



3GPP TSG RAN Meeting #84

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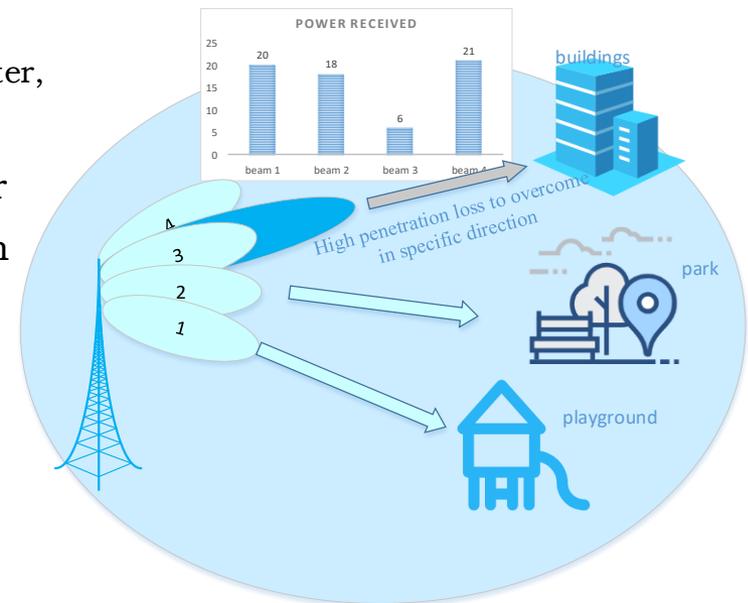
Newport Beach, USA, June 3-6, 2019

Agenda Item: 8

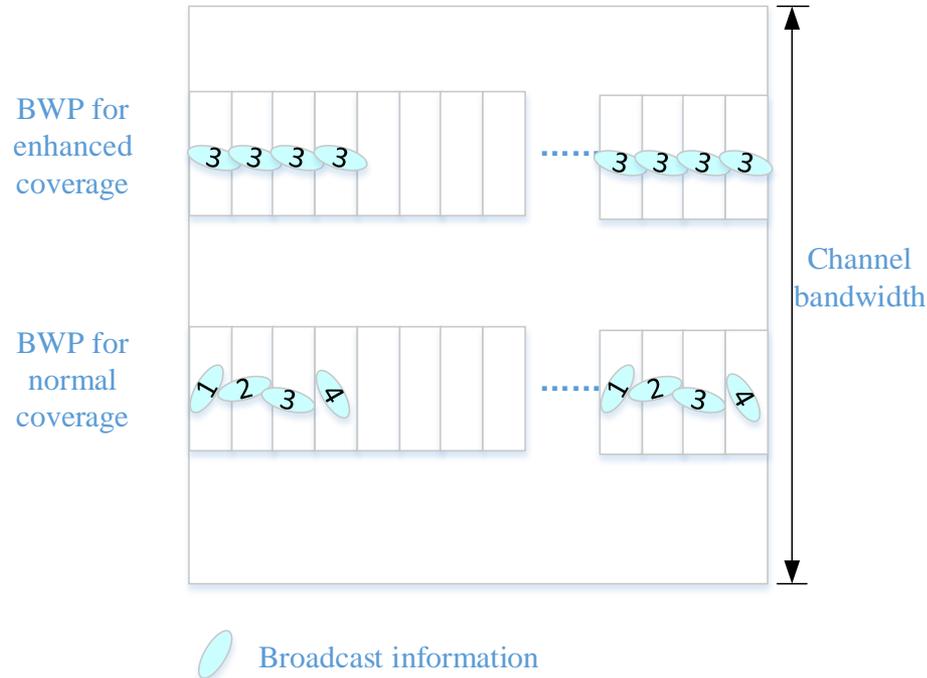
Discussion on the necessity of hierarchical coverage design in NR

CMCC

- Considering joint solution for supporting comprehensive coverage and NR mMTC-like application, which will facilitate NR to provide different coverage levels in a carrier/cell while supporting NR mMTC-like deployment with low cost and simplicity by nature
- With above facility, the following two applications can be simultaneously fulfilled well in a single design
 - Application 1: Coverage holes in some direction(s) are observed while most parts in the planed range are covered by a cell
 - Obstacles or high penetration loss in specific direction, resulting poor coverage in the corresponding direction
 - To fix this kind of coverage hole by introducing Repeater, Relay or even an additional cell?
 - Application 2: Support mMTC-like UE with deeper coverage with medium throughput (eventually with low complexity/bandwidth capability)
 - The capacity expansion should be easier than existing IoT solutions.
 - How to realize the throughput requirement while keep low complexity?



- **Hierarchical coverage design of NR**
 - Maximal reusing existing mechanisms and structures for initial access in R15 NR as much as possible
 - Enjoy cost reduction of devices by large scale deployment of NR;
 - Reduce specification work load by reuse NR framework.
 - Support accumulation detection of certain directional SSB on one BWP in a duration, with different directional SSBs configured on different BWPs
 - Easy to expand capacity
 - Easy to satisfy dynamic throughput range.



- Study and identify the mechanism for supporting different accumulation level of SSB, and identify the MCL of corresponding accumulated SSB as reference for other channels coverage enhancement. [RAN1]
- Identify the design of channel/signals for supporting hierarchical coverage enhancement, which includes the channel/signals structure, and the information it conveys. Identify techniques for hierarchical coverage enhancement in RRC_IDLE, RRC_CONNECTED, and RRC_INACTIVE modes[RAN1/2/4]
 - Study the initial access channels enhancement including SIBs, PRACH, etc. and the associated procedures enhancement.
 - Study the physical control channel and physical shared channel enhancement for hierarchical coverage.
- Study and identify the mechanisms for supporting intra-cell switch between normal SSB and accumulated SSB [RAN1/2/4]
 - Study measurement and report configurations;
 - Study procedure for switch between beams of different coverage levels inside the cell, and hence inter-cell.
- Study and identify the mechanism for support inter-cell switch between hierarchical cells [RAN1/2/4]
 - Study measurement and report configurations.
- Study the UE capability for support deeper coverage and medium throughput.

Thank you!