

**3GPP TSG RAN Meeting #68**  
**Malmö, Sweden, 15 – 18 June 2015**

***RP-150782***

Agenda Item: 13.1.1

# **Motivation for study on channel model for frequency spectrum above 6 GHz**

**Samsung**

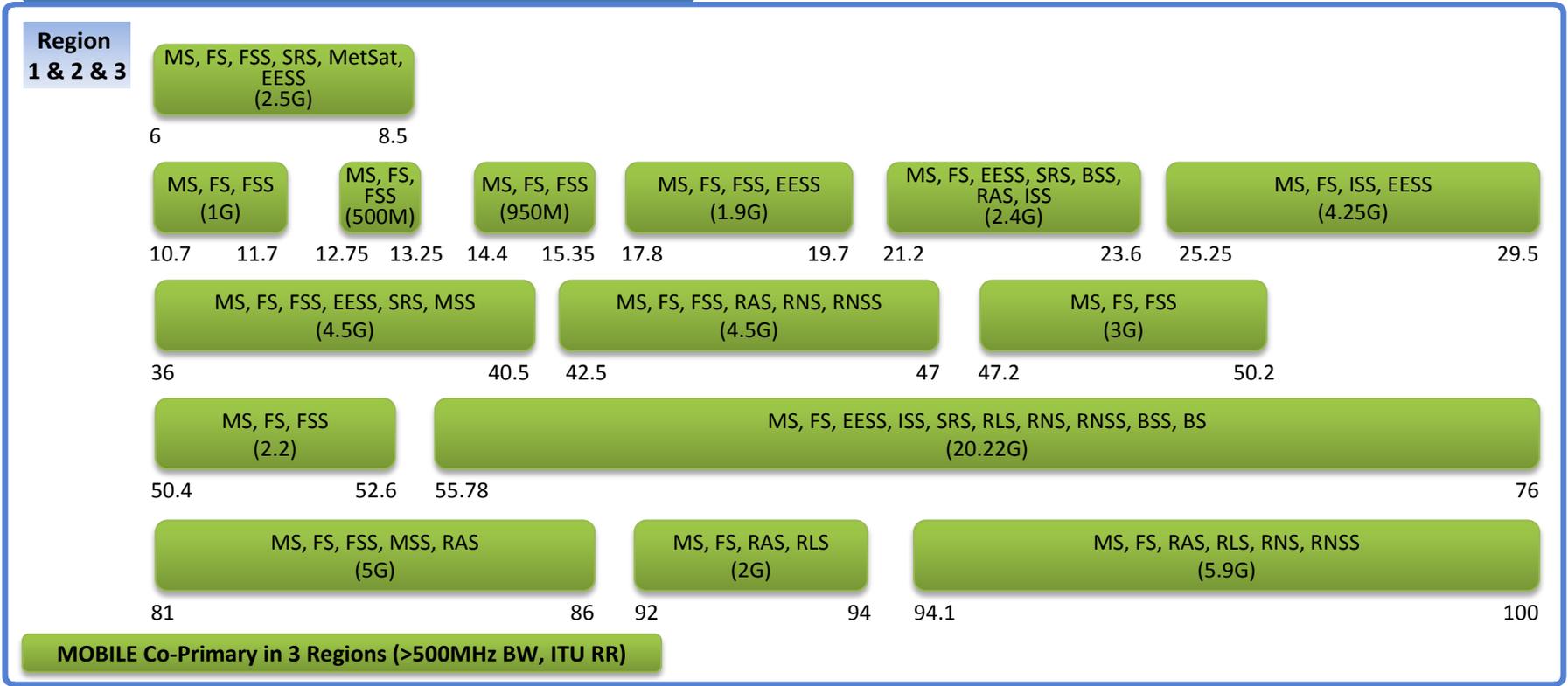
# Possibility in Frequency Bands above 6GHz



➤ Possible to find large chunks of contiguous spectrum of > 500MHz bandwidth

## Higher Frequency Candidates

※ The following figure does not show current usages in each region/country.



