Public Consultation

TDRA– UAE Spectrum Outlook 2020-2025 v1.0

Commencement Date: 19 February 2025

Response Date: 31 March 2025

Telecommunications and Digital Government Regulatory Authority (TDRA)
P O Box 26662, Abu Dhabi, United Arab Emirates (UAE)
www.tdra.gov.ae

Preface and Notes to Potential Respondents

In keeping with its values of Transparency and sector engagement, the TDRA wishes to review and study the impact of regulatory instruments issued by it to keep abreast of developments to better involve all stakeholders. The TDRA strives to meet the needs of the sector and seeks the views and feedback from the sector. The purpose of this document is to invite comments from stakeholders regarding the TDRA's intention to revise TDRA - UAE Spectrum Outlook 2020-2025 Version 1.0 in accordance with the Telecom Law.

Stakeholders who wish to respond to this consultation should do so in writing to the TDRA on or before the response date stated on the front cover of this document.
The comments which are contained in any response to this consultation should be clearly identified with respect to the specific question in this consultation to which such comments refer. Any comments which are of a general nature and not in response to a particular question should be clearly identified as such.

Responses to this consultation should be made in writing and provided electronically in MS Word format and Adobe PDF format, on or before the response date stated on the front cover of this document. Responses must be accompanied by the full contacts details (contact name, e-mail address and phone and fax numbers) of the respondent to:

spectrumconsultation@TDRA.gov.ae;

Executive Director Spectrum Affairs
Telecommunications and Digital Government Regulatory Authority
P.O. Box 26662
Abu Dhabi, UAE

Respondents are advised that it will be the general intention of the TDRA to publish in full the responses received to this consultation. Additionally, the TDRA may, at its discretion generate and publish a "Summary of Responses" document at the conclusion of this consultation. Accordingly, the Summary of Responses may include references to and citations (in whole or in part) of comments which have been received. The TDRA recognizes that certain responses may include commercially sensitive and confidential information which the respondent may not wish to be published. In the event that a response contains confidential information, it shall be the responsibility of the respondent to clearly mark any information which is considered to be of a confidential nature.

In any event, the respondent shall be required to submit two versions of its response to the TDRA as follows:

- A full copy of its response in MS Word format with any confidential information clearly marked. The TDRA will not publish the Word document and will only use it for internal purposes.

- A publishable copy of its response in Adobe PDF format. The TDRA will publish the PDF version in its entirety. Thus, the respondent should take care to redact any commercially sensitive and confidential information in the PDF version of its response.

By participating in this consultation and by providing a PDF version of its response the respondent expressly authorizes the TDRA to publish the submitted PDF version of its response in full.

It should be noted that none of the ideas expressed or comments made in this consultation document will necessarily result in formal decisions by the TDRA and nothing contained herein shall limit or otherwise restrict the TDRA's powers to regulate the telecommunications sector at any time.

If any Person or entity seeks to clarify or discuss any part of this Regulations can request for a meeting in writing again to the above E-mail and then TDRA will set the meetings in the period from **10-14 March 2025** so that formal comments can still be received by **12.00pm on 31 March 2025.**

Consultation Schedule

Milestone	Due Date	Notes
Closing Date for Initial Responses	31 March 2025	All responses to this consultation should be properly received by no later than 12.00 noon on the closing date. Responses are to be submitted in electronic format as set out in this consultation document.
Latest date for requests for extension to the due date for Initial Responses.	15 March 2025	Stakeholders wishing to secure an extension to the Closing Date for Initial Responses may apply in writing to the TDRA for such an extension. The request should set out the rationale for the request. Requests for extension should be submitted by e-mail to the e-mail address shown above. The TDRA will not consider any requests for extension which the TDRA receives after 12.00 noon on the date stated here. The TDRA will consider requests to extend the Closing Date for Initial Responses and will take into account such factors as: the number of such requests received; the rationale for such requests; and the effect on the overall time-scale of the particular project in question. In the event that the TDRA extends the Closing Date for Initial Responses, the TDRA will publish the revised closing date on its website.

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1 Introduction

1.1 The TDRA intend to revise its UAE Spectrum Outlook 2020-2025 1.0. As such, all readers are informed that this document outlines the draft version of this outlook in order to give this document context and to enable the TDRA to ask pertinent questions. All text in this consultation document should be read and interpreted as text and not as recording decisions of the TDRA.

1.2 The TDRA seeks to consider inputs of all industry stakeholders regarding these changes, which are increasingly relevant and valuable in the TDRA's exercise of its duties and legal mandates.

1.3 Additionally, the TDRA strives to follow the principles of Transparency, fairness and openness in dealings with customers, partners and other stakeholders and, therefore considers that it is important to take into account the views of those who have a legitimate interest in the outcomes of the TDRA's regulation.

1.4 In the ensuing text, significant changes are marked as follows:

- Additions are highlighted in yellow
- Deletions are ~~struck-through and highlighted in grey~~

2 Matters for Discussion and Consultation

1. Introduction and objectives

Radio spectrum is the cornerstone of wireless connectivity, but is a scarce resource that all wireless systems depend on for their operation. The way spectrum is managed and the way its concurrent and different users access it will enable industries to digitalise and thrive or may alternatively impede the development of entire parts of the economy. This is therefore a prime area for the ~~TRA~~Telecommunications and Digital Government Regulatory Authority (TDRA) to focus on given its increasing economic and social value.

Connectivity, powered by information and communications technologies, is the foundation of the evolving 'digital lifestyle.' Wireless systems are critical to delivering flexibility and ubiquity across sectors, making them a fundamental human need supported by information and communications technologies more broadly, is the fundamental prerequisite for all the platforms that form part of the developing 'digital lifestyle', powered by smart devices, smart systems and smart services. Wireless connectivity in all sectors will become a basic human need, as wireless connectivity will bring flexibility and ubiquity to the digital lifestyle.

The rapid evolution of wireless technologies, including the deployment of IMT 2020 (5G) and upcoming IMT2030 (6G) networks, requires a forward-looking approach to spectrum management that ensures efficient and flexible use of spectrum resources. The growing adoption of emerging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Machine Learning (ML), and blockchain will drive new spectrum demands across various sectors, from autonomous vehicles to smart cities, remote healthcare, and industrial automation.

The "UAE Strategy for the Future" encourages all government entities to focus on future topics that include amongst others:

- the future of technology and smart systems
- the future of the infrastructure and transportation
- the future of economy and economic and commercial security
- the future of the government and governmental services
- the future of positive and happy life environment.

Aligned with these goals, the "We the UAE 2031" vision emphasizes digital transformation, sustainability, and global competitiveness. For instance, the deployment of 5G and 6G networks will enable smart cities, bolster industrial automation, and transform sectors such as healthcare and transportation and sets a strategic direction for the next decade, emphasizing digital transformation, sustainability, and global competitiveness. In response to this vision, the UAE Spectrum Outlook for the period 2026–2031 will address key spectrum management objectives, including supporting innovative technologies, promoting efficient spectrum use, and enabling the UAE's leadership in the global digital economy.

In its endeavour to contribute towards the "We the UAE 2031" vision""Digital UAE", the TDRA has ~~prepared~~revised its Spectrum Outlook to cover ~~for~~ the period ~~2020~~2026–~~2025~~ 2031 based on meeting future wireless connectivity needs, ~~accounting for~~ while taking into account the evolution of wireless technologies, market demands, changing lifestyles, smart and connected living. The "UAE Spectrum Outlook" is the output of a comprehensive future-looking exercise and thorough analysis aimed at highlighting the goals for the UAE's wireless technologies industries and to reflect the aspirations for the UAE's wireless sector over the coming years. This includes proposed changes to the

way that spectrum is used to address the major wireless sectors and their growing demands for wireless connectivity.

As part of the development exercise to prepare the UAE Spectrum Outlook, the ~~TRA~~TDRA has taken account of a broad range of considerations:

- abiding to the key principles governing all the ~~TRA~~TDRA's activities, as listed in the Radiocommunication Policy
- achieving the TRATDRA's objectives for frequency spectrum management as presented in the Radiocommunications Policy
- assessing local and global, demand and technology trends as well as understanding the main future challenges which could affect spectrum management in the UAE
- studying the international experience in preparing future-looking spectrum strategies, and in particular other spectrum outlook documents developed in leading countries such as Australia, Canada, Ireland, New Zealand , USA and the UK
- Collaborating with the industry and incorporating feedback from industry stakeholders, with a public consultation held in ~~October/November 2019~~ February/March 2025.
- Additionally, the TDRA will engage in continuous collaboration with global and regional regulatory bodies, ensuring the UAE's spectrum management is harmonized with international best practices and aligned with global developments, particularly in anticipation of WRC-27 and the growing significance of Non-Terrestrial Networks (NTNs) and Low Earth Orbit (LEO) satellite constellations.

The paramount objective of developing the "UAE Spectrum Outlook" is to give the industry the confidence that frequencies will be available to meet future demand, and also to give existing spectrum users confidence that spectrum will continue to be available to meet their needs. This will allow spectrum users to make informed long-term decisions and allow technological advancements to develop and mature in the UAE market.

The TRATDRA has set a ~~five~~ six-year horizon for the "UAE Spectrum Outlook", because the TRATDRA believes that this period is sufficient to give a reasonable level of predictability to the industry, while considering the rapid pace of change in wireless technology and shifting demands of various spectrum users. Furthermore, this period is in line with international practice and the industry has expressed its satisfaction at this time horizon. Notwithstanding the above, the ~~TRA~~TDRA may revisit from time to time some aspects of the plan within the ~~2020–2025~~2026-2031 period.

- The TDRA has investigated various aspects that impact spectrum needs and usage in the UAE and developed the UAE Spectrum Outlook (2026-2031) in the following manner in order to highlight the primary issues that should be covered in the document: ~~In order to highlight the main issues that should be covered in the UAE Spectrum Outlook (2020 – 2025), the TRA has explored different aspects that affect spectrum needs and usage in the UAE and developed the outlook document in the following way:~~
- In Section 2, considers the challenges of spectrum management and the alternative spectrum management approaches that are emerging internationally in terms of

assignment, change of use and sharing. The ~~TRA~~TDRA will have to consider whether changes are needed to the UAE spectrum management framework.

- In Section 3, the outlook then reviews key wireless developments such as the demand for services and technology trends affecting the main categories of radio system and service, which are subject to ~~TRA~~ TDRA national regulation. Based on this review, the ~~TRA~~TDRA highlighted a number of issues in relation to the potential changes in needs and demand for spectrum in the next ~~five~~ six years.
- Section 4 of the UAE Spectrum Outlook (2026-2031) outlines the primary initiatives for the TDRA over the next six years. It primarily draws from the analysis presented in Sections 4 and 5, but it also considers global developments, including decisions made at the most recent World Radiocommunication Conference in Dubai (WRC-23), as well as upcoming research that will be carried out in accordance with the 2027 agenda for the next World Radiocommunication Conference and the provisional agenda for WRC-31. In light of these developments, TDRA should consider altering the way spectrum is used, developing frameworks for sharing, and making new allocations and assignments. After that, the TDRA will carry out technical and sharing studies, re-plan the spectrum, prepare UAE positions for regional and international study groups on radio and spectrum matters, monitor global developments, and update the country's frequency plan and spectrum regulations in accordance with them. ~~Section 4of the UAE Spectrum Outlook (2020–2025) identifies the main actions for the TRA in the next five years, mostly on the basis of the analysis in Sections 4 and 5, also taking into account international developments such as decisions taken internationally at the recent World Radiocommunication Conference in Sharm el-Sheikh (WRC-19), and future studies that will be conducted in accordance with the agenda for the next WRC, in 2023, as well as the provisional agenda for WRC-27. Actions for the TRA to take to reflect these developments include the consideration for a change of use of spectrum, sharing frameworks, new allocation and assignments. The TRA will then undertake spectrum re-planning activities, technical and sharing studies, prepare UAE positions for regional and international study groups on radio and spectrum matters, follow international developments and update the national frequency plan and spectrum regulations accordingly.~~
- Section 5 finally provides a high-level assessment of the impact of the UAE Spectrum Outlook, highlighting the expected benefits for the UAE from the outlook.

Question 1: Do you agree with the objectives of the UAE Spectrum Outlook (2026-2031) to support new technologies, use spectrum efficiently, and strengthen UAE's position in the global digital economy? Are these objectives clear and relevant to the needs of spectrum users in the UAE? If not, what would you suggest?

