NR data on PCell/PSCell

2. Enhanced NR ZP-CSI-RS to enable efficent rate matching of LTE CSI-RS