

# UK Spectrum Policy Forum Cluster 3 Spectrum Sharing

## Satellites in Terrestrial IMT spectrum – a high level discussion

12 October 2023

| 10/2023

| Stuart Cooke



SAMSUNG SEOUL R&D CAMPUS

- Terrestrial IMT / 5G networks

- 100k's base stations deployed

- 1,000,000's devices

- Fastest roll out of a 'G'

- Initial deployment phase – multi-decade lifetime

- 6G/IMT-2030 research & development underway targeting around 2030 onwards

- Satellite networks

- Renewed interest and tech investment

- Backhaul to base stations (4G/5G), access points (wifi), etc

- Direct to handset – currently MSS spectrum with low data rate with initiatives to increase data rates

- Terrestrial / Satellite co-existence

- Solutions already exist and are evolving to enable co-existence in different geographic areas (ships, aircraft, remote areas, earth stations, etc) – in-band and adjacent band

- Challenge is around same area, same spectrum, same time

## ■ Complimentary ?

- large 'macro' cell
- &/or base station/access point backhaul
- integrated by terrestrial network operator to manage co-existence, handovers etc
- are there any regulatory / spectrum hurdles or show stoppers that need to be overcome to enable this approach (use ITU Radio Regs Article 4.4 ? &/or new WRC27 agenda item ?, FCC's NPRM on Supplemental Coverage from Space (SPS), IMT Satellite Radio Regs footnote?, etc)
- If an ITU activity is needed then the challenge is how to draft the work item to enable this complimentary approach without inadvertently enabling a competitive approach (secondary allocation ? conditional primary allocation? IMT satellite identification? etc?)

## ■ Competitor ?

- satellite operator competing with terrestrial operator same ground area same spectrum same time
- regulator / government policy to enabling this option ?
- uncoordinated / unsynchronized networks challenging
- terrestrial operators pay £Bns for access to the spectrum – what do satellite operators pay?

*Early stage in the discussions so many parts of the Industry (including Samsung) still considering this topic (including Samsung) still considering this topic*

- Introduced in 3GPP Rel-17, specifications available since 2022
- NTN - Modifications of 4G IoT and 5G NR to support Non-Terrestrial Network connectivity
  - NTN is another cell, tracking area or PLMN in a cellular network
  - Supports satellite (LEO, MEO, GEO) and High Altitude Platform Systems
  - Supports satellite to device connectivity
  - Supports integration (mobility to and from) with terrestrial network
- All 3GPP-actors getting involved (network vendors, chipset vendors, operators, satellite companies)
- Use cases – NTN is just another cell
  - Smart phone connectivity, public safety, fixed wireless access in rural areas (think Starlink), airplane and ship backhaul – not to compete with terrestrial cellular networks
  - Stand alone NTN-only network – the operator may be a traditional satellite operator
  - Integrated with a terrestrial network – the operator may be a traditional terrestrial operator
- GNSS is required for synchronization – no GNSS, no NTN connection

In 3GPP rel-17 following bands standardized:

- n256: UL: 1980 – 2010 MHz, DL: 2170 – 2200 MHz
- n255: UL 1626.5 – 1660.5 MHz, DL 1525 – 1559 MHz

FR2 (>20 GHz) bands not introduced yet

- There are only TDD bands for FR2 – TDD is not used for satellite

Future suggestions by certain companies in 3GPP:

- Study complementary reuse of terrestrial spectrum for satellite deployments
- Standardization of Satellite Ku band

- Most popular work item in 2020/2021 – significant effort from ALL companies in 3GPP
- Several satellite companies participating:
  - Thales, Intelsat, Eutelsat, Hughes, Inmarsat, ESA, etc
- Work continues for the foreseeable future:
  - Satellite-component of IMT2020 – self-evaluation currently on-going
  - Air-to-Ground scenario (networks serving airplanes from the ground) currently being specified
  - More L/S-bands NTN to be introduced: n254: UL: 1610 – 1626.5 MHz, DL: 2483.5 – 2500 MHz (MSS),
  - 30 MHz channel bandwidths
  - Requirements for (>10 GHz) for VSAT terminals



# Thankyou



SAMSUNG SEOUL R&D CAMPUS