Question 2: Is the proposed six-year planning period adequate to balance predictability for

Question 3: Do you believe the UAE Spectrum Outlook appropriately considers both local and global trends in spectrum use, and effectively engages with international and industry stakeholders to align with best practices? Are there any other trends, challenges, or areas for collaboration that should be included?

2. Innovative approaches to spectrum planning

Regulators worldwide are exploring new spectrum planning approaches to maximise spectrum efficiency, enable new uses and, where relevant, allow for more dynamic and adaptive spectrum assignment and use, including shared use of spectrum enabled through databases or spectrum access systems (SAS). Dynamic spectrum access techniques have been reviewed internationally in ITU-R Report SM.2405, "Spectrum management principles, challenges and issues related to dynamic access to frequency bands by means of radio systems employing cognitive capabilities"[1]. The ITU-R report notes the need for regulators to weigh up a range of considerations – including cross-border frequency co-ordination with neighbouring countries, efficient use of spectrum and complexity of implementation (e.g. of SAS databases) – before taking a decision on implementing an innovative future spectrum management approach.

As per current regulations, the ~~TRA~~ TDRA aims to ensure spectrum is allocated, assigned and used efficiently in the UAE. The ~~TRA~~TDRA recognised that the rapid development of new technologies requires an increasingly dynamic and flexible approach to spectrum planning, while taking into account the needs of the UAE market.

With the growing deployment of 5G networks and preparation for 6G, as well as the expansion of Internet of Things (IoT) devices, Artificial Intelligence (AI), Machine Learning (ML), and other emerging technologies, spectrum management must evolve to support not only increased connectivity but also innovative applications like autonomous systems, smart cities, and beyond.

The ~~TRA~~TDRA has noted from responses to the public consultation on the draft Spectrum Outlook published in ~~on 30 September 2019~~ February/March 2025., that a number of stakeholders are interested in seeing greater use of spectrum-sharing approaches in some spectrum bands in the UAE.

In addition, international trends, such as the introduction of flexible licensing frameworks and the adoption of AI-based dynamic spectrum management tools, underscore the need for the UAE to adopt more adaptive and innovative spectrum management approaches.

Within the next ~~five~~ six years, the ~~TRA~~TDRA will study the feasibility of applying approaches identified as relevant in the UAE. In light of these studies and within the UAE's legal, technical and regulatory framework, the ~~TRA~~TDRA will consider whether changes are needed to UAE spectrum planning to allow for greater flexibility, use of novel spectrum sharing approaches and/or other emerging spectrum planning approaches.

This will include evaluating new techniques such as Cognitive Radio Networks (CRNs), Artificial Intelligence-driven spectrum management, and the introduction of spectrum sharing frameworks that enable co-existence between multiple users in the same frequency bands.

In the event that the ~~TRA~~TDRA identifies that future spectrum planning approaches require changes to the UAE's legal and regulatory framework for use of spectrum, the ~~TRA~~TDRA will identify the revisions needed, to enable the identified actions.

~~One consideration that the TRA will reflect in its future studies on future planning approaches in the UAE is that spectrum-planning approaches tend to be market specific, taking account of incumbent uses and emerging local market needs. For example, several spectrum-sharing approaches have been applied in certain markets such as the Citizens Broadband Radio Services (CBRS) approach being applied in the 3.5GHz band in the USA or 'licensed shared access' methods being considered in the 2.3–2.4GHz band in some markets in~~

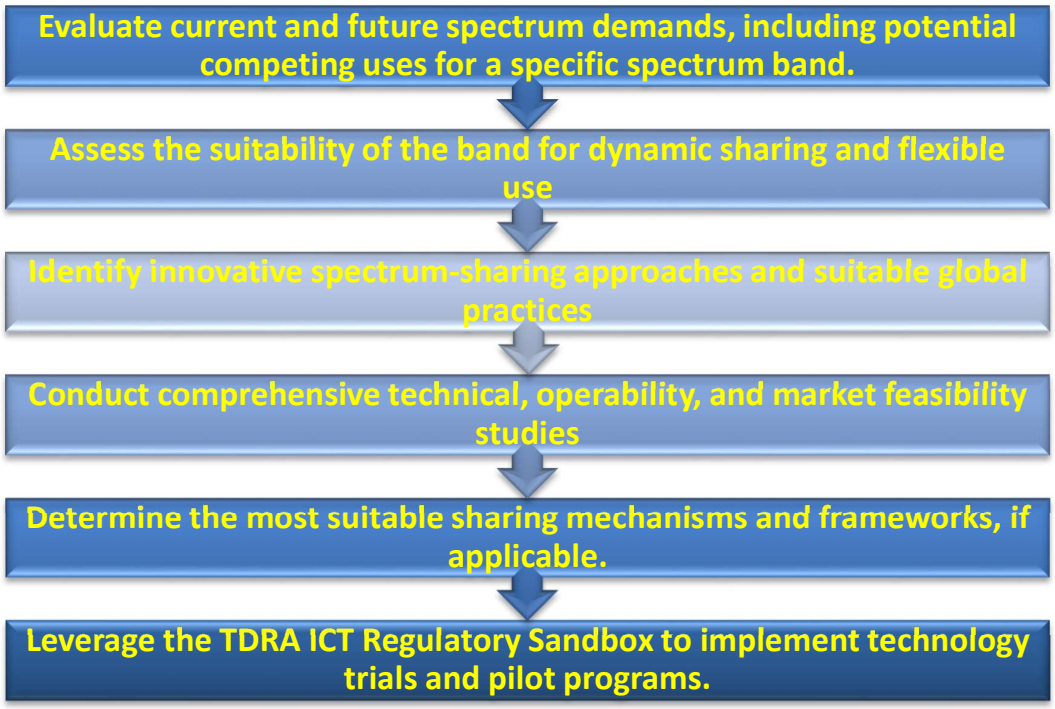
[1] https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-SM.2405-2017-PDF-E.pdf

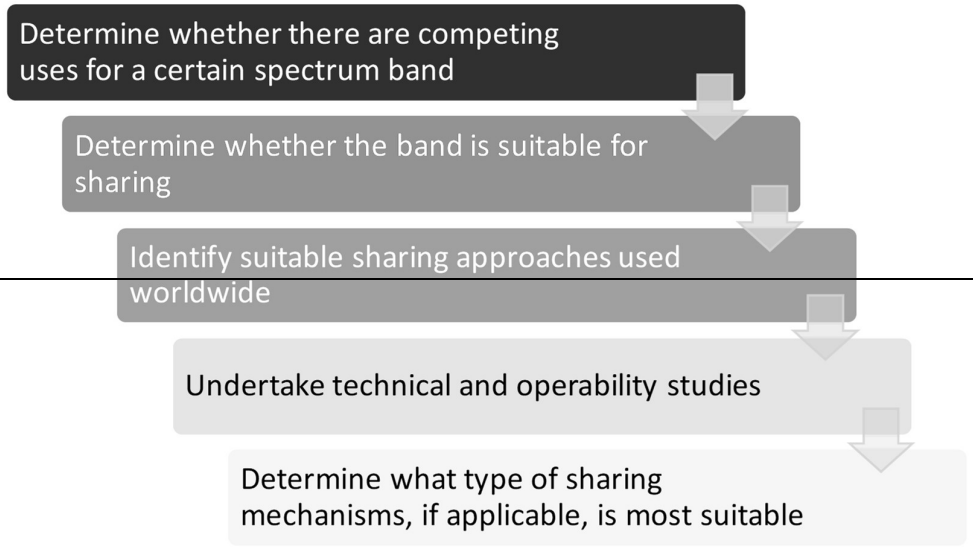
~~Europe. However, these initiatives have been market specific with limited scope for regional and/or international harmonisation on approaches to occur.~~

Whilst the ~~TRA~~TDRA can learn from developments in other countries, further work is needed in the UAE market to identify relevant new planning approaches, and also, where pertinent, suitable bands for shared use.

The TDRA is also considering the use of advanced technologies such as blockchain for spectrum transactions, which could facilitate secure and transparent spectrum trading, and sharing, enabling a more dynamic and responsive spectrum management environment.

The diagram below shows a high-level illustration of the process the ~~TRA~~ TDRA will undertake to understand whether sharing mechanisms are relevant for certain bands in the UAE.





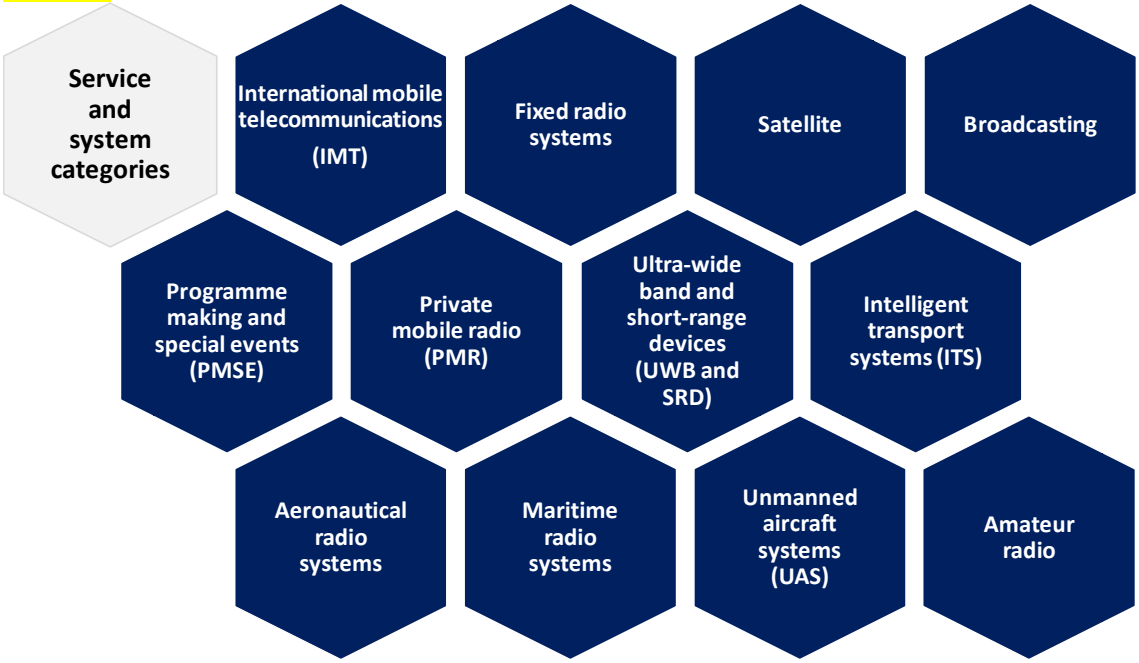
Question 4: Is the TDRA's plan to study international practices and consider regulatory changes over the next six years adequate for effective spectrum management in the UAE? What additional focus areas, if any, do you recommend?

3. Review of wireless systems developments

~~The TRA~~TDRA has looked into wireless systems developments in terms of demand trends and technology that which will affect the demand for spectrum in the future, to understand the issues the wireless industry is going through and which need to be tackled by the ~~TRA~~ TDRA in the years to come. The UAE Spectrum Outlook should define relevant actions which help the industry to address those issues and support the development of the industry.

The rapid evolution of wireless technologies, including the rollout of 5G and the preparations for 6G networks, along with the increasing integration of Internet of Things (IoT), Artificial Intelligence (AI), and Machine Learning (ML), demands a forward-looking approach to spectrum management. New applications such as autonomous vehicles, smart cities, remote healthcare, and digital industrial solutions will further drive the demand for spectrum.

- ~~The review of technological trends and demand follows the categorisation of radio services and systems that are subject to TRA national regulations, as follows:~~ The following is a classification of radio services and systems that are subject to national regulations under the TDRA, followed by an examination of technological trends and demand:



- ~~The TRA~~TDRA has taken into consideration frequencies ~~from 3kHz to 94GHz, i.e. the frequencies~~ allocated in the ~~TRA's current~~ National Frequency Plan 4.0 that is in-force and in use. ~~There are currently no frequencies in use above 94GHz in the UAE.~~Given the ongoing development of terahertz communication technologies and the anticipated growth of ultra-high frequency applications beyond 94GHz, the TDRA will actively monitor advancements and potential use cases for these frequencies, preparing to adjust the National Frequency Plan as necessary.
- Based on this review, key developments in spectrum demand include a growing need for additional allocations for IMT services to support 5G, 6G, and other advanced mobile technologies, as well as expanding satellite services, particularly Low Earth Orbit (LEO) and Medium Earth Orbit (MEO) constellations, requiring more spectrum and coordination. Additionally, continued support is necessary for existing services, such as

aeronautical, maritime, and amateur radio, while ensuring their coexistence with emerging technologies.

