Invitation to Tender (ITT)

Independent study on Sharing between satellites and terrestrial mobile networks in the future

23 June 2025

Background

As satellite connectivity advances and satellites become increasingly prominent in the agenda items of WRC-27, it is imperative to explore the future of satellite communications and its convergence with terrestrial mobile networks.

WRC-27 will debate three key agenda Items—AI 1.12, AI 1.13, and AI 1.14—that directly address the use of spectrum below 3GHz for Direct-to-Device (D2D) satellite communications.

- AI 1.12 explores opportunities for using specific bands for low-data-rate NGSO MSS systems, supported by parallel work within CEPT's preparatory groups to develop regulatory measures that accommodate new services.
- AI 1.13 focuses on the potential of new MSS allocations for direct connectivity with IMT user devices using terrestrial mobile (IMT) bands below 3GHz.This concept has gained traction in countries like US and Canada, which have already developed relevant national regulatory frameworks, as well as in the UK, where Ofcom has recently consulted for such use in some of these sub-3GHz mobile (IMT) bands.
- Lastly, AI 1.14 examines issues of potential future allocations to MSS and particularly the challenges associated with the coexistence of MSS and mobile services in certain bands, raising important questions about compatibility.

Ofcom is also exploring a new regulatory framework to enable satellite connectivity directly to mobile handsets using mobile (IMT) bands —where there is an agreement with relevant mobile spectrum licensees. Ofcom are also considering options for the future of the 2 GHz Mobile Satellite Services (MSS) spectrum, for which the current licences are due to expire in 2027.

Additionally, with Ofcom's consultations on spectrum sharing mechanisms and ongoing studies by stakeholders on D2D connectivity, there arises a need to evaluate various aspects of connectivity and coexistence between mobile and satellite networks in the future.

Exploring mobile (IMT) bands and other potential bands to operate D2D services could open many opportunities, including:

- The provision of mobile coverage and connectivity to remote or hard to reach areas where it is currently uneconomical to deploy traditional terrestrial networks.
- Enhanced availability and reliability for access to and assistance from the emergency services during emergency situations.
- Improved network resilience for terrestrial networks enabling continuity of service during disruptions such as e.g. natural disasters and interruption to base station power supplies

Beyond consumer devices, future innovation and market opportunities across different sectors include providing space connectivity for Internet of Things (IoT) devices.

The emergence of Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) satellites, along with High Altitude Platform Stations (HAPS), offer substantial potential for direct-to-device

(D2D) services. These technological advancements drive innovation in wireless communications and foster economic growth. However, they also present both opportunities and challenges. A detailed study should explore the future technology roadmap, assess the risks and opportunities in new markets, and examine the evolving business models, considering the preparations for WRC-27 and ongoing standardisation efforts in groups such as 3GPP.

Scope

This study should encompass the following points.

1. Provide an assessment of the D2D business case based on the anticipated use-cases in IMT bands as well as in the current and future 3GPP NTN bands for both satellite and mobile network operators outlining their relevance to the UK technology ecosystem.
2. Demonstrate details, insights and requirements for the satellite-terrestrial interworking architecture to provide D2D connectivity beyond the current IMT bands in discussion at Ofcom and internationally (WRC-27).
3. Analyse global D2D frameworks and trials and identify a range of relevant future scenarios for the deployment of satellite D2D services in the UK utilising mobile (IMT) bands as well as MSS bands, considering regulatory requirements, quality of service, standards, device compatibility (i.e. device form factors), capacity limitations, coexistence and sharing, as well as commercial viability (e.g., target market and demand).
4. Analyse the requirements for integration of billing systems, including roaming agreements in satellite environments for D2D expansion based on the UK context.

Regarding points one (1) and two (2) of the scope, the study must uncover what are the use cases, benefits and commercial opportunities of partnerships among satellite and mobile operators in terrestrial mobile IMT bands and other potential bands to provide D2D services.

The study should assess any trials, commercial deployments, or real-world applications either planned or underway, explaining what interworking architectures enable efficient spectrum usage and what bandwidth is required to ensure quality of service of the anticipated use-cases.

For point three (3), the aim is to outline the regulatory requirements (ITU regulations, lawful interception, emergency calling, coexistence and interference mitigation, etc) but also to highlight any technical barriers (chipset availability, UE modifications vs satellite modifications, frequency planning, terrestrial-satellite integration aspects etc), compatibility (3GPP standards) and commercial challenges, exploring potential working arrangements between satellite and terrestrial network operators when services are deployed using mobile (IMT) bands and other alternative bands, outside of mobile bands.

