EUTC Position on WRC 2019 agenda item 1.3 – possible upgrading of satellite allocations in the 460-470 MHz-band

Summary

The European Utility Telecom Council (EUTC) would like to express its serious concerns with the proposal for the upcoming World Radio Conference under agenda item 1.3. Under this agenda item is proposed to upgrade the current secondary allocation for the meteorological-satellite service (space-to-Earth) to a primary status as well as to upgrade the allocation of the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz.

Within a number of European countries the 460-470 MHz-band is used for critical communications for utility purposes. The proposed upgrade under agenda item 1.3 is likely to endanger the current usage of the 460-470 MHz-band in these countries.

In order to protect the current usage of the 460-470 Hz-band which is very important for the utility services and society's energy provision the EUTC calls on CEPT/ECC to not support the proposed update.

The European Utility Telecom Council (EUTC)

The European Utilities Telecom Council (EUTC) is the leading European Utilities trade association dedicated to informing its members and influencing policies on how telecommunication solutions and associated challenges can support the future smart infrastructures and the related policy objectives through the use of innovative technologies, processes, business insights and professional people.

This is combined with sharing best practices and learning from across the EUTC and the UTC global organization of telecommunication professionals within the field of utilities and other critical infrastructure environments and associated stakeholders.

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Background

WRC Proposal

WRC-19 Agenda Item 1.3 (upgrading MetSat allocation /primary allocation to EESS 460-470MHz): *"Consideration of possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a primary allocation to the Earth exploration- satellite service (space-to-Earth) in the frequency band 460-470 MHz"*

Current usage of the 460-470 MHz-band

In most of Europe, the potential interference from the non-geosynchronous satellite system is into utility outstations / terminal equipment / CPE (Customer Premises Equipment). However, countries such as the United Kingdom and Republic of Ireland have historically used a different frequency plan from the harmonised European band plan which, because the spectrum contains tens of thousands of individual frequency assignments, has not been aligned to the common European Band Plan. The 460-470 MHz-band is used mainly by systems conforming to EN 300113. These include traditional Private Mobile Radio (PMR) systems and point-to-multipoint telemetry schemes.

For these users, the additional interference resulting from the proposed upgrade for the satellite systems will be into the base station receiver. Furthermore, for utility SCADA (Supervisory, Control And Data Acquisition) systems, they usually deploy high mounted antennas – usually at the very top of the tower as shown in the attached picture of a UK National Grid's gas telemetry tower, approximately 40m above average ground height on a hill-top to provide coverage over a radius of 35 km or more. These high mounted antennas use high gain omni-directional antennas associated with sensitive receivers. Thus, they will experience interference from the non-geostationary satellites over the full 180 degree sky-facing arc. Due to the nature of the frequency hopping satellite modulation scheme, utility terrestrial services will experience an increase in the noise floor, reducing their coverage range and maximum data rate capability. Hence potentially impacting the energy supply.

Typical high sited utility SCADA base station receive antennas in 460-470 MHz band.

Technical details

- The current proposal to safeguard terrestrial services recommends a power flux density (pfd) limit of -152dBW/m^2/4kHz between 0-20 degrees of the horizon.
- For calculation purposes, -152dBW/m^2/4kHz is taken to be equivalent to -122 dBm/m^2/4kHz which equates to -6.2 dBuV/m.
- Assuming a 0 dBi reference antenna, that is equivalent to -136.7 dBm in 4 kHz.
- Translating this field strength into an equivalent 12.5 kHz terrestrial PMR (Private Mobile Radio) channel, this becomes a signal strength of -131.8 dBm
- The calculations below relate to the base station receive band 463-464 MHz for fixed point-to-multipoint systems used for SCADA (Supervisory Control And Data Acquisition) systems in extensive operation throughout UK and the Republic of Ireland. In this band, utilities have in excess of 20,000 outstations in licensed telemetry systems.

- These telemetry systems normally use a 6 dB gain co linear antenna at the base station, although occasionally a 3 dB gain co-linear and sometimes 9 dB co-linear antenna depending on system design. (see attached picture).
- The Code of Practice for installation of systems in this frequency band to conform to UK Regulator Ofcom's OFW49 planning rules specifies that antennas with gain are attenuated in order to restore the gain to the standard omni-directional antenna to prevent increasing received interference. Ofcom specification OFW49 requires the transmitted power of the telemetry outstation (equivalent to the mobile transmitter in a PMR system) to be attenuated to match the received signal level from the weakest transmitted signal, potentially creating an adverse situation for the wanted/unwanted (W/U) ratio. Regulation in the Republic of Ireland for this application in the 460-470 MHz band is based on similar rules.
- Typical feeder loss of these installations is 2-4 dB; thus using 8 dBi antenna gain associated with 2 dB feeder loss, the received signal would be -125.8 dBm in 12.5 kHz bandwidth.
- Assuming a thermal noise figure (kTBF) of typically -127 dBm, with a 6dB carrier to interference radio (-6 dB I-C); this results in a theoretical minimum signal level of -133 dBm.
- In practice, because electrical infrastructure sites by their nature have higher than average background noise levels, utility SCADA systems in practice use -120 dBm /12.5 kHz bandwidth in their 400 MHz UHF spectrum bands.
- For operational utility systems, the design assumes -126 dBm / 12.5 kHz channel for 50% of time coordination; or -114 dBm for 0.1% of time. These figures are on the limit of what is being proposed for a single EESS satellite transmitter within the aperture of the antenna.
- However, taking into consideration that the terrestrial service is using high-sited omni-directional antennas – essential to the operations of a point-to-multipoint fixed service, there are likely to be several satellites within the aperture of the terrestrial antenna at any one time.

Typical Electricity substation antennas for SCADA outstation transmissions in 460-470 MHz band.