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# LAA

## 15th meeting of the Community of practice on Cognitive Radio



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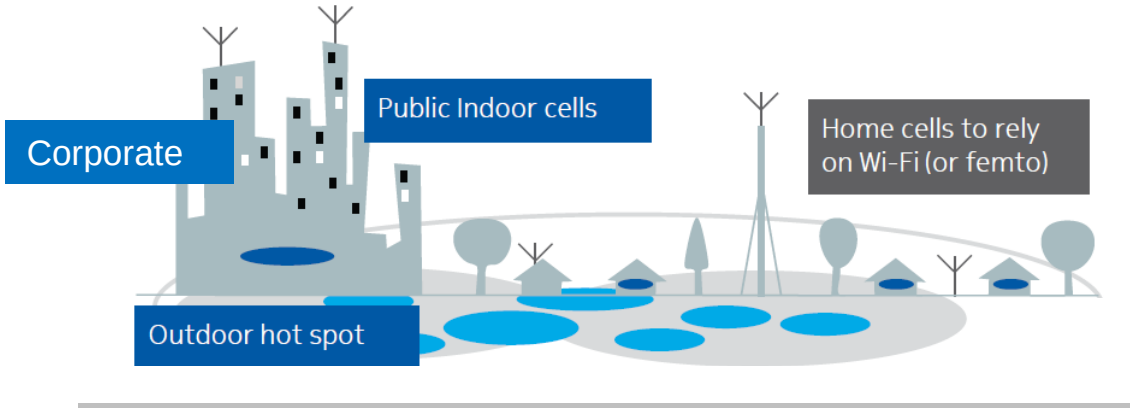
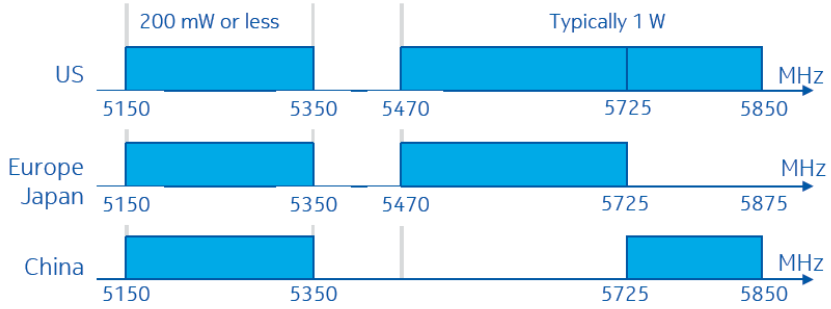
# LTE-u / LAA: Band available and typical use cases

**Use Cases:**
LTE-u has been considered for places where there is coverage LTE but where additional capacity would be beneficial. LTE-u is not a standalone system and not considered for residential/home environments,(Femto or own Wi-Fi). Another typical use case is the corporate segment, that will benefit from the higher capacity of LTE radio technology.




