

**Agenda item:** 7.3.5.1  
**Source:** KT Corp.  
**Title:** Scenarios on Above 6GHz Channel Modelling  
**Document for:** Discussion and Decision

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## 1. Introduction

A study item ‘Study on channel model for frequency spectrum above 6GHz’ was approved in RAN #69 meeting [1]. According to the study item description in [2], RAN1 will develop a channel model(s) for frequencies up to 100 GHz taking into account the outcome of RAN-level discussion and discussion in the ‘5G’ requirement study item. In RAN-level discussion [3], the following six key scenarios were identified

- (1) UMi (Street canyon, open area) with O2O and O2I
- (2) UMa with O2O and O2I
- (3) Indoor
- (4) Backhaul, including outdoor above roof top backhaul in urban area and street canyon scenario where small cell BSs are placed at lamp posts.
- (5) Device-to-device access in open area, street canyon, and indoor scenarios. V2V is a special case where the devices are mobile.
- (6) Other scenarios such as Stadium (open-roof) and Gym (close-roof).

In 5G requirement study item, detailed attributes for indoor hotspot, dense urban, rural, and urban macro scenarios were discussed [4]. In this contribution, KT’s prioritization on the identified scenarios and additional details are presented.

## 2. Discussion on Scenarios

Well-known properties of high frequency band such as around 30GHz which is an initial target frequency for 5G eMBB deployment in KT’s perspective are as follows:

- Large available bandwidth of up to GHz
- Large path-loss due to effects such as free-space loss, refraction, diffraction, reflection, aperture-medium coupling loss, and absorption

The above first property, i.e. large available bandwidth, of such high frequency band could provide capability of a big data pipe to deal with large traffic demands in dense areas. On the other hand, the second property, large path-loss, would cause difficulty to handle large coverage areas. Due to such properties, in our view, the key scenarios for above 6GHz channel modelling should be on small coverage areas with large capacity demands by dense active users. Therefore, the following scenarios should have the first priority for above 6GHz channel modelling:

- (1) **UMi (Street canyon, open area):** The base stations are located below rooftop levels of surrounding buildings. UMi open area is intended to capture real-life scenarios such as a city or station square. The width of the typical open area is in the order of 50 to 100 m. Since the base station which would be located outdoor in this scenario could serve both indoor and outdoor UEs, O2I should be taken into account in addition to O2O.

- (2) **Scenarios such as Stadium (open-roof) and Gym (close-roof):** Potentially more than hundred thousand users could be located in one stadium or gym in case of popular events such as Olympic and Baseball games. In this case, Traffic demands are in the order of hundreds of GB per hour during the event. This scenario could be categorized as outdoor scenario.
- (3) **Indoor hotspot:** This scenario includes various typical indoor deployment scenarios such as office environments, and shopping malls. The typical office environment is comprised of open cubicle areas, walled offices, open areas, corridors etc. The base stations are mounted at a height of 2-3 m either on the ceilings or walls. The shopping malls are often 1-5 stories high and may include an open area shared by several floors.

>6GHz new RAT in rural and urban macro scenarios could be deployed in practice after deployment on the above prioritized scenarios, when taking into account the required traffic demand and the properties of high frequency band. In addition, D2D and V2V would normally be serviced first in sub 6GHz frequency bands. Therefore, above 6GHz channel modelling on rural, urban macro, D2D, and V2V scenarios would not need to be prioritized.

### 3. Conclusion

Having discussed above, it is proposed that:

**Proposal: Prioritize the following three scenarios for above 6GHz channel modelling:**

- *UMi (Street canyon, open area)*
- *Scenarios such as Stadium (open-roof) and Gym (close-roof)*
- *Indoor hotspot*

### 4. References

- [1] Report of 3GPP TSG RAN meeting #69
- [2] RP-152257, "New Study Item Proposal: Study on channel model for frequency spectrum above 6 GHz", CMCC, 3GPP TSG RAN meeting #69
- [3] RP-152212, "Report of RAN email discussion about >6GHz channel modelling", Samsung, 3GPP TSG RAN meeting #70
- [4] RPa160077, "Text proposal to TR 38.913 on "Study item on scenarios and requirements for next generation access technologies"", CMCC, TSG RAN ad hoc new generation access.