TSG RAN#60
Oranjestad, Aruba
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RP-130706

Title: Motivation document for Further LTE Carrier Aggregation Enhancements in Rel-12

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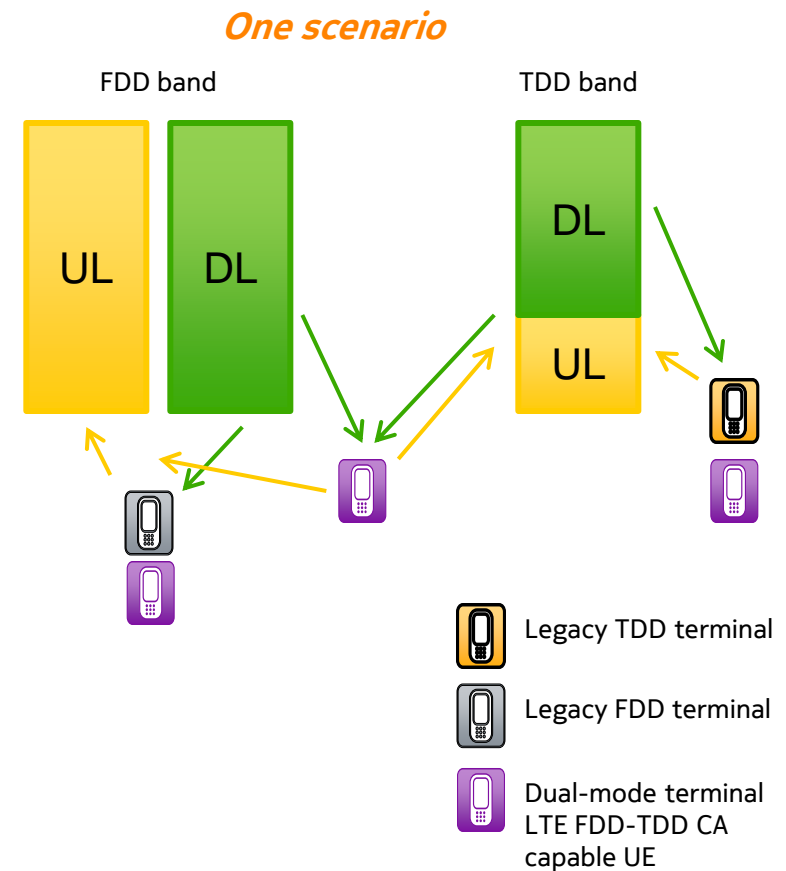
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LTE TDD-FDD CA

- The use of carrier aggregation (CA) offers means to increase typical and peak user throughputs for LTE TDD and FDD
- So far 3GPP RAN has developed specifications for intra-band contiguous, intra-band non-contiguous and inter-band CA
- Efficient spectrum usage and utilization of different technologies jointly are getting more and more important for the future LTE deployments in order to cope with increased throughput and capacity needs. Thus, we see increased need for supporting LTE Carrier Aggregation also between TDD and FDD bands and cells.

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LTE TDD-FDD CA

WI Assumptions for specification work:

- For the existing LTE CA scenarios in TS36.300

- Either FDD or TDD is Pcell

- Legacy FDD UEs may camp on FDD cell and be served by FDD cell if even LTE FDD-TDD CA is used

- Legacy TDD UEs may camp on TDD cell and be served by TDD cell if even LTE FDD-TDD CA is used

- Initially the work would focus on extending RAN1 and RAN2 specification to support LTE FDD-TDD CA

- Next under the same core work item RAN4 would define framework requirements for LTE FDD-TDD CA

- Only in the next phase, which probably means Rel-13, RAN4 would define band specific requirements for LTE FDD-TDD CA

One scenario

FDD band   TDD band

UL   DL   DL   UL

Legacy TDD terminal

Legacy FDD terminal

Dual-mode terminal
LTE FDD-TDD CA
capable UE

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UCI Enhancements

- In the CA deployment scenario#4, PCell can be served by the macro cell layer as much as possible. In this operation, the following benefits can be observed:
- Installation of the small equipment like RRH, in an easy manner, e.g., with the sub-optimized parameters HO parameter, antenna tilt, transmission power and RACH parameters, etc
  - the actual deployment can be relaxed reducing the cost and/or facilitating faster deployments,
- Higher QoS services will be served by the macro cell coverage tuned sensibly

UCI Enhancements cont.

- If the number of CA capable UEs and/or the aggregated CCs is increased, the cell used as PCell will be loaded.
- The Uplink Control Information (UCI) currently only possible with PCell
  - The scenarios where the SCell is implemented with the RRH causes shortage of the UCI resources if only possible on the PCell
  - Alternative solution for this load issue would to make the RRH based cell as the PCell but it would create lot of handovers and related signaling and therefore not attractive solution
- We see that for timely rel-12 introduction of UCI on SCell it would be good to start the work for the existing CA scenario 4 first

Non-contiguous intra-band 2UL CA

- RAN4 framework requirements for non-contiguous intra-band CA with 1 UL are defined in Release 11 under the LTE CA enhancement WID.
- The framework requirements for non-contiguous intra-band CA with 2ULs have been postponed to release 12.
- RAN4 framework requirements are utilized when developing different band specific requirements based on the work done for the framework requirements.
- After deploying 2 DL CA with 1 UL on the field CA deployments are expected to move towards 2UL deployments. Therefore, we see that it would be good to continue work on non-contiguous intra-band CA for 2 UL support.

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Two alternative approaches for continuing CA enhancements in Rel-12 is provided for RAN#60 discussion and decision:

Alternative A "one WI approach"

- RP-130705, New WI: Further LTE Carrier Aggregation Enhancements - RAN1 lead
- Consists of the following components:
  - LTE TDD-FDD CA
  - UCI Enhancements
  - 2UL non-contiguous CA frame work requirements

Alternative B "separate WI approach"

- RP-130707, New WI: LTE TDD-FDD Carrier Aggregation - RAN1 lead
- RP-130708, New WI: UCI Enhancements for LTE Carrier Aggregation - RAN1 lead
- RP-130709, New WI: 2UL non-contiguous intra-band CA frame-work requirements - RAN4 lead

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Thank You!