**5GHz Spectrum:**
The lower portion is often restricted to indoor use, with a transmit power below 200 mW
Upper part of the spectrum allows higher transmission power, typically 1 W (depend from country regulation).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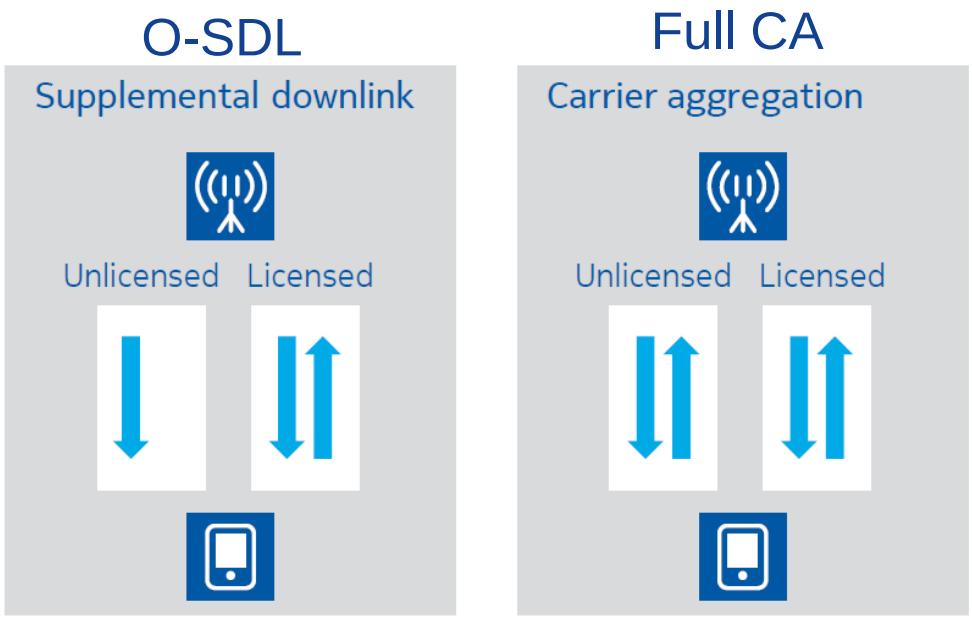
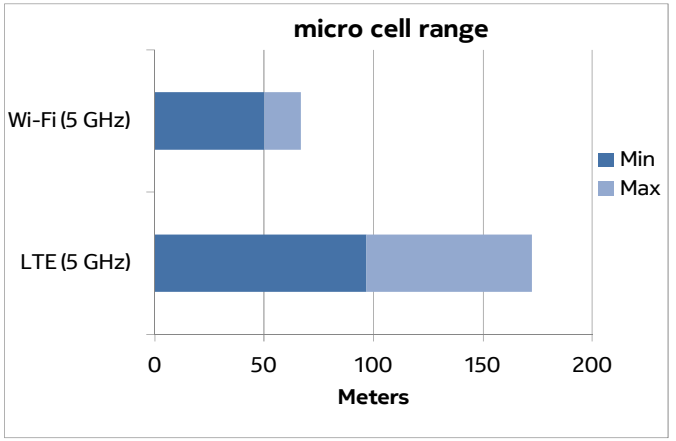
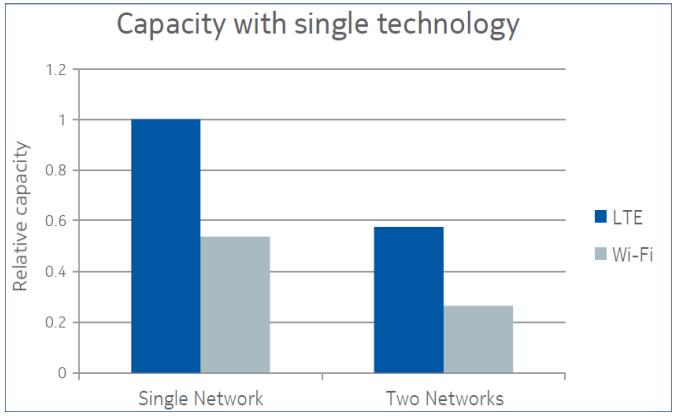
# LTE-u/ LAA: Mode of operation




The specification support for LAA may be phased in such a way that only downlink aggregation with 5 GHz band will supported in Release 13, with Release 14 supporting the full TDD operation.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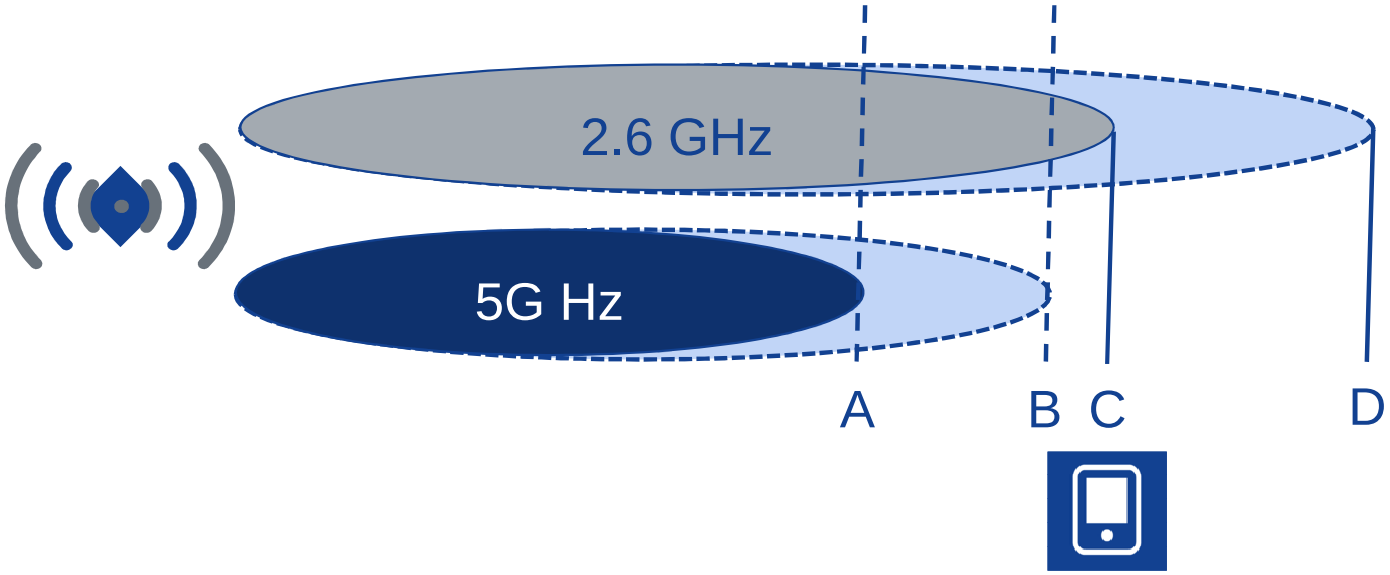
# Cell range and CA consideration




