Introduction

The Mobile Satellite Services Association (MSSA) is a non-profit industry association, founded in 2024, that seeks to promote and advance the emerging ecosystem for advanced Non-Terrestrial Network (NTN) services, including direct-to-device (D2D). MSSA supports the efforts of advanced NTN solutions providers, including terrestrial mobile and satellite operators, original equipment manufacturers, infrastructure providers, chip vendors, and others. MSSA is focused on facilitating a global ecosystem utilizing spectrum already allocated and licensed for mobile-satellite services (MSS) and well-suited for integration into a broad range of mobile devices. More specifically, MSSA seeks to facilitate global mobile connectivity via satellite through open, standards-based solutions. More information about MSSA is available at www.MSS-Association.org

MSSA appreciates the opportunity to respond to the consultation of the Telecommunications Regulatory Authority of the Kingdom of Bahrain (TRA) on the authorization of Satellite D2D services. and looks forward to continued collaboration with the TRA on this topic in the coming months. In the following sections, MSSA responds to the questions outlined in the consultation document:

Responses to Consultation Questions

Q1: Do you agree with our assessment of the development of D2D services internationally?

MSSA agrees with the TRA's assessment of how D2D services have developed internationally, although MSSA notes that the consultation document is focused on the provision of D2D services in mobile service (MS) bands.

The consultation document accurately recognizes that regulatory bodies in Australia (ACMA), Canada (ISED), the United Kingdom (Ofcom), and the United States (FCC), have developed frameworks for authorizing D2D services in MS bands, typically based on commercial partnerships between MNOs and satellite operators.

MSSA emphasizes that D2D services—as well as other advanced NTN services—can also be implemented in MSS spectrum without the need for new allocations or the adoption of new regulations at the national or international level. These services can effectively

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leverage existing International Telecommunication Union (ITU) allocations and national MSS licensing frameworks.

The introduction of D2D services in MSS bands is being accelerated by reliance on 3GPP standards for NTN operations. Notably, 3GPP Release 17 introduces NTN features into the 5G Core Architecture, enabling support for coverage extension, IoT, disaster communication, global roaming, and broadcasting. Building on this foundation, 3GPP Release 18 further identifies three specific MSS frequency band ranges under 6 GHz (recognized across all ITU Regions) as suitable for NTN implementation.

MSS spectrum is being used successfully to support D2D applications across several regions, including MENA. For example, an MSSA member recently and successfully conducted a proof-of-concept demonstration for messaging and emergency communications using standard, unmodified smartphones in both the Kingdom of Saudi Arabia and the United Arab Emirates. This successful trial demonstrates the technology's readiness for regional deployment.

Q2: Do you consider that there are other benefits that could be realized through the authorisation of D2D services?

MSSA agrees with the benefits identified by the TRA and would emphasize the following additional points that reflect the broader value of D2D and other advanced NTN services using MSS spectrum:

- Complementary Nature: D2D and other advanced NTN services using MSS spectrum offer exciting opportunities to complement, rather than compete with, the services currently provided by mobile network operators (MNOs). This complementary approach facilitates ubiquitous coverage without disrupting existing terrestrial infrastructure.

- Emergency Services Enhancement: Beyond the coverage of territorial waters, as noted in the consultation, D2D and other advanced NTN services using MSS spectrum will be particularly valuable for addressing short-term, urgent requirements with respect to disaster response, when terrestrial infrastructure may be damaged or overloaded.
- Digital Inclusion: D2D and other advanced NTN services using MSS spectrum can help close the digital divide by expanding connectivity to underserved and unserved parts of urban, suburban, rural, and remote areas.

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- Network Resilience: D2D and other advanced NTN systems using MSS spectrum are generally more robust and resilient than terrestrial-only systems, as satellite links are not dependent on vulnerable ground-based infrastructure. This makes MSS systems ideal for maintaining communication when terrestrial networks fail during natural disasters or extreme weather events.

- Future Service Innovation: The certainty and stability provided by clear regulatory frameworks will allow operators to deliver new and enhanced advanced NTN services using MSS spectrum in addition to D2D, such as IoT applications.

Q3: Are there any other spectrum bands that we should consider?

MSSA strongly supports the TRA's proposal to authorize D2D services in the MSS frequency bands listed in Table 1 of the consultation document. These bands align with existing ITU allocations and enable D2D services within established regulatory frameworks.

Regarding the potential provision of D2D services in MS frequency bands (sometimes referred to as international mobile telecommunications or IMT bands), MSSA offers the following observations and urges the TRA to proceed with extreme caution. The provision of D2D services in MS/IMT bands poses complex technical issues that do not arise where D2D services are provided in MSS spectrum. Among other things, D2D services provided in MS/IMT spectrum pose potential interference risks to MNOs and other terrestrial users of that same spectrum, as well as to MSS systems operating in nearby frequency bands.

Detailed interference and coexistence studies (among other types of technical analysis) are needed before the TRA can understand the risks posed by such D2D operations in MS/IMT spectrum or make informed decisions as to whether such operations should be authorized and, if so, on what terms. More specifically, D2D operations in MS/IMT spectrum may also pose interference risks to MSS services in the L-band (above 1518 MHz) and S-band (1980-1995 MHz and 2170-2185 MHz), which must be studied carefully before D2D operations in nearby spectrum can be responsibly authorized. These studies have not been completed to date, and potential interference mitigation measures taken in IMT spectrum, such as guard bands and power limits, have not been agreed upon.