Within these considerations, the research should identify how these barriers can be managed, along with any technology solutions within the satellite and mobile ecosystem that can mitigate against some of them, such as:

- Satellites dynamically adjusting their transmit power at certain times or over certain regions to reduce interference, or
- Examine what technical capabilities of the space component can be used to address the technical and regulatory challenges, e.g., differences to terrestrial network base station on high speed (Doppler), distance (latency) and the beam size.

- Implementation of seamless handover between TN and satellite networks (and vice-versa)

Lastly, the study will describe what billing approaches are potentially being considered including pricing strategies and end-user charging mechanisms, evaluating what other countries and regions are considering from a regulatory perspective.

Expected deliverables

1. A report detailing the findings including:

    a) Evaluation of the business case and commercial viability of satellite D2D services using terrestrial mobile (IMT) bands and other alternative bands:

        - Evaluate the business case for satellite D2D services using both terrestrial mobile (IMT) bands and alternative spectrum bands such as Mobile Satellite Services (MSS).
        - Assess the commercial viability of different D2D deployment scenarios in the UK, including bandwidth requirements, spectrum sharing models, pricing strategies.
        - Explore the market opportunity for satellite operators in the UK, considering potential revenue streams, role of partnerships with MNOs, billing system models, including roaming agreements across different bands.
        - Analyse how different business models can optimize spectrum use and meet bandwidth requirements to ensure quality of service for targeted use cases.

    b) Assessment of the spectrum availability and interworking architecture requirements for the integration between satellite and terrestrial systems:

        - Investigate how D2D services can operate across IMT and non-IMT bands, addressing bandwidth requirements, throughput potential, use-cases that could be enabled as well as equipment readiness, including the evolution of device form factors and other emerging technology developments that could enable demand.
        - Forward-looking analysis of network architectures (e.g, RAN architectures) that support dynamic and efficient spectrum sharing for satellite D2D, taking into account possible regulatory implications.
        - Assess how 3GPP NTN standards —especially for future 6G— can support D2D end-to-end quality of service, with a focus on latency, handover, and other technical and economic challenges.
        - Provide an overview of additional deployment challenges, including regulatory compliance (e.g., lawful interception and market access) and commercial risks (e.g., chipset availability and resilience to jamming).

Facilitate a comprehensive synthesis of global satellite-based D2D trials and deployments, with a focus on identifying alternative spectrum bands suitable for service delivery. This analysis should encompass evaluations of the economic and regulatory environments shaping the implementation of these services and testbeds.

Cost:

- Total budget is of the order of £30,000 (+VAT)

Timetable:

- ITT issued: 23 June 2025
- Deadline for clarification of questions[1]: 02 July 2025
- Deadline to submit your tender: 07 July 2025

Duration:

- Expected duration of the study: approximatively three months, including delivering the report.
- To enable transparency and more efficient delivery management, it is suggested, at the time of commencement of the report, to establish monthly checkpoint meetings, during which UK SPF could provide updates on the progress and the findings of the research as well as to invite for a mid-point peer review of the final report.

Evaluation:

- The scoring system is as follows:

Criteria	Weight
Understanding the requirements	20%
Relevant experiences	20%
Methodology and approach	20%
Project management	10%
Resources allocated (CVs)	20%
Price	10%

Notes for bidders:

- Individual bidders are not discouraged however given the data requirements we will prioritise organisations/group submitters
- Unsuccessful bidders will receive their scores to help inform future tenders
- The successful contractor will be required to meet (in person or virtually) with the UK SPF drafting group to provide regular updates and feedback
- The successful bidder is expected to work with the UK SPF secretariat to create a press release and publicise the report and its findings
- Interested companies should contact Tales Gaspar at tales.gaspar@techuk.org for Terms and Conditions. Any contract or order awarded as a result of this ITT shall be subject to these Terms and Conditions. Any reference to your own conditions of contract/conditions of sale in your standard bid documentation shall be specifically withdrawn.
- Interested companies should submit one electronic copy of their quotation per proposal –including financial and technical proposals – to Tales Gaspar at tales.gaspar@techuk.org by 17.00 BST on the date stated in the Timetable. Your quotation is expected to include all required information, or clearly state the reason for being unable to do so. Any assumptions used in preparing responses should be clearly stated.

[1] If the bidder(s) may wish to seek clarifications concerning the invitation to tender (ITT), please get in touch with Tales Gaspar by by 17.00 GMT on the date stated in the timetable

- The technical response, covering aspects such as understanding the requirements, relevant experiences, methodology and approach should be limited to a maximum of 5 pages. Your quotation shall be firm, fixed and capable of acceptance.
- Please direct any questions relating to clarification of the ITT by email to Tales Gaspar (tales.gaspar@techuk.org).
- By submitting a response, you accept that you understand the requirement and have sufficiently addressed all aspects of the tender and information provided and that you have checked all stated details, such as prices, to be correct and as intended.