A: Uplink reach and Cell range in case of CA with Pcell 5GHz
B: Downlink Reach and Cell range in case of CA with Pcell 2.6GHz
C: Uplink reach and Cell Range on 2.6 GHz
D: Reach of Downlink signal at 2.6GHz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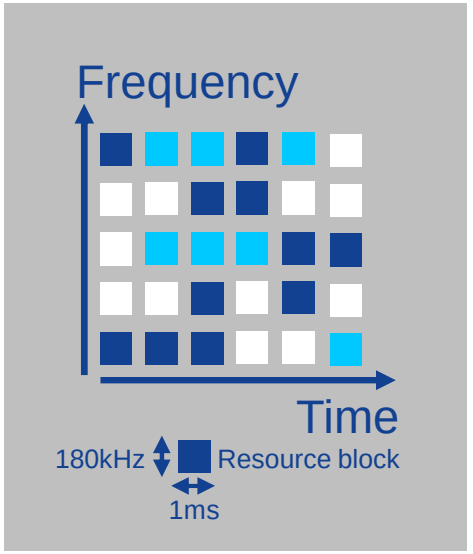
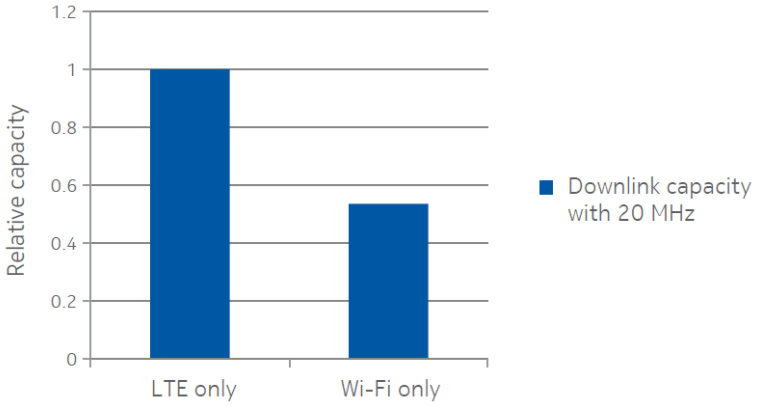
# LTE-u/LAA: Capacity consideration

## Scheduling in LTE (simplified)


## Downlink capacity with 20 MHz




**What is a scheduler?**

✓ The scheduler is the **software** within an eNodeB, which allocates the spectrum resources each millisecond to the users in a cell

**Why is it relevant?**

✓ The scheduler has a direct impact on **throughput** and **latency**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# LAA simulation


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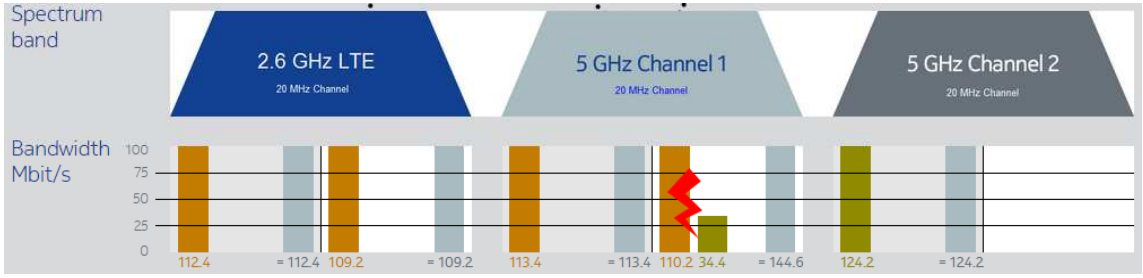
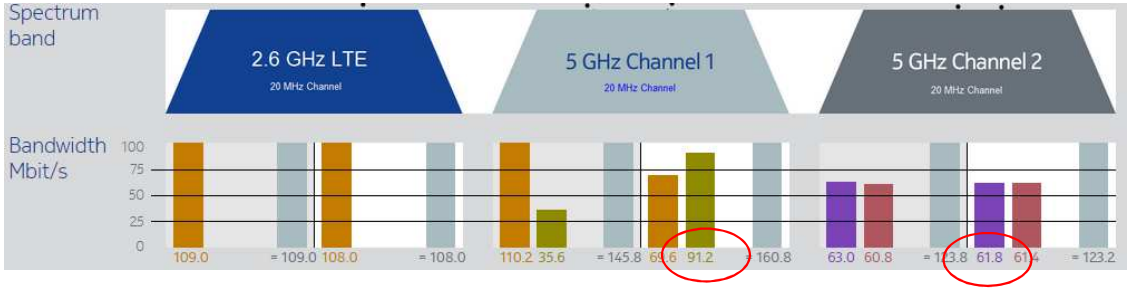
# LTE-u/ LAA: Simulation results

LTE vs WiFi
Multiuser
-Own channels


LTE and WiFi
-Channel conflict




LTE and WiFi
Channel conflict
-LBT in use





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