Question 5: Do you agree with the TDRA's identified priorities for managing spectrum demand, including supporting 5G/6G, expanding satellite services, and ensuring coexistence with existing services? Are there any other developments or areas that should be considered to meet future spectrum needs effectively?

3.1 International Mobile Telecommunications (IMT)

3.1.1 **Present status**: ~~The two telecoms licensees (operators), Etisalat and du, are authorized to offer all telecoms services including public cellular mobile services also known as International Mobile Telecommunications (IMT). The two licensees have deployed the IMT networks supporting different air interfaces like GSM (2G), UMTS (3G), LTE (4G) and OFDM (5G), using spectrum in various bands from 700MHz to 3.8GHz. It is the operators' domain to decide on air interface and network management as the TRA maintains a technology-neutral approach. Both operators are currently in the process of enhancing the coverage of IMT(5G) networks in line with international technology and standards developments in the mobile sector, with IMT(5G) already commercially available in several urban areas. 5G has been launched in the UAE, providing enhanced mobile broadband (eMBB) and fixed broadband wireless access (FWA). The operators are expected to deploy 5G nationwide to offer greater capacity, scalability, reliability and flexibility in order to cater for new and evolving mobile demands including the needs of industrial users, and the Internet of Things (IoT).~~Etisalat by e& and EITC (du), the two authorized telecom operators in the UAE, are licensed to provide a comprehensive range of telecom services, including International Mobile Telecommunications (IMT), also known as public cellular mobile services. They have established IMT networks supporting various air interfaces such as GSM (2G), UMTS (3G), LTE (4G), and OFDM (5G), utilizing spectrum across different bands from 700MHz to 3.8GHz. The choice of air interface and network management falls within the operators' jurisdiction, as the TDRA maintains a technology-neutral stance. Both operators are actively expanding the coverage of their IMT (5G) networks, aligning with global advancements and standards in the mobile sector. IMT (5G) services are already available commercially in numerous urban areas across the country. The introduction of 5G and 5.5 G in the UAE brings about improved mobile broadband (eMBB) and fixed broadband wireless access (FWA). There are plans for nationwide deployment of 5G by the operators, aiming to provide increased capacity, scalability, reliability, and flexibility to meet the evolving needs of mobile users, including industrial applications and the Internet of Things (IoT). As per WRC-23 Final Acts, No changes to the Radio Regulations (RR) were necessary to use IMT technologies in the fixed service. Further spectrum allocations for IMT were among the major choices that had to be made in order to develop future

4G, 5G, and 6G services as well as increase broadband connectivity. The 3600–3800 megahertz (MHz) and 6425-7125 MHz bands are notable spectrum allocations in Region 1 under the ITU RR. These allocations will support the crucial expansion of mobile broadband services.

3.1.2 **Future trends for IMT**: ~~Further development of IMT(5G) is the most significant evolution that is expected in the mobile market: by 2025, it is expected that 5G networks will offer near-nationwide availability in the UAE and will support new and innovative use cases. Implementing 5G networks is a key step towards a full digital transformation in mobile networks, bringing considerable improvements in capacity, speed, reliability and latency, and forming the basis of a wealth of new applications. Over time, 5G is expected to support new solutions and services (use cases), e.g. smart cities, intelligent transportation system, etc. It will be important for such solutions and services to be able to develop in the UAE and the TRA has issued a "UAE Strategy for 5G and beyond" also for the period 2020–2025. The future trend for IMT will be access to more frequency bands in millimetre wave (mmWave) above 24GHz for capacity and high throughput. For coverage, additional frequency bands will be required below 1GHz.~~IMT 2030 introduces significant advancements in connectivity, enabling enhanced digital infrastructure, sustainability, and seamless integration of emerging technologies. It will support high-speed mobility, precision positioning, and robust security to meet future connectivity demands. MT 2030 introduces significant advancements in connectivity, enabling enhanced digital infrastructure, sustainability, and seamless integration of emerging technologies. It will support high-speed mobility, precision positioning, and robust security to meet future connectivity demands. It stands as a beacon of progress, reshaping the UAE's spectrum landscape with its visionary capabilities. Expanding coverage to every corner of the nation, IMT 2030 ensures seamless connectivity, fostering economic growth and societal inclusion. Integrated with advanced AI, the network dynamically adapts to user demands, optimizing performance and efficiency while paving the way for a smarter digital infrastructure. Additionally, IMT 2030 prioritizes sustainability, minimizing environmental impact and ensuring network longevity for future generations. With precision positioning accuracy and impressive performance metrics, including peak data rates and minimal latency, IMT 2030 sets new benchmarks for connectivity excellence. It guarantees uninterrupted communication, even in densely populated areas and at high speeds of mobility. Upholding security and interoperability, IMT 2030 establishes a resilient digital ecosystem, safeguarding against cyber threats and fostering collaboration among stakeholders. In essence, IMT 2030 represents a transformative leap forward, propelling the UAE into a future where connectivity knows no bounds. WRC-27 will consider studies on sharing and compatibility to develop technical conditions for the use of IMT in the frequency bands 4.4-4.8 GHz, 7.125-8.4 GHz, and 14.8-15.35 GHz. This will take into account the existing primary services operating in these and adjacent frequency bands, in accordance with Resolution

256 (WRC-23). The goal is to ensure harmonious coexistence and efficient use of the spectrum.

3.1.3 **Spectrum outlook for IMT**: Given the significance of maintaining spectrum harmonisation, TDRA will work to maintain alignment with ITU-R, 3GPP standards, and regional agreements on (GCC and ASMG) levels. This entails incorporating all related decisions made by the WRC-23 into the national regulatory framework and taking part in future research in the pertinent ITU-R study groups on future IMT spectrum issues. In order to develop a unified strategy for the area, the TDRA will also keep taking part in regional spectrum groups like the GCC Technical Committee and ASMG. In order to make allocations contiguous for increased efficiency, some of the current frequency ranges assigned for IMT in the UAE will also need to be re-planned. Where applicable, the TDRA will make an effort to consider the requirements of other uses, such as satellite services, in order to guarantee service compatibility and protection. WRC-27 and WRC-31 will take into account other frequency ranges for innovative applications.~~The TRA will strive to maintain alignment with ITU-R, 3GPP standards and regional agreements (GCC and ASMG), given the importance of keeping spectrum harmonised – this means translating all WRC-19 decisions related to mmWave into the local regulatory framework and participating in future studies in the relevant ITU-R study groups on future IMT spectrum issues. The TRA will also continue participating in regional spectrum groups such as the GCC Technical Committee and ASMG to build a harmonised strategy for the region, such as the ASMG agreement in December 2018 to allocate 3.3–3.8GHz band for IMT.The TRA will undertake its re-planning and sharing studies to allow deployments of IMT in the mmWave bands identified at WRC-19. Some existing allocated frequency ranges for IMT in the UAE will also require re-planning to make allocations contiguous for enhanced efficiency. The TRA will endeavour to take into account the needs of other uses such as satellite services to ensure service compatibility and protection where relevant. Additional frequency ranges will be considered at WRC-23 and WRC-27 for novel uses such as UAS operating on IMT networks.~~

Question 6: Do you agree with the TDRA's approach to maintain spectrum harmonization for IMT services in line with ITU-R standards, 3GPP, and regional agreements while also preparing for future technologies like IMT 2030? Are there any additional considerations or changes you suggest for future IMT spectrum management in the UAE?

3.2 Fixed radio systems

3.2.1 **Present status:** ~~The licensees Etisalat and du are currently the main users of fixed services for mobile backhaul, point-to-point links in the UAE. Other users of fixed radio systems include oil companies, the financial sector, utility companies, and government users (including for public protection and disaster relief). Frequencies between from around 3GHz up to 95GHz are included in the UAE~~

~~national regulation for fixed radio systems.~~In the UAE, Etisalat by e& and EITC (du) are the primary users of fixed services for mobile backhaul and point-to-point links. Other sectors, including oil, utilities, finance, and government entities for public protection and disaster relief (PPDR), also heavily rely on fixed radio systems. Oil and utility companies use point-to-multipoint applications extensively to improve communication, coordination, safety, and response times. Government entities use these systems for emergency response and public safety, ensuring reliable communication during crises.

TDRA Regulations for Fixed Radio Systems cover frequencies from approximately 230 MHz to 95 GHz, providing various industries with the necessary bandwidth for their specific needs, from high-capacity backhaul to localized point-to-multipoint connections. The TDRA revised the "fixed radio systems" regulations in 2022.

3.2.2 **Future trends for fixed radio systems:** ~~In the next few years, fixed radio system users will increasingly require greater bandwidth to be available for high-capacity fixed-link deployment, due to the growing demand for very high bit rates, and low latency. The development of fibre networks is having an impact on the architecture of mobile networks, affecting the demand for fixed links, particularly high-capacity links at the edge of networks. Mobile networks are expected to provide considerably higher data throughputs to end users in future, and small-cell deployments are widely expected alongside higher macro-cell capacity requirements. This may have a significant impact on backhaul capacity requirements in both existing and new (higher) fixed-link bands.~~ The landscape for fixed radio systems will evolve significantly in the coming years due to the growing need for greater bandwidth, driven by high bit rates and low latency requirements. As mobile networks advance, particularly with the evolution of IMT technologies, network architecture will increasingly integrate with fiber networks.

Advancements will lead to greater deployment of outdoor units (ODUs) and portable microwave backhaul links. ODUs, mounted outdoors for better signal reception and transmission, will offer higher capacity and more efficient spectrum use. Portable microwave backhaul links will become more common, providing flexible, rapid deployment options for temporary or mobile sites, such as events or emergencies.

As 5G and future IMT technologies evolve, these portable and fixed solutions will be critical for maintaining high capacity, low-latency communication networks. The spectrum for fixed radio systems may expand to include the 275-325 GHz range, as proposed in Resolution 721 (WRC-23), to meet the growing demand for high-capacity links. This expansion will support increased data rates and low latency, requiring updates to the Radio Regulations (RR), including Nos. 5.149, 5.340, 5.564A, and 5.565. These changes will ensure that the regulatory framework aligns with technological advancements, enhancing fixed radio systems' ability to serve as a robust backbone for mobile networks, support small cell deployments, and increase macro-cell capacities.

3.2.3 **Spectrum outlook for fixed radio systems:** To close the widespread digital divide, more spectrum and allocations for certain applications of fixed radio systems are essential (i.e. high-altitude platform stations (HAPS)). TDRA will explore research opportunities for relevant bands and services. Future networks will need very high capacity fixed links, which traditional fixed radio bands cannot support. As more bandwidth becomes available, TDRA will encourage the use of higher frequencies for fixed radio services while ensuring that user needs are not compromised by allocations to other services. Additionally, TDRA will monitor the convergence of fixed and mobile technologies and services, considering its impact in the UAE.~~Some of the spectrum allocated and used by fixed services below 20GHz is increasingly being considered for other uses, including IMT(5G) and other technologies such as high-altitude platform stations (HAPS). The TRA will consider sharing studies for relevant bands and services. Traditional bands used for fixed radio systems have insufficient capacity to provide the very high capacity fixed links that will be needed to support future networks. The TRA will encourage take-up of high frequencies by fixed radio services, where additional bandwidth is available, and ensure than the needs of the users are not adversely affected by allocation of frequencies to other services. In addition, the TRA will follow development in the convergence of fixed and mobile technologies and services, considering the impact in the UAE. The TRA will update the TRA Regulation on "fixed radio systems" in line with international developments and WRC-19 decisions.~~

Question 7: Do you support TDRA's approach to expanding the use of higher frequencies and encouraging the integration of fixed and mobile technologies to meet growing demand for high-capacity, low-latency communication networks in the UAE? Are there specific considerations or additional actions you believe TDRA should take?