MS : Mobile Service    FSS : Fixed Satellite Service    LMDS : Local Multipoint Distribution Service    FS : Fixed Service    P-P : Point to Point    S-E : Space to Earth    E-S : Earth to Space    ISS : Inter-Satellite Service  
 RAS : Radio Astronomy Service    SRS : Space Research Service    EESS : Earth Exploration Satellite Service    MSS : Mobile Satellite Service    RNS : RadioNavigation Service    RNSS : RadioNavigation Satellite Service  
 RLS : RadioLocation Service    BS : Broadcasting Service    BSS : Broadcasting Satellite Service    MetSat : Meteorological Satellite Service

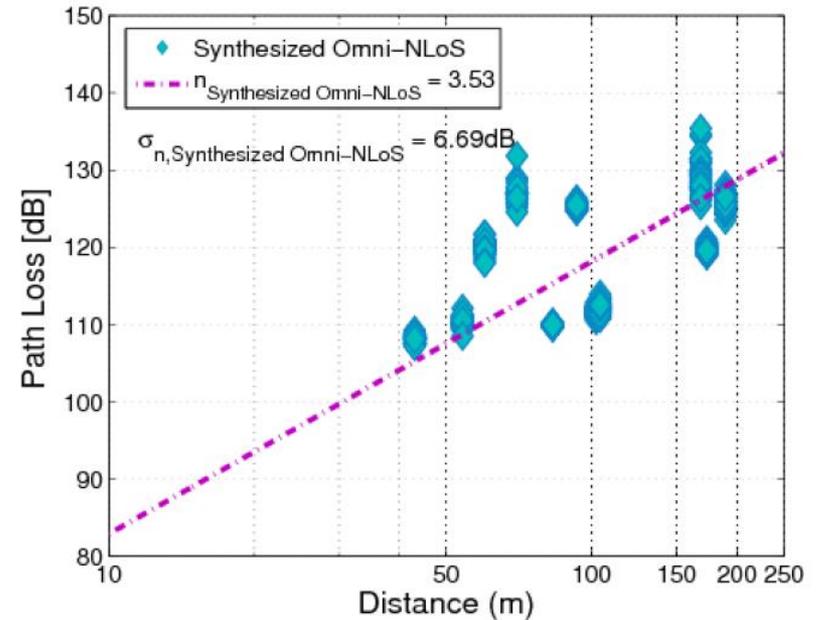
# Channel Measurement Examples

- ✦ Path loss exponent of 3.53 for 28GHz band observed in typical outdoor urban scenario with NLoS propagation in Daejon, Korea [1]
  - ◆ Communication links can be supported over 200 meters of distance

