3GPP RAN Rel-19 Workshop RWS-230180

June 15th-16th, 2023, Taipei, Taiwan

Agenda Item: 5

Network Energy Savings

Qualcomm Incorporated

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On-demand SSB/SIB1

- Intra-band CA with SSB-less carriers was supported in R15 for both FR1 and FR2
- Inter-band CA with SSB-less carriers is being discussed in R18 for FR1 only
  - Feasibility requirements on co-location, MRTD and band combination make the feature applicable to some limited deployments
  - Extending the feature to FR2 is challenging due to beam management operation.

- Introduction of discovery reference signal (DRS) and on-demand SSB in CA operation
  - DRS (e.g., simplified SSB) for RRM measurement while on-demand SSB for T/F sync and multi-beam operation
  - Cover scenarios in which CA with SSB-less carriers is not feasible
  - May help extending inter-band CA with SSB-less carriers to FR2
- DRS and/or on-demand SSB/SIB1 for operation in Idle/Inactive state needs further study
  - Non-backward compatible and very limited study during R18 study item

- **Proposal 1: Specify necessary enhancements to support DRS and/or on-demand SSB in secondary cell(s) in CA or neighboring cell(s) for RRM in Connected state.**
  - **FFS: whether on-demand SSB is triggered by an uplink signal from UE or by NW coordination**
- **Proposal 2: Further study whether DRS and/or on-demand SSB/SIB1 can be used for UE operation (e.g., cell reselection) in Idle/Inactive state.**

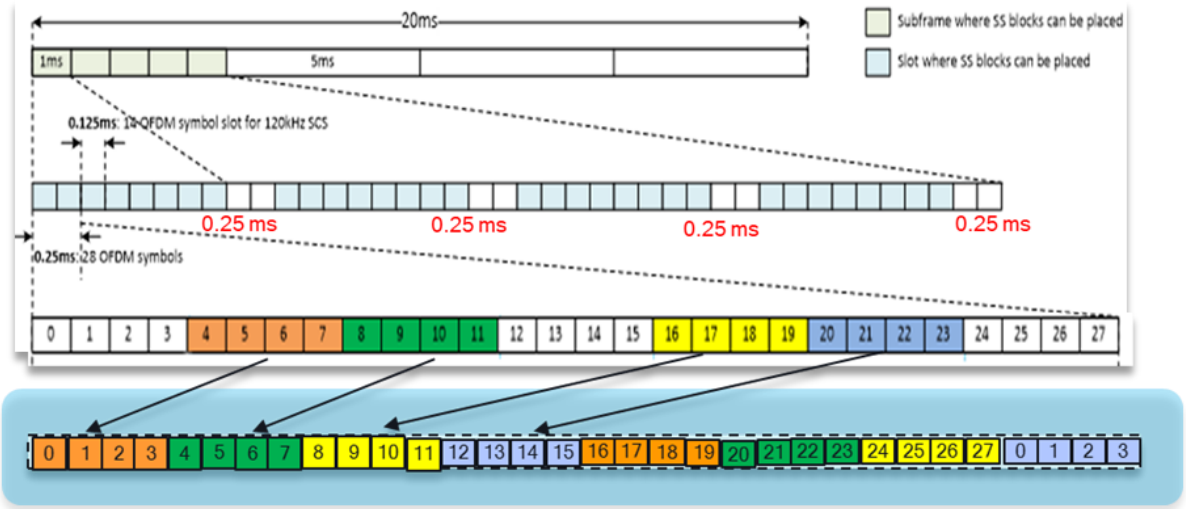
Beam-Specific Broadcast Configuration

- The following features are supported in 3GPP specification
  - Beam-level activation/deactivation
  - PDSCH transmission power adaptation
  - Power configuration for common channels (SSB, PRACH) is uniform across beams.
- Non-uniform spatial coverage is typical in practical deployments especially in FR2.
- NW may also desire to create non-uniform spatial coverage not only by beam-level (de)activation but also by adapting transmission power per beam.

- **Proposal 3: Support beam-specific SSB power configuration (e.g., *ss-PBCH-BlockPower* and/or *rsrp-ThresholdSSB* in RACH configuration) which is semi-statically configured to the UEs.**

- Benefit of the proposal
  - NW can non-uniformly transmit SSB power in different directions, which enables NW power savings and creates non-uniform spatial coverage.
  - NW can configure different SSB RSRP thresholds for different directions for UEs to select SSB for PRACH transmission to create non-uniform spatial coverage.

Compact SSB Pattern in FR2



- Legacy SSB patterns are defined with some time gap between consecutive SSBs to accommodate control and data scheduling
- For no or low load scenarios, such time gaps may not be needed in FR2 (no coexistence with LTE is needed). More compact SSB pattern with less time gap would be more NW energy efficient.
- **Proposal 4: Support compact SSB pattern in FR2**
  - **Secondary cell(s) in CA or neighboring cell(s) for RRM in Connected Mode**
  - **FFS: Idle/inactive state operation in band(s) without legacy UEs.**

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Thank you

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