3.3 Satellite

3.3.1 **Present status:** The UAE has a thriving satellite industry with both fixed and mobile satellite services. Key users of Earth stations in the fixed satellite service include Space 42 , Media Zone "Intaj," Etisalat by e&, and EITC (du). The main satellite operators in the UAE are Space 42, Mohammed Bin Rashid Space Center (MBRSC), Inmarsat,. These operators provide fixed satellite service (FSS), broadcasting satellite service (BSS), mobile satellite service (MSS), and Earth exploration satellite service (EESS). Technological advancements in the satellite sector are making connectivity more affordable, faster to deploy, and more attractive due to its ubiquity, broad coverage, and improved latency. Current developments include new non-geostationary-satellite orbit (NGSO) systemsadvancements in geostationary-satellite orbit (GSO) networks, increased use of Earth stations in motion (ESIM) terminals, hybrid satellite-terrestrial IMT systems, and integration of IoT/M2M technology via satellite. Future innovations may include massive machine-type communications (mMTC), high-density fixed satellite systems (HDFSS), low-power data collection via NGSO, unmanned aircraft systems control and non-payload communications

(UAS and CNPC), enhanced synthetic-aperture radar (SAR) capabilities, and improved meteorological satellite spectrum. WRC-23 decisions recognized the importance of space weather sensors and adopting Coordinated Universal Time (UTC) by 2035 to enhance global telecommunications, supporting various needs across the Arab world. The TDRA, through ASMG, contributed to this topic at WRC-23 ~~There is a dynamic satellite sector in the UAE. Satellite services include mobile and fixed satellite services. The main users of Earth stations in the fixed satellite service are Etisalat and du, as well as Yahsat, Thuraya and Media Zone "Intaj". The main UAE satellite operators include Yahsat, Thuraya (now acquired by Yahsat), Inmarsat and Mohammed Bin Rashid Space Center (DubaiSat). These satellite operators offer fixed satellite service (FSS), broadcasting satellite service (BSS), mobile satellite service (MSS) and Earth exploration satellite service (EESS). Demand for spectrum from satellite services is continuing to grow worldwide, particularly in higher frequency bands. Satellites services also play an important role in the scientific sector including Earth exploration into climate change, weather forecasting, space exploration and many other research and scientific applications. Bandwidth requirements are driven by the increasing capacity needs of applications that use satellite connectivity, such as broadcasting, backhaul, entertainment, satellite navigation and others.~~

3.3.2 **Future trends for satellite:** Future trends in the satellite sector include the expansion NGSO systems, greater integration with 5G, advanced IoT and M2M applications, high-throughput satellites (HTS), AI and machine learning, energy-efficient satellites, enhanced Earth observation, growth in UAS and unmanned traffic management (UTM), secure networks, and new applications for meteorological satellites. These trends will increase efficiency, expand capabilities, and create broader applications for the satellite industry.

Key Topics for WRC-27 will address the use of the 47.2-50.2 GHz and 50.4-51.4 GHz bands, conditions for aeronautical and maritime Earth stations in motion communicating with geostationary and non-geostationary satellites, and revising sharing conditions in the 13.75-14 GHz band for smaller Earth station antennas. It will also study the 51.4-52.4 GHz band for gateway Earth stations transmitting to non-geostationary satellites, establish power flux-density limits for non-geostationary systems in the 17.3-17.7 GHz band, and develop measures to prevent unauthorized operations of Earth stations.

WRC-27 will also focus on ensuring equitable access to the 37.5-42.5 GHz, 42.5-43.5 GHz, 47.2-50.2 GHz, and 50.4-51.4 GHz bands for fixed-satellite services, and setting limits to protect fixed and mobile services in the 71-76 GHz and 81-86 GHz bands. Additional discussions will address space-to-space links among satellites, and consider new allocations for the mobile-satellite service in several frequency bands to support future low-data-rate systems and direct connectivity with IMT equipment.

These efforts aim to develop technical, operational, and regulatory measures for efficient and equitable use of frequency bands while ensuring the protection of existing services.~~Technological advances in the satellite sector are making~~

~~satellite connectivity cheaper, faster to deploy and more attractive due to ubiquity, coverage and improved latency.~~

~~Future plans include new low Earth orbit (LEO) and non-geostationary satellite orbit (NGSO) systems, as well as geostationary satellite orbit (GSO) systems, increasing use of Earth stations in motion (ESIM) terminals, hybrid satellite and terrestrial IMT systems, use of IoT/M2M technology via satellite, massive machine type communications (mMTC), high density fixed satellite systems (HDFSS), low power data collection systems via NGSO, unmanned aircraft systems control and non-payload communications links (UAS CNPC), enhanced synthetic-aperture radar (SAR) capabilities, meteorological satellites spectrum, etc.~~

3.3.3 **Spectrum outlook for satellite:** TDRA will implement WRC-23 decisions that revised the regulatory framework for non-GSO systems to support global coverage and low-latency applications. Additionally, WRC-23 allocated frequencies for Earth exploration satellites, enhancing climate monitoring and weather forecasting. TDRA will continue to monitor global developments in satellite services and related spectrum needs.

~~The satellite industry is facing a key challenge that bands allocated for satellite use are increasingly being subdivided and considered for different alternate and shared uses. Planned new constellations using many smaller satellites must be co-ordinated within existing satellite bands. Unlike fixed radio systems, it is not possible to redeploy existing satellite services in higher bands, due to the bespoke nature of satellite constellations, which will continue to rely on the bands they currently use. The TRA will be implementing WRC-19 decisions and updating satellite regulations as well as following international developments relating to new satellite systems and associated spectrum needs.~~

Question 8: Do you agree with TDRA's approach to implement WRC-23 decisions and monitor global developments to support the expanding needs of the satellite sector in the UAE?
Are there any additional considerations or specific actions you recommend for enhancing satellite services and spectrum management?

3.4 Broadcasting

3.4.1 **Present status:** Sound broadcasting remains a strong media platform in the UAE, with a presence in both analogue and digital formats. Analogue AM/FM radio (87.5–108 MHz) is still widely used, particularly in vehicles, but there is a growing shift toward digital audio broadcasting (DAB) due to FM band saturation. DAB offers better sound quality and more channels, gradually increasing its market share as listeners move to digital receivers.

The UAE has completed its transition from analogue to digital terrestrial television (DTT) using the UHF spectrum. While broadcasters emphasize DTT's strategic importance for emergency and crisis communications, most digital TV viewers prefer cable, fiber, and satellite TV for their wider channel offerings and enhanced viewing experiences. Internet streaming services are also gaining popularity, providing on-demand and live content via broadband networks. This shift

prompts ongoing discussions about the optimal use of the UHF spectrum (470–694 MHz) as demand for digital services grows.

TDRA in collaboration with the Ministry of Industry and Advanced Technology (MOIAT), has developed and issued key regulatory frameworks for broadcasting in the UAE. These documents outline the specifications and requirements for radio and television receivers to ensure compliance with national standards. These are "UAE Terrestrial Radio Receiver Specifications for AM/FM/T-DAB+" and "Receiver Specification Requirements for Digital Terrestrial TV Broadcasting in UAE". These are also accessible on the MOIAT's website.

The WRC-23 Final Acts addressed UHF bands, with the Arab region securing primary and secondary allocations in the 614-694 MHz band to balance the needs of mobile services and broadcasting.~~Sound broadcasting is a strong media platform in the UAE, including shortwave radio (high frequency, or HF), and analogue sound broadcasting using amplitude modulation (AM) and frequency modulation (FM) technology, which uses spectrum from 87.5–108MHz. Many radio listeners in the UAE are still using analogue AM/FM sets, especially in their vehicles. While digital audio broadcasting (DAB) standards have been developed internationally, these services are yet to increase market share in the UAE due to high penetration of FM receivers in vehicles. The FM band is fully utilised and no frequencies are available for new channels, which underlines the importance of DAB deployment.Terrestrial television also uses radio spectrum in the ultra-high frequency (UHF) portion of spectrum. Whilst terrestrial television was historically broadcast using analogue technology, a migration to digital terrestrial television (DTT) has taken place over the last decade. Analogue terrestrial TV, which has traditionally used UHF spectrum, has now largely been replaced with digital terrestrial TV (DTT). Based on the results of the questionnaire carried out by the TRA, broadcasters expressed their desire to provide digital terrestrial television as a strategic option, especially in emergency and crisis situations, and not on a commercial basis. In the UAE, digital TV viewers use alternative platforms, such as cable, fibre and satellite TV instead of DTT. There are also alternative internet video streaming services emerging internationally, which use broadband networks to provide on-demand and streaming video into the home. As such, this raises questions concerning the most efficient use of the UHF spectrum (470–694MHz) in the longer term.~~

3.4.2 **Future trends for broadcasting:** The future of audio broadcasting in the UAE will likely be driven by the adoption of DAB, internet radio, and online audio services. TDRA is promoting DAB networks to ease congestion in the limited analogue FM radio bands, improving audio quality and variety as the industry transitions from traditional analogue methods.

In television broadcasting, the rise of internet-based platforms is reducing pressure on traditional spectrum use. However, the low adoption of DTT in the UAE raises questions about the best use of the UHF spectrum (470-694 MHz).

Technological advancements are expected to encourage convergence between broadcasting and IMT networks, a key focus of WRC-23. TDRA plans to support trials of broadcasting over 5G and work with stakeholders to explore innovative uses of the UHF spectrum, ensuring efficient and high-quality services.~~The technology trend for audio broadcasting is moving towards digital audio broadcast (DAB), internet radio and other online audio services. The TRA intends to encourage the broadcasting industry to continue with implementation of DAB networks, which the TRA sees as being an important step to alleviate congestion in the limited frequency bands available for analogue (FM) radio stations.~~

~~In the TV broadcasting sector, traditional content providers are facing strong competition from internet players, which are taking an increasing share of the viewership and relieving the pressure on broadcasting spectrum. Whilst this trend is occurring internationally, the low take up of digital TV using DTT in the UAE raises questions concerning the best use of UHF spectrum in the longer term.~~

~~Technology developments might also lead to greater convergence between broadcasting and IMT networks in future – a topic that is expected to be studied as part of an agenda item for the WRC 23. The TRA will consider encouraging technological trials from broadcasting over 5G~~ networks and work with stakeholders with interest in these developments.

3.4.3 **Spectrum outlook for broadcasting:** TDRA will implement the WRC-23 resolution related to UHF bands, aligning broadcasting and mobile services. To support efficient broadcasting, TDRA will assist with 5G broadcast trials and collaborate with stakeholders to explore innovative uses for broadcasting services.

~~The TRA will be further encouraging the introduction of DAB technology to ensure a more rapid transition from FM. The TRA will also initiate at ASMG, studies for an efficient use of the frequency spectrum from 470–694MHz for a regional decision ahead of WRC 23. The TRA will then determine the best strategy for this band~~.

Question 9: Do you support TDRA's plan to implement WRC-23 resolutions for UHF bands and promote trials of 5G broadcasting to optimize spectrum use for both broadcasting and mobile services? What additional strategies or actions do you think TDRA should consider to further enhance broadcasting services in the UAE?

