Objective and Methodologies

**Objective**

- To numerically identify how much interferences will be generated for fixed service (FS) stations.
- To determine the required frequency rejection as a function of separation distance that allows compatible operation of small cell systems and FS systems.
- Required frequency rejection (in dB) = calculated interference (in dB) – tolerated interference power (in dB)

**Simulation Topology**

- Separation Distance (0~30 km)
- FS Receive Station
- Cell Radius
- Sector
- Base Station (BS)
- Mobile Station (MS/UE)

**Antenna Radiation Patterns**

- Azimuth angle: \( \phi \)
- Elevation angle: \( \theta \)

**Simulation Results**

**Downlink Interference** (Interference to FS Receive Station from BS)

- By the transmission from each BS \( i \) to its associated UE \( j \) (interference to FS \( k \))

\[
I_{i,j,k} = P_i + G_i(\phi^+, \theta^+) - PL(d_{i-k}) + G_k(\phi^-, \theta^-)
\]

**Uplink Interference** (Interference to FS Receive Station from MS/UE)

- By the transmission from each UE \( j \) to its associated BS \( i \) (interference to FS \( k \))

\[
I_{j,i,k} = P_j^r + G_j(0,0) - PL(d_{j-k}) + G_k(\phi^-, \theta^-)
\]

**Transmit Power Control at MS/UE**

\[
R_{\text{max}} \times \min \left[ 1, \max \left( \frac{P_L}{P_{L_{	ext{FS}}}} \right) \right]
\]

**39 GHz Specific Settings**

- Path loss (LOS): \( 92.44 + 20 \log(10f) + 10 \log(10d) \) where \( f=39 \)
- Oxygen attenuation: ITU-R P.676-10

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IEEE Global Communications Conference (GLOBECOM), Industry Program - Austin, Texas, USA, 8 - 12 December 2014