3GPP TSG RAN4#110
Athens, Greece, February 26 – March 1, 2024

R4-2401143

Rel-19 proposal for FR2 UE with multi-Rx/STxMP

Agenda: 15
Source: Samsung, Verizon, Tellus, Rogers, KT
Document for : Information

Motivation for FR2 UE with multi-Rx/STxMP

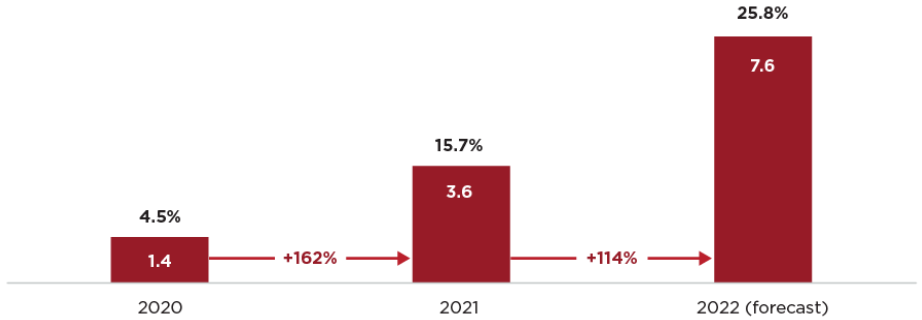
NR operation on mmWave bands (FR2) can achieve high data rate with large BW (10x compared to sub-6GHz FR1). On the other hand, coverage become the major shortage due to FR2 propagation characteristics with large loss.

According to GSA survey [1], the most attractive device type in FR2 commercial deployment is FWA (fixed wireless access) which can overcome the shortage of FR2 with low mobility and higher power.

Supporting intra-band CA (DL only) and equipped with multi-panels for simultaneously transmission and reception for FWA devices can enhance broadband service on FR2 as the limitation on power consumption and form factors can be eased compared to hand-held device types.

The GSMA report, *5G mmWave Deployment Best Practices [1],* indicated: *"There has been solid growth in the number of mmWave devices coming to the market in the past 24 months, with 854 devices from 52 companies.* ***In the short-term, the key growth engine for mmWave CPE will be FWA. The Global mobile Suppliers Association (GSA) forecasts that in 2022, aggregate shipments of FWA CPE devices will grow 33%, resulting in 21.9 million units higher than the 2020 volumes."***

Figure 31 in [1]: Shipments of 5G FWA Devices
(millions of units, and as a percentage of total shipments)



[1] GSMA report: 5G mmWave Deployment Best Practices
(https://www.gsma.com/futurenetworks/resources/5g-mmwave-deployment-best-practices-whitepaper/)

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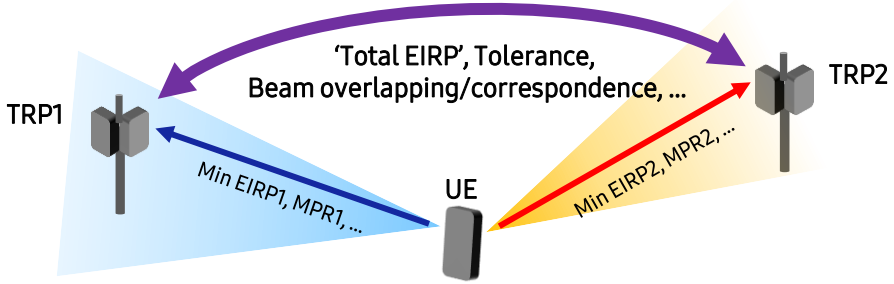
FR2 UE with STxMP for non-handheld UE

Essential to continue study based on practical RF/RRM impact of STxMP

Justification

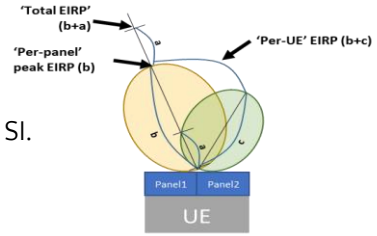
- In addition to the enhanced feature of DL multi-TRP/panel operation (Rel-16), and UL panel selection scheme (Rel-17), a support of simultaneous transmission with multi-panels (STxMP) was introduced in Rel-18 MIMO WI, which can provide benefits of higher UL coverage and average throughput for advanced UEs in FR2 (e.g. CPE, FWA, vehicle, industrial devices)



- However, other than the least requirements for STxMP scenario, no other detailed requirement could be specified as it needs extensive RAN4 studies for the simultaneous transmission
- Therefore, it is important to continue RAN4 discussion to specify corresponding requirements for mAoD transmission.

Potential objectives

- UE requirements to support single carrier STxMP operation assuming limit to 2 TRPs and single panel/module per TRP [RAN4]
  - UE RF requirements for simultaneous transmission to multi directions/TRPs
    - Power related requirements including minimum peak EIRP, BC, MPR/A-MPR/P-MPR considering regulatory requirements
    - Other UE RF requirements are not precluded
  - RRM requirements
    - Unified TCI state switching and others if identified
- New OTA test method considering simultaneous transmission
  - Multiple beam peak search



Note: Targeting CPE/FWA/vehicle/industrial devices
Note: OTA test method can be handled under separate FR2 test SI.

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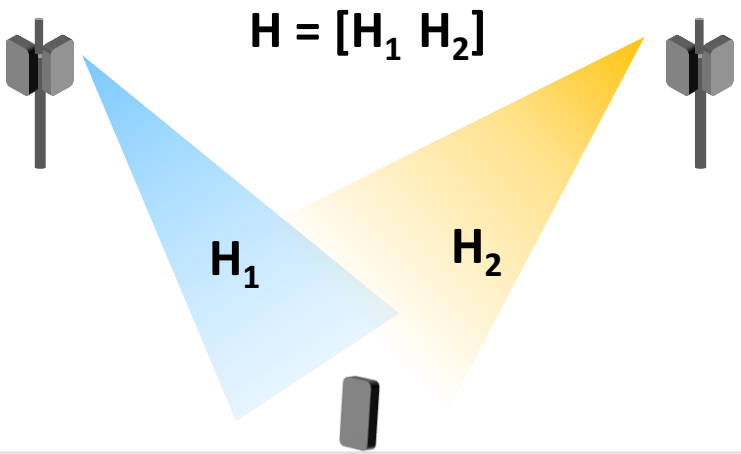
FR2 UE with multi-Rx chain

Requirement enhancement for FR2 UE with multi-Rx chain

Justification

- Rel-18 FR2 Multi-Rx WI only focused on L1 measurement delay reduction for FR2-1 UE with simultaneous DL reception from different directions (AoAs). Further enhanced requirements can be considered for FR2 which Supports simultaneous reception with different QCL Type-D RSs.
- Rel-18 FR2 Multi-Rx WI only focused on single carrier case. The extension to CA case can be considered per the request from operators.



Potential objectives

- UE requirements for for FR2-1 UE which supports simultaneous reception with different QCL Type-D RSs
  - Study and if identified specify enhanced FR2-1 L3 RRM measurement requirements [RAN4]
    - Scheduling/measurement restrictions
    - L3 measurement delay
  - Specify RF, RRM and demodulation requirements for intra-band DL CA [RAN4]

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