3.5 Programme Making and Special Events (PMSE)

3.5.1 **Present status:** Audio and video PMSE are essential for the success of events in the UAE, with high spectrum demand, especially during major international events like the Abu Dhabi Formula One Grand Prix. TDRA manages this demand by optimizing spectrum allocation and usage regulations. Audio PMSE, including wireless microphones, operates across bands from 138 MHz to 1900 MHz, mainly within the UHF spectrum (470-694 MHz). Video PMSE, such as wireless cameras and video links, primarily uses frequencies from 1.98 GHz to 9.1 GHz, with significant activity in the 2.2-2.4 GHz band. TDRA has implemented

advanced regulatory measures to ensure efficient spectrum use, supporting high demand and technological advancements, and enabling the UAE to host international events seamlessly.~~Audio and video programme making and special events (PMSE) are important for the smooth running of small and major events taking place in the UAE. The UAE hosts several international events where demand for PMSE spectrum is at a peak. Major events occurring in the UAE (e.g. Abu Dhabi Formula One Grand Prix) create location- and time-specific peaks in demand for PMSE spectrum. There are broadly two categories, audio PMSE and video PMSE. Audio PMSE, which includes equipment such as wireless microphones, typically uses spectrum in several bands in the UAE from 138MHz up to 1900MHz (but with most use currently in the UHF spectrum between 470MHz and 694MHz). Video PMSE includes wireless cameras and video links and typically uses frequencies from around 1.98GHz up to 9.1GHz (but with a significant majority of use currently in the UHF spectrum between 2.2-2.4GHz). All PMSE equipment in the UAE is subject to the UAE regulations for PMSE.~~

3.5.2 **Future trends for PMSE:** The future of PMSE technology in the UAE is promising, driven by continued demand for audio and video solutions at various events. Regulatory bodies are expected to further optimize spectrum allocation to meet evolving needs. Technological advancements will likely lead to more sophisticated PMSE equipment with improved performance and flexibility. Integration with 5G, AI, and IoT could enhance PMSE capabilities, enabling seamless, real-time audio and video transmission. Overall, the outlook for PMSE in the UAE points to innovation and efficiency in supporting diverse event requirements. ~~Technological developments are enabling PMSE equipment to use spectrum more efficiently (e.g. video compression in the PMSE video sector, and evolution to digital technology in both the audio and video PMSE sectors). Indeed, technological developments and wider availability of digital equipment are meaning that use of higher-spectrum frequencies is now becoming practical, such as wireless cameras operating in the 7GHz band, and above. Audio PMSE typically uses UHF spectrum and it will be important to ensure that sufficient spectrum is provisioned for audio PMSE if future changes to allocations in the 470-694MHz band are made based on future WRC decisions, affecting the spectrum that is currently used by audio PMSE.~~

3.5.3 **Spectrum outlook for PMSE:** The ~~TRA~~ TDRA will take into account the needs of PMSE users and encourage the increase in quality of large-scale events in the UAE, learning for the management of such events in other countries. The ~~TRA~~TDRA will also ensure that the PMSE stakeholders are suitably engaged and consulted in order to identify suitable frequencies.

3.6 Private mobile radio

3.6.1 **Present status:** The private mobile radio (PMR) sector in the UAE is active, offering tailored land mobile services with increased network control for

businesses. PMR is an attractive option for those seeking customized communication solutions and greater resilience than public networks, especially with the rise of machine-to-machine (M2M) applications. PMR services in the UAE typically use frequencies between 137–174 MHz and 401–470 MHz.

To meet growing demand, TDRA has allocated additional spectrum, including the 350–380 MHz band, to support PMR users. Initiatives like PMR446 and LPD433 have also enabled UHF PMR to operate under Class Authorization, improving access and use of PMR services in the UAE.

~~The private mobile radio (PMR) sector is active in the UAE. PMR can be an attractive option for users looking for bespoke land mobile services or intending to have more control over the network they use. Additionally, with the growth of machine-to-machine (M2M) applications internationally, businesses may explore the option of PMR in order to get a more resilient service than the public networks can offer. PMR services in the UAE typically use frequencies between 137–174MHz and 401–470MHz.To make more spectrum available for PMR use, the TRA has allocated 350–380MHz as additional spectrum for PMR. PMR446 and LPD433 has provided opportunities for UHF PMR to avail Class Authorization.~~

3.6.2 **Future trends for PMR:** The future of private mobile radio (PMR) in the UAE is evolving with advancements in telecommunications technologies. Solutions like Push-to-Talk over Cellular (PoC) and PMR over WiFi are reshaping the PMR landscape, offering greater flexibility, scalability, and connectivity. PoC uses cellular networks for instant voice communication over wide areas, ideal for industries requiring real-time coordination, while PMR over WiFi leverages existing infrastructure for cost-effective communication, particularly indoors.

The convergence of PMR with technologies like IoT and cloud computing is expected to create new opportunities for real-time insights and optimized resource allocation. As these innovations develop, PMR will remain essential for mission-critical communications, enabling seamless coordination across sectors. Integrated PMR solutions with IoT sensors and data analytics will enhance operational efficiency and adaptability. The future of PMR in the UAE promises improved connectivity, flexibility, and functionality to meet the changing communication needs of businesses and industries.~~The PMR sector is moving from analogue to digital (digital mobile radio Tier I-III, digital private mobile radio, etc.) with integrated data transmission. Enhanced modulation techniques, increased spectral efficiency, interworking with legacy analogue and optimisation of the total cost of ownership (TCO) are the key factors.~~

~~The future of PMR services will depend on their ability to adapt to new capacity and speed requirements.~~

3.6.3 **Spectrum outlook for PMR:** The PMR landscape in the UAE is expected to evolve with global developments and technological advancements. The ITU and international bodies are exploring new frequency ranges, including 275–450

GHz, to support innovative PMR applications. Technological advancements such as 5G integration, Push-to-Talk over Cellular (PoC), PMR over WiFi, IoT, and AI are driving greater flexibility, scalability, and real-time capabilities in PMR systems. TDRA will continue to monitor these trends, considering the convergence of PMR with new technologies like LEO satellite systems, to enhance coverage and resilience. The focus will remain on ensuring spectrum efficiency and compatibility with other services while adapting to the diverse communication needs of sectors such as public safety, transportation, and industry. TDRA aims to maintain a flexible regulatory approach to accommodate future requirements and ensure PMR systems deliver secure and high-quality communications in the UAE.

~~No immediate changes to spectrum availability for PMR are envisaged by the TRA in this UAE Spectrum Outlook 2020–2025.Additional frequencies are being considered internationally for some types of land mobile use. Indeed, the ITU-R Report M.2417 provides technical and operational characteristics of land-mobile service applications in the frequency range 275–450GHz. This report details several types of land mobile use in these bands such as wireless kiosk links, ticket gate downloading mobile systems, inter-device communications and other close-proximity applications2. A recent WRC-19 decision supports the identification of the 275–296GHz, 306–313GHz, 318–333GHz, 356–450GHz bands for land mobile and fixed service applications.~~

Question 10: How can TDRA enhance spectrum management for PMSE and PMR to support the growing demand for high-quality, real-time communication in the UAE, particularly in light of technological advancements like 5G, IoT, and AI? What additional measures or strategies should be considered to ensure efficient spectrum use and innovation in these sectors?

3.7 Ultra-wide band and short-range devices

3.7.1 **Present status:** Low-power wireless technologies, operating within Class Authorization are expanding across various sectors. Applications include smart sensors for agriculture to monitor soil conditions and optimize irrigation, real-time monitoring of air and water quality for environmental management, and asset tracking in logistics, healthcare, and manufacturing. These technologies are also critical for developing smart city infrastructure to enhance resource management and urban living.

Wireless power transmission (WPT), particularly for electric vehicles (WPT-EV), is also gaining momentum, offering cable-free charging and increased user convenience. These advancements highlight the transformative potential of low-power wireless technologies for a more connected, efficient, and sustainable future.

WRC-23 considered the growing interest from national administrations in introducing additional mobile applications in the 6 GHz bands, including radio local area networks (RLANs) and wireless access systems (WAS). It maintained flexibility for regional and national decisions on whether to allocate this band for

RLAN or IMT.~~Ultra-wide band (UWB) and short range devices (SRD) are used for numerous low-power wireless applications, ranging from active medical implants to automatic meter reading, domestic alarms and wireless access systems. SRD technology forms the basis of many IoT technologies and services. NB-IoT using cellular networks is expected to develop in parallel to SRD-based IoT, providing wider-area coverage where needed.~~

~~It is important to note that IoT using spectrum that is class authorised in the UAE is using frequencies covered within the UAE spectrum regulations for UWB and SRD, ranging from 9kHz to 246GHz. While NB-IoT and other cellular IoT technologies are deployed within IMT networks, using spectrum identified for IMT use and licensed to mobile operators (typically using licensed bands that the MNOs have access to below 2GHz).~~

3.7.2 **Future trends for UWB and SRD:** Future trends in low-power wireless technologies and wireless power transmission will further transform industries and everyday life. In agriculture, precision farming will increasingly use wireless sensors for optimized resource allocation and crop management. Environmental monitoring will become more proactive, with sensor networks providing real-time detection and response to environmental issues.

Asset tracking will advance with AI and machine learning, improving predictive maintenance and operational efficiency. Smart city initiatives will expand, using low-power technologies for better infrastructure management, energy efficiency, and urban mobility. Healthcare monitoring will grow more personalized and preventive, leveraging wearable devices and remote systems for continuous health tracking and early intervention.

Advancements in wireless power transmission, especially for electric vehicle charging, will increase efficiency and scalability, promoting wider adoption. Innovations in interoperability and convenience will drive the growth of wireless charging technologies among consumers and businesses. Overall, these trends promise continued innovation, enhancing connectivity, efficiency, and sustainability across sectors.~~There have been several ITU-R working party studies related to NB-IoT deployed within IMT. Mobile satellite service (MSS) also offering IoT connectivity services. In addition, ITU-R Working Party 5A (WP5A) is working on a draft new report ITU-R M.[UTILITIES], which evaluates spectrum allocation for utilities and other critical infrastructure industries that provide essential energy and water services.~~

~~Numerous new applications are also developing using low-power wireless technologies in class authorised spectrum. Wireless power transmission (WPT) and wireless power transmission for electric vehicle (WPT-EV) applications are also being studied. Use of SRD in relation to medical applications is also on the increase, with inductive ultra-low power active devices such as medical implants, membrane implants, animal implants (amongst others) operating in VLF, LF and MF spectrum bands. In addition, Wi-Fi 6 (802.11ax) technology is evolving and there is growing use of radio local area network (RLAN) both in the UAE and worldwide, which is driving demand for SRD spectrum in the 5GHz range especially.~~

3.7.3 **Spectrum outlook for UWB and SRD:** ~~The TRA will implement WRC-19 decisions and update of the TRA UWB and SRD regulations with regards to WRC-19 decisions concerning the 5GHz band. The TRA will follow market and technology developments in SRD application and ensure that new applications are able to develop in the UAE and allocate additional spectrum, where relevant.~~ TDRA has updated the TDRA regulations for UWB and SRD in 2023 to ensure that new applications can flourish in the UAE and that more spectrum is allocated when necessary, the TDRA will continue to monitor market and technological advancements in SRD applications.

3.8 Intelligent transport systems

3.8.1 **Present ~~state~~status:** The UAE is advancing its transportation systems with a strong emphasis on wireless technologies to enhance sustainability and innovation. Currently, 9.4% of Dubai's transportation comprises self-driving vehicles, with a target of 25% by 2030. This transition relies on robust wireless communication networks to enable vehicle-to-everything (V2X) connectivity, enhancing road efficiency and safety through real-time data exchange.

The development of the UAE's rail systems also incorporates wireless technologies. The Etihad Rail project and the driverless Dubai Metro rely on advanced wireless communication systems for real-time monitoring, control, and automation, ensuring seamless integration with other intelligent transport systems (ITS) to optimize passenger and freight movement.

The UAE is also adopting wireless technologies to support electric and hydrogen-fueled vehicles. Additionally, wireless connectivity underpins smart traffic management systems, enabling real-time traffic monitoring, intelligent signal controls, and dynamic rerouting to reduce congestion and improve safety.

Moreover, the UAE is exploring wireless communication for air mobility solutions, such as air taxis, and integrating these technologies into broader ITS frameworks. Overall, these initiatives highlight the UAE's commitment to leveraging wireless systems to build a more connected, efficient, and sustainable transportation ecosystem.. ~~Intelligent transport systems (ITS) are regarded as an important technological development in the UAE, with applications across various modes of transportation including road and rail. The national railway company of the UAE (Etihad Rail) is already using GSM-R, which in the future may require LTE technology, providing additional data functionality for the railway systems. International developments in the automotive sector are driving demand for connected cars and, in future, fully autonomous vehicles.~~

3.8.2 **Future trends for ITS:** Globally, intelligent transportation systems (ITS) are driving innovation across railways, integrated road transport, and the automotive industry. Future trends include the expansion of electric and hydrogen-fueled vehicles, clean marine transport, and air mobility solutions like air taxis, supported by advanced wireless technologies for real-time data exchange, smart traffic management, and vehicle-to-everything (V2X) connectivity. Vehicles will increasingly use technologies like LIDAR and low-power wireless communication to enhance safety and efficiency. ~~ITS is the future of transportation in railways (main and urban rail), integrated road transport (road toll, signage, sensors,~~

safety, buses, taxi etc.), and the automotive industry. Many new connected vehicles use intelligent technologies in the vehicles' combined advanced traffic management, advanced traveller information, advanced public transportation management systems and/or advanced fleet management systems. Future vehicles are expected to use a range of technologies including LIDAR as well as low powered wireless connectivity between roads and vehicles. These developments are taking place globally and it will be important for the UAE market to lead in these fields. In line with its ambitions in this field, the government has launched the "Dubai Autonomous Transportation Strategy" which aims to transform 25% of the total transportation in Dubai to autonomous mode by 2030.