Map of measurement environment



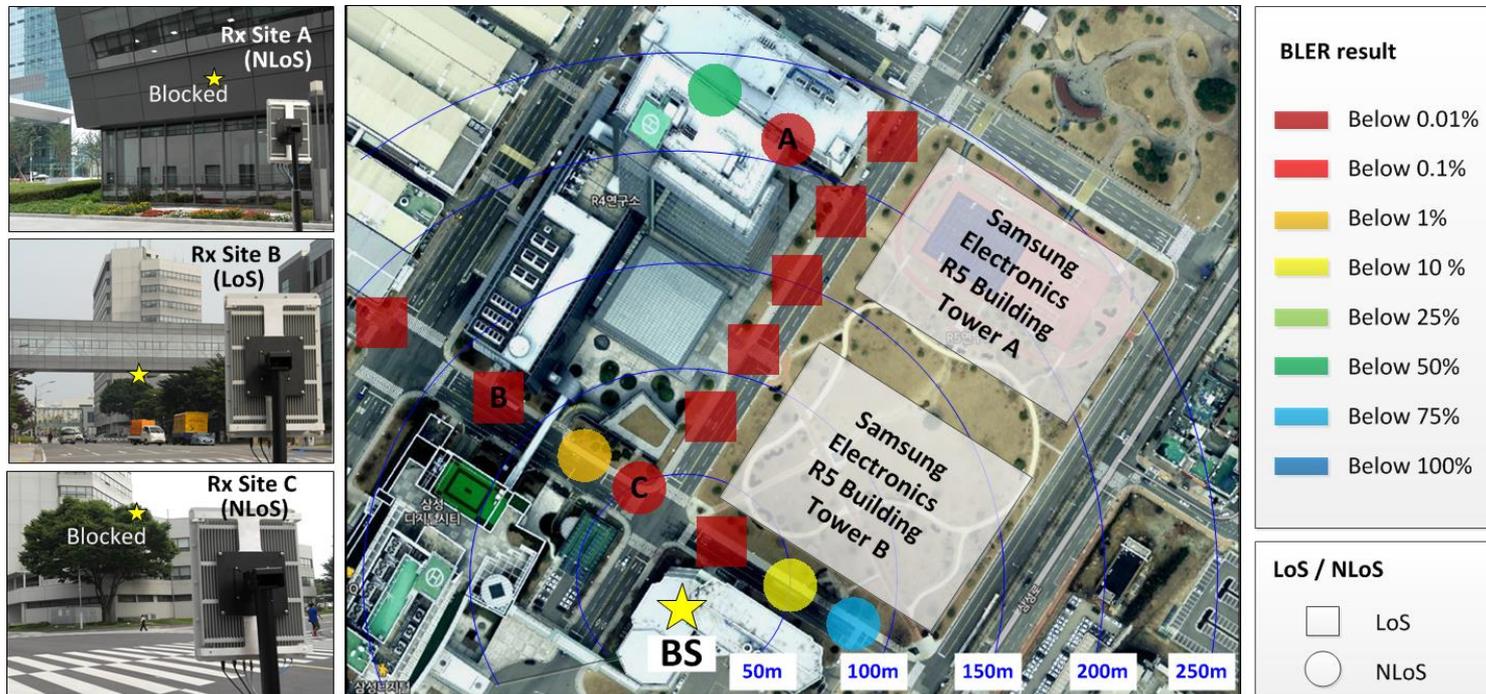
Pathloss measurement results



[1] Sooyoung Hur et al., "Wideband Spatial Channel Model in an Urban Cellular Environments At 28 GHz," in Proc. EuCAP'15, April. 2015.

# Use of mmWave for Cellular Service

✦ mmWave with adaptive beamforming can establish reliable communication links for NLoS sites that are more than 200 meters away from the base station



Tests were performed at sites surrounded by tall buildings where various channel propagation effects such as reflection, diffraction, and penetration were present [2]

[2] Wonil Roh et al., "Millimeter-wave Beamforming as an Enabling Technology for 5G Cellular Communications: Theoretical Feasibility and Prototype Results," IEEE Communications Magazine, vol. 52, no. 2, pp. 106-113, Feb. 2014.

- The study item aims to develop a channel model to enable feasibility study and developing framework of using high frequency spectrum ranging from 6 GHz to 100 GHz
  - From RAN#69 (Sep 2015) to RAN#70 (Dec 2015), RAN identifies the status/expectation of global spectrum allocation for the high frequency spectrum
  - From Q1 2016, RAN1 develops channel model for the key bands identified in the RAN-level study
    - Define the scenarios of interest for 3GPP based radio communication above 6GHz
    - Consider the work done outside 3GPP as well as earlier 3GPP work, such as the 3GPP 3D-channel model as a starting point and identify necessary modifications and additions for proper modelling of wireless channels of the high frequency spectrum for the identified typical scenarios

# Time Budget Proposal



- From RAN#69 to RAN#70, RAN-level email discussion will take place, which will be followed by a session in RAN#70
- RAN WG1 time budget proposal

RAN #70					Q1/2016					RAN #71
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf	
84	84	93	93	93	91	78	78	78	78	
2										

RAN #71					Q2/2016										RAN #72				
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf	R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
84bis	84bis	93bis	93bis	93bis	91bis	78bis	78bis	78bis	78bis	85	85	94	94	94	92	79	79	79	79
3										3									

**Thank You!**