MSSA urges the TRA to wait for the conclusion of WRC-27 Agenda Item 1.13 before deciding on the most appropriate authorization approach for D2D in MS/IMT spectrum bands. This will ensure that Bahrain's framework aligns with emerging international consensus on technical standards and interference mitigation measures.

Consequently, MSSA recommends that the TRA initially authorize D2D and other advanced NTN services operations in MSS spectrum only, where existing international frameworks effectively manage interference risks. Authorization for D2D in MS/IMT spectrum should be deferred until relevant technical and coexistence issues are better understood through WRC-27 preparatory work and appropriate national coexistence studies.

Q4: Do you agree that the proposed technical conditions for D2D satellite emissions are sufficient to ensure protection against undue interference?

MSSA generally supports the TRA's approach to managing interference through technical conditions, particularly with the goal of ensuring spectrum integrity and service continuity. However, MSSA offer the following observations:

- MSS Spectrum: For D2D operations in MSS spectrum, MSSA believes that the potential for cross-border interference can be effectively addressed using the same mechanisms currently used to address such interference in the case of other MSS services. The ITU Radio Regulations and Recommendations effectively manage potential interference risks and enable the effective use of these bands (including for D2D).
- Non-Interference Principle in MS/IMT spectrum: For D2D operations in MS/IMT spectrum, MSSA encourages the TRA to proceed with careful consideration, recognizing that additional technical conditions may be required to address the unique interference risks associated with these bands. Any such conditions should be guided by ongoing international technical studies and the outcomes of WRC-27. MSSA urges the TRA to view with caution any suggestion that D2D uses of IMT/MS spectrum can or should be allowed to proceed on a "non-interference" basis under RR No. 4.4 of the ITU Radio Regulations. As noted by the Radio Regulations Board (RRB) in its report to WRC-23, the use of this provision (which permits certain uses on a non-interference basis) in the case of satellite networks should be approached with caution—including because of

the high risk that interference that necessarily results from the operation of thousands of satellites in increasingly congested spectrum bands and orbits.

- Immediate Remediation: The proposed license condition requiring licensees to eliminate all interference immediately by taking all necessary measures (including decommissioning) would provide partial protection from interference for other spectrum users.
- Cross-Border Coordination: The proposed cross-border coordination and sharing procedures (Annex 1 Clause 10) are appropriate and necessary.

Q5: Do you have any comments relating to the proposed licence conditions?

Although MSSA supports the TRA's approach of authorizing D2D services in MS/IMT bands through a Schedule to the Individual Mobile Telecommunications Licence (IMTL), requiring MNOs to enter into agreements with satellite operators, and holding MNOs accountable for compliance, we would encourage the TRA to afford ecosystem participants flexibility to develop and implement various business models in Bahrain.

MSSA believes that existing MSS licensing frameworks are fundamentally suitable for D2D services and other advanced NTN services using MSS spectrum, although minor clarifications and updates would be needed to provide additional certainty for operators and facilitate deployment.

In addition, MSSA also offers the following specific comments on the proposed Schedule to the IMTL:

- Frequency Bands: As discussed in our response to Q3, MSSA strongly supports proceeding with D2D authorizations in MSS bands. Authorizations in MS/IMT bands, however, should be deferred pending further technical studies.
- Record Keeping: The record-keeping requirements related to coordination procedures are reasonable. However, MSSA would appreciate clarity on the specific coordination procedures the TRA expects to establish.
- Spectrum Fees: MSSA welcomes the TRA proposal to charge frequency license fees for D2D services under the Low Opportunity Cost Band category, given the non-interference, non-protection basis of operation. This approach helps ensure equitable access to spectrum resources while providing the certainty and stability necessary to facilitate investment. MSSA believes that

administrative assignment mechanisms (as proposed by the TRA) are more appropriate than alternative mechanisms, such as auctions for satellite spectrum, which is subject to international coordination. Previous international experiences have shown that auctions of satellite spectrum can undermine national development goals and do not maximize socio-economic benefits.

- TRA Approval of Satellite Operators: MSSA notes that paragraph 33 of the consultation document states that the TRA will only authorize satellite operators that have been "approved". MSSA would welcome greater transparency on the criteria and procedures for such approvals to ensure transparency and predictability.

Conclusion

MSSA commends the TRA for its forward-thinking and balanced approach to enabling D2D services in the Kingdom of Bahrain. The proposed framework appropriately balances the need to enable innovative services with the importance of managing spectrum interference and protecting existing users.

MSSA's key recommendations are:

1. Proceed with MSS spectrum authorization outlined in Table 1.
2. Defer authorization in MS/IMT spectrum until after WRC-27 and the completion of appropriate technical studies.
3. Maintain flexibility for all participants to develop appropriate business models.
4. Continue using administrative assignment mechanisms rather than auctions for satellite spectrum.
5. Provide clarity on the process for TRA approval of satellite operators.

MSSA looks forward to continued collaboration with the TRA and other stakeholders to ensure the successful deployment of D2D services that deliver meaningful benefits to all users in the Kingdom of Bahrain.