3.8.3 **Spectrum outlook for ITS:** The outcome of WRC-19, highlighted the importance of progressing technical and operational studies on ITS in order to facilitate global or regional harmonized frequency bands, in particular for the implementation of railway radio systems between train and trackside (RSTT) and ITS implementation using existing mobile service allocations. ITU has also published ITU-R Recommendations and Reports on ITS. The TRA will ensure that stakeholders are consulted in development of future ITS spectrum strategy and the TRA intends to produce a specific technical regulation for meeting ITS spectrum needs. Frequency ranges in VHF and UHF have been identified for global railway applications such as train radio, positioning information, remote control, and surveillance. TDRA Regulations for UWB and SRD V5.0 include several frequency ranges for railways, transportation, and traffic telematics. In order to meet the needs for ITS spectrum, the TDRA plans to create a specific technical regulation and will make sure that stakeholders are consulted during the development of any future ITS spectrum strategy.

Question 11: How should the TDRA prioritize spectrum allocation and regulatory measures to support the growth of low-power wireless technologies (UWB, SRD) and Intelligent Transport Systems (ITS) in the UAE, given emerging trends like smart cities, autonomous vehicles, and sustainable transportation?

3.9 Aeronautical radio systems

3.9.1 **Present status:** The UAE's aeronautical radio systems, regulated by TDRA, encompasses a range of technologies from beacons to advanced radar systems, ensuring global coordination. With major carriers like Emirates, Etihad Air Arabia, Fly Dubai, etc, the sector is growing rapidly, with a projected 5.0% annual increase in air transport until 2036. Innovations such as WAIC and onboard broadband connectivity highlight the industry's progress, while the rise of drone applications is reshaping airspace management and regulation. The UAE's aeronautical sector remains at the forefront of aviation technology, driving future advancements in air transport.The TRA's national regulations for aeronautical radio systems define various categories of aeronautical radio use, which use frequencies in several bands for beacons in the kHz range and several bands from around 3MHz to 94GHz which captures a wide range of equipment including

~~mobile satellite and radar technology. Aeronautical regulations are co-ordinated internationally and hence the frequencies used for aeronautical radio systems are internationally defined and co-ordinated. The substantial growth of Emirates, Etihad and other UAE-based air carriers (such as flydubai and Air Arabia) in the past decade has established the airline industry in the country as one of the most important and progressive markets across the world.[3] In the Middle East, the International Air Transport Association has forecast an average annual growth rate of 5.0% from 2017 to 2036.[4] The number of aircraft registrations and new aeronautical radio authorisations has been increasing in the UAE. In the UAE, the aeronautical industry has been leading the international community with the deployment of wireless avionics intra-communications (WAIC), advanced surface movement guidance and control systems (A-SMGCS), cellular on board, Wi-Fi on board the aircraft and now broadband connectivity to aircraft through ESIM.~~

3.9.2 **Future trends for aeronautical radio systems:** The aeronautical sector is advancing with autonomous infrastructure and smart functionalities at airports and in air traffic management, enhancing flexibility, safety, and convenience. High-throughput satellites and air-to-ground (ATG) systems are being developed to provide reliable broadband connectivity to aircraft, meeting passenger data and entertainment needs. The potential use of IMT networks for urban air mobility and drone operations further highlights the sector's focus on integrating new technologies. These developments emphasize the critical role of spectrum allocation and management in supporting connectivity and innovation in aviation. to consider appropriate regulatory actions to update Appendix 26 to the Radio Regulations in support of aeronautical mobile (OR) high frequency modernization, in accordance with Resolution 411 (WRC-23).~~The aeronautical sector is expected to see the development of fully autonomous and smart infrastructure implemented across the different functionalities of aeronautical transportation, making travel more flexible, safe and convenient. The airports are also expected to undergo developments with fully automated functionality for air traffic, passengers and luggage management. Airspace management will see technological developments such as enhanced 4D sensors and flexible trajectories to efficiently manage the air traffic.~~

3.9.3 ~~High-throughput satellites are being developed to provide broadband connectivity to the aircraft, meeting data and 'infotainment' requirements for airlines and their passengers, and allowing for seamless connectivity at airports~~

Question 12: How can the TDRA best adapt its spectrum management policies to support the evolving needs of the UAE's aeronautical sector, including emerging technologies like high-throughput satellite systems, air-to-ground communications, and urban air mobility, while ensuring compliance with international regulations and standards?

and during flights. Connected and autonomous aircraft features will require wireless connectivity. These developments are likely to increase the demand for spectrum which will be a critical enabler for the aeronautical sector. Urban air mobility (UAM) vehicles are also expected to emerge over time, creating demand for connectivity solutions for beyond visual line of sight (BVLOS) communications below commercial airspace. One potential connectivity solution to provide this BVLOS connectivity for UAS and UAM is to use IMT (4G/5G) networks. A provisional agenda item for WRC-27 will consider the use of existing IMT spectrum identifications in the 694–960MHz frequency range, and possible removal of the limitation regarding aeronautical mobile in the IMT, such that IMT networks can be used to connect devices (user equipment) that are airborne at low altitudes, such as for UAM and UAV. A separate item – using high-altitude platform stations as IMT base stations in IMT bands below 2.7GHz – has also been discussed internationally.

3.9.4 **Spectrum outlook for aeronautical radio systems:** TDRA will continue to monitor global aviation wireless needs through the International Civil Aviation Organization (ICAO) and ITU, and maintain close communication with aviation stakeholders, including the General Civil Aviation Authority (GCAA), during the implementation of the UAE Spectrum Outlook. TDRA will update its regulations for aeronautical radio systems to align with spectrum requirements, regulatory standards, WRC-23 decisions, and GCAA guidelines. Maintaining access to internationally agreed spectrum bands is essential to ensure global coordination of aviation spectrum, technologies, and requirements.The TRA will continue to follow all aviation sector wireless needs at international level through International Civil Aviation Organisation (ICAO) and ITU. The TRA will continue to collaborate with all aviation stakeholders during the execution phase of the UAE Spectrum Outlook. The TRA will update its regulations on aeronautical radio systems to meet the related spectrum needs and regulatory provisions as well as implement WRC-19 decisions. It is important to note, however, that the need for global co-ordination of spectrum, technologies and requirements for aviation use means that access to spectrum for aeronautical radio systems in the UAE must be kept in alignment with internationally agreed spectrum bands.

3.10 Maritime radio systems

3.10.1 **Present status:** Maritime communication is vital for navigational safety and data transmission across inland waterways, sea, air, space, and terrestrial domains. Technologies range from short-range systems like Wi-Fi and Bluetooth to wide-area systems such as SATCOM for global coverage. Narrowband solutions are enabling long-distance, low-power communication, while broadband options like cellular networks and VSAT support high-speed data transmission for multimedia applications. However, current maritime communication networks (MCNs) still lag behind 5G in performance, and managing UAV-based networks remains challenging due to their dynamic nature and environmental factors. The maritime sector plays a pivotal role in the UAE, with Dubai being one of the biggest global

~~container ports in the world. Maritime radio systems generally use frequencies between 415kHz and 14GHz for a range of different equipment according to the UAE spectrum regulation for maritime radio systems.~~

3.10.2 **Future trends for maritime radio systems:** The future of maritime communication will be shaped by advanced technologies like UAVs and USVs, which provide cost-effective coverage without relying on satellite systems. UAVs can function as mobile aerial base stations, while USVs offer autonomous data collection and flexible wireless communication to remote devices. Integrating IoT, including the Industrial Internet of Things (IIoT) and the Internet of Underwater Things (IoUT), will enhance applications such as smart containers, autonomous underwater vehicles (AUVs), and real-time data collection, supporting cargo tracking, fleet management, environmental monitoring, and disaster prevention.

Additionally, studies and regulatory measures are being developed for using the 47.2-50.2 GHz and 50.4-51.4 GHz (Earth-to-space) bands for aeronautical and maritime earth stations in motion, communicating with both geostationary and non-geostationary satellites. TDRA is updating its Maritime Radio Systems Regulations in the UAE, with new guidelines expected in 2025.~~In the maritime sector, a number of new technologies are being considered. For example, in the modernisation plan of the Global Maritime Distress and Safety System (GMDSS). These new technologies are expected to improve safety, move cargo more efficiently and maximise spectrum efficiency.~~

3.10.3 **Spectrum outlook for maritime radio systems:** To meet spectrum needs and comply with WRC-23 decisions, TDRA will update its regulations on maritime radio systems. TDRA will monitor global advancements and participate in WRC-27 and WRC-31 studies affecting the maritime sector, while seeking feedback from industry stakeholders throughout the outlook period~~he TRA will be implementing WRC-19 decisions and update the TRA regulations on maritime radio systems to meet the related spectrum needs and regulatory provisions from the WRC-19 decisions. The TRA will continue following international developments in the sector and participate in WRC-23 and WRC-27 studies affecting the maritime sector. Input from the maritime sector will be sought during the duration of the outlook.~~

Question 13: What specific regulatory measures and spectrum allocations should TDRA prioritize to enhance maritime communication technologies, such as UAVs, USVs, and IoT applications, while ensuring alignment with global standards and upcoming WRC-27 and WRC-31 studies?

3.11 Unmanned aircraft systems

3.11.1 **Present status:** TDRA regulations define the frequency ranges, usage, and conditions for Unmanned Aerial Systems (UAS), based on past WRC decisions regarding satellite networks for UAS connectivity. The integration of UAS into IMT (4G/5G) networks is set to transform civil applications, from scientific research to delivery services. UAS technologies are already enhancing industries like oil and gas through efficient infrastructure inspections and advanced data collection.

Companies like Amazon are also exploring drones for direct customer deliveries, improving last-mile logistics~~.TRA regulations for unmanned aircraft radio systems (UAS), currently provides frequency ranges for UAS, their use and applicable usage conditions, based on decisions taken at previous WRCs on use of satellite networks for UAS connectivity.~~

3.11.2 **Future trends for UAS:** The future of Unmanned Aerial Systems (UAS) will see significant advancements, particularly in autonomous capabilities, allowing them to perform complex tasks with minimal human intervention. Enhanced sensor technology will improve data collection and analysis, enabling detailed environmental monitoring and precise mapping. Integration with 5G networks will boost connectivity, supporting real-time communication and extended range. Advances in propulsion systems and materials will increase endurance and payload capacity, expanding applications in environmental research, infrastructure inspection, and emergency response. Overall, UAS will drive transformative innovations across diverse fields. ~~In the future, UAS connectivity may use IMT (4G/5G) networks. UAS are increasingly being used for civil applications where it is not feasible or practical to rely on extended human-piloted flights; these include long-duration scientific research, remote sensing, firefighting, aerial photography, land and crops surveying, border protection and emergency management, among other uses.The use of drones in the oil and gas industry is growing and the technology has a lot to offer for the industry. Drones are effective in midstream operations, providing efficient visual inspections of pipeline rights-of-ways and in other operations such as systemic sensing.UAS are also envisioned to be the drivers of future delivery services. Companies focusing on e-commerce activities, such as Amazon, are already trialling the use of drones, not only to manage their warehouse stock but also to deliver goods to the end customer.~~

3.11.3 **Spectrum outlook for UAS:** TDRA will monitor industry advancements and assess future spectrum needs for aviation and UAS innovations, including urban air mobility (UAM). A provisional agenda item for WRC-27 involves reviewing mobile allocations between 694 and 960 MHz to potentially remove the "except aeronautical" restriction, enabling UAS to connect to air and ground via IMT networks using airborne IMT equipment~~The TRA will closely follow developments in sector and seek to understand the future spectrum needs of both the aeronautical sector and UAS-related developments including UAM. A provisional agenda item for the WRC-27 is seeking to review the status of mobile allocations between 694-960MHz with a view to removing the 'except aeronautical' limitation. This is being envisaged to enable use of IMT networks to provide air~~

Question 14: How should TDRA adapt its spectrum management and regulatory frameworks to support the integration of Unmanned Aerial Systems (UAS) with emerging technologies, such as 5G and urban air mobility, while aligning with global standards and the outcomes of WRC-27?

~~to ground, and ground to air, connectivity for UAS via airborne IMT user equipment.~~

3.12 Amateur radio

3.12.1 **Present status:** Amateur radio spectrum in the UAE is recreationally by radio enthusiasts. It is also used by universities for training, instruction, and research projects, including lab tests involving amateur satellite spectrum~~. Amateur radio spectrum is primarily used for training and education by universities or as a leisure activity (e.g. a hobby for radio enthusiasts). Indeed, universities in the UAE are using amateur satellite spectrum in academic projects and in laboratory experiments.~~

3.12.2 **Future trends for amateur radio:** No significant changes are expected in the amateur sector in the near future. WRC-31 will consider new allocations for amateur and amateur satellite use.~~ The amateur sector is not expected to undergo significant changes in the next few years. Recent decisions taken at WRC-19 will provide a primary allocation for amateur use in the UAE between 50-54MHz.~~

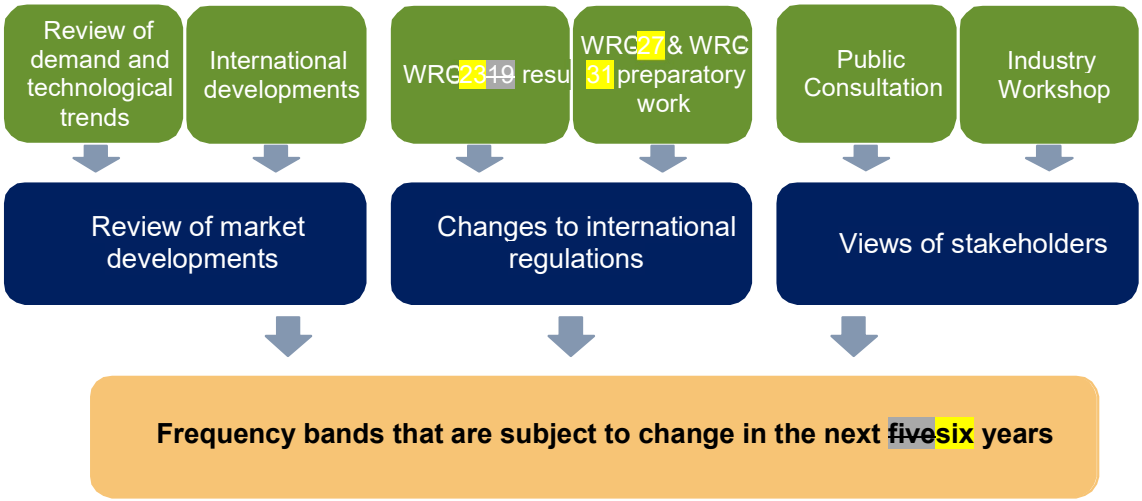
3.12.3 **Spectrum outlook for amateur radio:** TDRA has updated its Regulations for Amateur Radio Systems 3.0 in 2020, In order to align with WRC-31 decisions, TDRA will update its regulations for amateur radio systems, seek feedback from the amateur community, and monitor global developments as needed. ~~The TRA will update the TRA regulations on amateur radio systems to meet the related spectrum needs and decisions taken at WRC-19. The TRA will follow international developments and seek input from the amateur community, when required.~~

Question 15: How should TDRA engage with the amateur radio community to ensure that future regulations align with global standards and address the evolving needs of amateur and amateur satellite services?

4. Indicative spectrum re-planning roadmap

The roadmap for future spectrum use and associated re-planning activities takes account of future trends~~that have been identified in the review of wireless systems development,~~ international developments and anticipated future demand for spectrum. The roadmap also takes account of comments received in response to the ~~TRA~~TDRA's public consultation on the draft UAE Spectrum Outlook issued in February/March 2025. , ~~issue date 30 September 2019.~~

To identify frequency bands that ~~might~~ may be subject to change in use over the next ~~five~~ six years, the ~~TRA~~TDRA has thus taken account of several inputs, as summarised below:



To implement changes, the ~~TRA~~TDRA will take different actions depending on the nature of the band in question and the nature of the changes being proposed. Actions that the ~~TRA~~TDRA will need to take are summarised as follows:

Change of Use

- Bands which are currently used by an existing service in the UAE, which are to be studied for a change of use taking account of UAE market demand, and which might include studies on existing usage, sharing, re-planning and changes to existing UAE spectrum national regulations, etc.

Spectrum Release

- Bands which are currently unused, where parts of the band are available for new use, which can be immediately planned for spectrum release (i.e. without a need to re-plan existing use)

Further Study

- Bands that might be subject to a future change of use in the UAE, but subject to decisions of a future WRC- which might be the subject of further studies that the TDRA should carry out

Follow International Developments

- Bands that are subject of international developments, which the TDRA should follow in order to identify their relevance to the UAE

It is important to note, however, that this roadmap is indicative and will have to remain flexible and dynamic to align with developments in:

- equipment availability
- market demand
- changes in industry standards.

The tables below summarise the actions identified for the ~~TRA~~TDRA over the period ~~2020–2025~~2026- 2031 of this spectrum outlook.

Question 16: What factors should TDRA prioritize when updating the spectrum re-planning roadmap to ensure it remains flexible and responsive to changes in market demand, equipment availability, and industry standards?

IMT

The following table identifies bands subject to potential changes relevant to public mobile and IMT, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
2025-2026	614-694 MHz	Change the current use from Broadcasting applications (i.e. PMSE) to IMT use
~~**2020–2021**~~	~~*26.5–27.5GHz*~~	~~Since no fixed links are currently operational in the band, initiate actions to make the band available for IMT (5G) use, with the relevant technical conditions in regulations in line with mobile equipment specifications and to ensure protection of EESS (passive) as agreed by WRC-19.~~
~~**2020**~~**2025–**~~**2021**~~**2026**	*2.3–2.4GHz*	~~Study existing~~Implement usage of the band and plan for deployment of PPDR 5G networks.
~~**2021–2022**~~	~~*24.25–26GHz*~~	~~Initiate studies and collaborate with operators to share parts of this band between fixed and mobile or change the use from fixed to mobile/IMT use. Taking account of the two-stage mechanism for the protection of passive services in 23.6–24GHz as agreed by WRC-19, when preparing regulations for use of this band by IMT systems, ensure that the regulations include limits for the protection of EESS (passive).~~
2025-2026	*3800-4000 MHz*	Evaluate the feasibility of releasing this band for IMT (5G) use, taking into account international interest and potential harmonization strategies to meet growing mobile broadband requirements.
~~**2023**~~**2028–**~~**2024**~~**2030**	*37–40.5GHz*	Initiate studies and collaborate with operators to share parts of this band between fixed and mobile or change the use from fixed to mobile, for use by IMT (5G) systems. When authorising for IMT, ensure protection of EESS (passive) in the 36–37GHz band, according to WRC-19.
~~**2023**~~**2029–**~~**2024**~~**2031**	*40.5–43.5GHz*	Conduct industry consultation to consider making available parts of this band for IMT(5G) systems, based on standards development and equipment availability.
~~**2023**~~**2028–**~~**2024**~~**2031**	*66–71GHz*	Initiate studies to bring into use the band for IMT, taking account of the decision at WRC-19.

Spectrum release		
2025-2026	614-694 MHz	Commence detailed planning to authorise spectrum in this band for IMT use to mobile operators, Facilitate immediate use by both licensees, given the ecosystem readiness and request for allocation.
2025-2026	6.425–7.125 GHz	Allocate this band for IMT use, as the ecosystem is supposed to be ready by Q1 2025. Coordinate with both licensees to support deployment and utilization, based on successful trials in 2023.
~~2020~~2025–~~2021~~2026	*1427–1518MHz*	Resume coordination with licensees, vendors and chipset manufacturers to make sure the availability of equipment and ~~Commence detailed planning~~ to authorise spectrum in this band for IMT use to mobile operators~~, based on standards development and equipment availability.~~
~~2021~~2026–~~2024~~2031	*Release of any other bands confirmed by change of use studies, as above and as per the results of the IMT bands re-planning conducted in 2024 with agreed plan mutually agreed by TDRA and licensees*	
Further study		
2026-2028	*4 400-4 800 MHz*	Participate in studies under WRC-27 Agenda Item 1.7 to evaluate potential identification of this band for IMT use, considering its strategic importance for expanding mobile broadband coverage in both urban and rural settings.
2026-2028	*7 125-8 400 MHz*	Engage in studies under WRC-27 Agenda Item 1.7 to explore the possible identification of parts of this band for IMT use in. This includes evaluating sharing and compatibility with existing services and possible use for IMT applications.
2026-2028	*14.8-15.35 GHz*	Conduct studies under WRC-27 Agenda Item 1.7 to consider identifying this band for terrestrial IMT use. Focus on the technical, operational, and regulatory aspects, including protection of existing services and services in adjacent bands.
~~**2020–2023**~~	~~*Various*~~	~~Participate in studies for WRC-23 for the potential use of IMT technology for fixed wireless broadband in the frequency bands allocated to the fixed services on primary basis, in accordance with Resolution COM6/18 (WRC-19).~~
~~**2020–2023**~~	~~*6.425–7.125GHz*~~	~~Participate in studies for WRC-23 on consideration on potential identification of spectrum in the 6425–7025MHz and 7025–7125MHz bands for IMT.~~
~~**2020–2023**~~	~~*694–960MHz*~~	~~Participate in WRC-23 studies (under WRC-23 agenda~~

	~~*1710–1885MHz*~~ ~~*2.5–2.69MHz*~~	~~item (A.I.) 1.4) on the potential use of HAPS as IMT base stations (HIBS) in the mobile service in selected frequency bands below 2.7GHz already identified for IMT, on a global or regional level.~~
~~**2024–2027**~~	~~*694–960MHz*~~	~~Participate in studies in preparation for decisions at WRC-27 consideration of the possible removal of the limitation regarding aeronautical mobile in IMT, for the use of IMT networks for air-to-ground and ground-to-air connectivity for airborne user equipment in the 694–960MHz frequency range (Region 1).~~
Follow international development		
2020–2024	*Monitor and align with global standards and technology developments related to IMT, such as 5G-Advanced and early-stage 6G, including new bands and use cases.*~~*Follow international developments relevant to IMT standards and technology and consider their relevance in the UAE.*~~	

Fixed radio systems

The following table identifies bands subject to potential changes relevant to fixed radio systems, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
2026–2028~~**2020–2022**~~	*31–31.3GHz*	Consider allocating or assigning this band for High-Altitude Platform Stations (HAPS), ensuring protection measures for existing services, in line with WRC-19 and WRC-23.~~In line with WRC-19 decision, initiate actions for the introduction of HAPS with protection measures for existing services.~~
2026–2028~~**2020–2022**~~	*38–39.5GHz*	Evaluate allocation or assignment for HAPS, considering protection for incumbent services and new use cases identified in WRC-23 and ongoing WRC-27 studies~~In line with WRC-19 decision, initiate actions for the introduction of HAPS with protection measures for existing services.~~
2026–2028~~**2020–2022**~~	*47.2–47.5GHz* *47.9–48.2GHz*	Consider refining technical and regulatory provisions for HAPS allocation in this band, including protection measures for existing services, as guided by WRC-19 and WRC-23 decisions. Align with regional strategies for satellite and HAPS coexistence~~In line with WRC-19 decision, refine the technical/regulatory provisions made to the allocation of the spectrum for HAPS.~~

2026–2029~~2023–2024~~	*275–296GHz* *306–313GHz* *318–333GHz* *356–450GHz*	Explore allocation of these bands for land mobile and fixed services, focusing on technological developments and equipment availability, while maintaining protection of Earth Exploration Satellite Service (EESS) and considering GCC collaboration.~~Consider making available some or all of these bands to land mobile and fixed service applications in accordance with decisions taken at WRC-19, and taking account of technology developments, while maintaining the protection of EESS as per the WRC-19 decision.~~
Spectrum release		
~~2024~~ 2026 and beyond	*275–296GHz* *306–313GHz* *318–333GHz* *356–450GHz*	Consider ~~Implement~~ implementing necessary changes in UAE regulations for fixed radio systems to make these bands available for point-to-point and point-to-multipoint use, subject to market demand, and taking account of the studies above, along with equipment availability.

Further study		
~~2024~~2025 and beyond	*71–76GHz* *81–86GHz*	Participate in WRC-27 studies to review the technical conditions associated with these bands, including sharing possibilities between fixed radio systems and NGSO satellite services, with a focus on GCC region harmonization~~Participate in WRC-27 studies on review of technical conditions associated with use of these bands including sharing between fixed radio systems and NGSO satellite services.~~
Follow international development		
~~2024~~ 2025 and beyond	*Above 95GHz*	Monitor international developments and GCC regional initiatives concerning equipment availability and use of bands above 95 GHz for fixed radio systems. Align with the emerging standards and potential applications as identified by WRC-27 studies~~Follow international developments in relation to equipment availability and use of bands above 95GHz for fixed radio systems.~~

Satellite

The following table identifies bands subject to potential changes relevant to satellite services, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
~~2020~~2026–~~2022~~2029	*137–138MHz*	Consider regulatory actions to facilitate the use of this band for space operation services associated with short-duration mission satellite systems, in line with WRC-19 and WRC-23 decisions. Ensure coordination with regional needs and developments.~~In line with WRC-19 decisions, initiate actions to facilitates the use of the bands in the UAE for space operation services associated with short-duration mission satellite systems.~~
	148–149.9MHz	
2026–2029~~2020–2022~~	*401–403MHz*	Adjust national regulations regarding in-band power limits for Earth Exploration Satellite Service (EESS) and Meteorological Satellite (MetSat) systems, following WRC-19 and WRC-23 decisions. Consider regional requirements for harmonized use.~~In line with WRC-19 decisions, initiate actions to adjust regulation for in-band power limits for EESS and MetSat systems in this band.~~
~~2020–2022~~	~~*399.9–400.02MHz*~~	~~In line with WRC-19 decisions, initiate actions to adjust national regulations relating to in-band power limits for MSS in this band.~~
~~2020~~2026–~~2022~~2028	*17.7–19.7GHz*	Implement regulatory changes to allow Earth Stations in Motion (ESIM) to communicate with GSO Fixed Satellite Services (FSS) satellites, considering emission limits established by WRC-19 and aligning with new WRC-23 outcomes.~~In line with WRC-19 decisions, initiate actions to allow use of these bands for Earth stations in motion (ESIM) communicating with GSO FSS satellites, with associated emission limits as decided by WRC-19.~~
	27.5–30GHz	
~~2020~~2026–~~2022~~2029	*37.5–39.5GHz*	Develop a regulatory framework for non-GSO FSS satellite systems in these bands, considering WRC-19 decisions and regional strategies. Include coordination mechanisms with other users, such as IMT, and consider harmonized satellite use in the region.~~In line with WRC-19 decisions, take actions to develop the regulatory framework for non GSO FSS satellite systems that may operate in 37.5–39.5GHz (s-E), 39.5–42.5GHz (s-E), 47.2–50.2GHz (E-s) and 50.4–51.4GHz (E-s) with the associated limits as agreed by WRC-19. See also actions~~
	39.5–42.5GHz	
	47.2–50.2GHz	
	50.4–51.4GHz	

		in the table above relating to consideration of use of parts of the 37–43.5GHz band for mobile services, for IMT.
20202026–20222028	*51.4–52.4GHz*	Implement actions to establish a new primary allocation for FSS (Earth-to-space) in the UAE national frequency plan, in line with WRC-19 and WRC-23 decisions. Ensure compatibility with existing services and regional requirements.In line with WRC-19 decisions, initiate actions to implement a new primary allocation for the FSS (Earth-to-space) in the UAE national frequency plan.
Spectrum release		
Update and revise Earth station regulations for any bands confirmed by change-of-use studies for satellite use, incorporating results from WRC-23 and WRC-27 outcomes and considering regional harmonization.Update and revise Earth station regulations for any bands confirmed by change of use studies above for satellite use		
Further study		
20202025–20232027	*45MHz (around)*	Participate in WRC-27 studies on spectrum needs for a potential new secondary allocation to EESS for spaceborne radar sounders, ensuring protection for incumbent services. Align with regional and global study outcomes.Participate in studies planned for consideration at WRC-23 on spectrum needs for a possible new secondary allocation to EESS for spaceborne radar sounders, taking into account the protection of incumbent services.
20202025–20232027	*2010–2025MHz*	Engage in WRC-27 studies on new allocations for the MSS for narrowband mobile-satellite systems. Align UAE's interests with potential allocations in bands like 1695–1710 MHz, 3300–3315 MHz, and 3385–3400 MHz, taking into account regional trends.Participate in WRC-23 studies relating to spectrum and operational needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems, in this band and in several other bands (1695–1710MHz, 3300–3315MHz and 3385–3400MHz), as determined by WRC-19.
20202025–20232027	*11.7–12.7GHz*	Participate in studies for the provision of inter-satellite links in these bands, considering global trends and specific UAE needs. Align with WRC-27 agenda items and regional proposals for optimal spectrum utilization.In preparation for WRC-23, participate in studies to consider the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, including in 11.7–12.7GHz,

		~~18.1–18.6GHz, 18.8–20.2GHz and 27.5–30GHz, or portions thereof, as determined by WRC-19.~~
~~2020~~2025–~~2023~~2027	*14.8–15.35GHz*	Participate in studies for a potential upgrade of allocation to the space research service, as determined by WRC-27 agenda items. Collaborate with regional entities to harmonize usage~~Participate in studies leading up to WRC-23 consideration of a possible upgrade of the allocation to the space research service, as determined by WRC-19.~~
~~2020~~2025–~~2023~~2027	*17.7–18.6GHz*	Engage in WRC-27 studies to develop technical, operational, and regulatory measures for non-GSO FSS Earth stations in motion, ensuring protection of existing services and aligning with GCC interests.~~Participate in studies for consideration at WRC-23 concerning the development of technical, operational and regulatory measures to facilitate the use of the frequency bands 17.7–18.6GHz and 18.8–19.3GHz, 19.7–20.2GHz as well as 27.5—29.1GHz and 29.5–30GHz by non-GSO FSS Earth stations in motion, while ensuring due protection of existing services.~~
	18.8–19.3GHz	
~~2020~~2025–~~2023~~2027	*27.5–30GHz*	Engage in studies for inter-satellite links and other satellite service improvements, considering regional coordination efforts, WRC-27 outcomes, and UAE-specific applications.~~In preparation for WRC-23, participate in studies to consider the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, including in 11.7–12.7GHz, 18.1–18.6GHz, 18.8–20.2GHz and 27.5–30GHz, or portions thereof, as determined by WRC-19.~~
2025–2027~~2020–2023~~	*231.5–252GHz*	Participate in WRC-27 studies to review or adjust frequency allocations to EESS (passive), aligning with remote-sensing observation needs and emphasis on space research and environmental monitoring.~~For WRC-23, participate in studies to review and consider possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) to ensure alignment with the latest remote-sensing observation requirements.~~
2025 and beyond	*Various Frequencies*	Participate in studies to be included in the WRC-27 agenda, focusing on potential new allocations to MSS, EESS, or other satellite services. Engage with GCC countries to ensure a coordinated regional strategy.
~~2022–2023~~	*~~18.1–18.6GHz~~*	~~In preparation for WRC-23, participate in studies to consider the appropriate regulatory actions for the provision of inter-satellite links in specific frequency~~

	~~*18.8–20.2GHz*~~	~~bands, or portions thereof, including in 11.7–12.7GHz, 18.1–18.6GHz, 18.8–20.2GHz and 27.5–30GHz, or portions thereof, as determined by WRC-19.~~
~~**2022–2023**~~	~~*19.7–20.2GHz*~~	~~Participate in studies for consideration at WRC-23 concerning the development of technical, operational and regulatory measures to facilitate the use of the frequency bands 17.7–18.6GHz and 18.8–19.3GHz, 19.7–20.2GHz as well as 27.5—29.1GHz and 29.5–30GHz by non-GSO FSS Earth stations in motion, while ensuring due protection of existing services.~~
	~~*27.5–29.1GHz*~~	
	~~*29.5–30GHz*~~	
~~**2024**~~ **2025 and beyond**	*1.5–5GHz (or parts thereof)*	Participate in possible studies being considered for inclusion in the agenda for WRC-27 on spectrum needs and possible worldwide allocation to the mobile satellite service for the future development of narrowband mobile-satellite systems in frequency bands in the range 1.5–5GHz (exact frequencies to be confirmed, as determined by WRC-19 and subsequent studies leading up to WRC-23).
~~**2024**~~ **2025 and beyond**	*1525–1544MHz*	Participate in possible studies being considered for inclusion in the agenda for WRC-27 studies of the technical and operational matters, and regulatory provisions, for space-to-space links among non-geostationary and geostationary satellites operating in the mobile-satellite service in these frequency bands, as determined by WRC-19 and in accordance with the preliminary agenda for WRC-27.
	1545–1559MHz	
	1610–1645.5MHz	
	1646.5–1660.5MHz	
	2483.5–2500MHz	
~~**2024**~~**2025 and beyond**	*22.55–23.15GHz*	Participate in possible studies being considered for inclusion in the agenda for WRC-27 relating to consideration of a new EESS (Earth-to-space) allocation in the band 22.55–23.15GHz, as determined by WRC-19.
~~**2024**~~ **2025 and beyond**	*43.5–45.5GHz*	Participate in possible studies being considered for inclusion in the agenda for WRC-27 relating to consideration of the allocation of all or part of this band to the fixed-satellite service.
~~**2024**~~**2025 and beyond**	*71-76GHz*	Participate in possible studies being considered for inclusion in the agenda for WRC-27 relating to review of the conditions for the use by stations in the satellite services to ensure compatibility with passive services.

	81–86GHz	Participate in studies for consideration at WRC-27 relating to consideration of the development of regulatory provisions for non-geostationary fixed-satellite system feeder links in these bands.
Follow international development		
~~2020~~2025-~~2024~~2031	*Monitor international developments and regional strategies regarding satellite services. Assess relevance and applicability to UAE's national spectrum plan and regulatory frameworks.* ~~*Follow international developments relevant to satellite services and consider their relevance in the UAE.*~~	

Broadcasting

The following table identifies bands subject to potential changes relevant to broadcasting, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
~~2020~~2026–~~2022~~2028	*174–230MHz*	Collaborate with stakeholders in the broadcasting sector and UAE government to encourage the continued preparation and deployment of Digital Audio Broadcasting (DAB) networks to facilitate the introduction of new digital radio services, in line with international trends and GCC strategies. ~~Work with relevant stakeholders in the broadcasting sector and government of UAE to encourage the industry to continue to prepare for launch of DAB networks, to facilitate new digital radio services.~~
Spectrum release		
~~2020~~2026–~~2024~~2031	*Release of any bands confirmed by change of use studies, as above.*	
Further study		
~~2020~~2026–~~2023~~2027	*470–694MHz*	~~Initiate~~ Continue discussions and studies at the Gulf regional level (Gulf Cooperation Council, GCC, and Arab Spectrum Management Group, or ASMG) to evaluate the present use of spectrum in this band, and potential future use by IMT in the band or part of it. Study the alternative requirements for broadcasting channels and coordination between neighbouring countries to protect their services.

		~~In addition, participate in international studies for review at WRC-23 in relation to the same subject, including the spectrum use and spectrum needs of existing services and possible regulatory actions to facilitate future services in the frequency band 470–694MHz.~~

Follow international development		
~~2020~~2025–~~2023~~2031	*470–694MHz*	Follow international developments in IMT and broadcast technologies within this frequency range ~~and consider future strategy for distribution of digital terrestrial television in the UAE and future use of the 470–694MHz spectrum,~~ taking account of the studies identified above in relation to regional and international developments in future use of the 470–649MHz band.

PMSE

The following table identifies bands subject to potential changes relevant to PMSE, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
~~2020~~2026–~~2024~~2027		*Conduct studies to assess the impact of potential changes in spectrum use, especially for bands currently used by PMSE. Evaluate the implications of reallocations for IMT or other services, considering findings from WRC-27 and coordinating with GCC and ASMG stakeholders.~~Study the change of use of bands identified as relevant in further studies.~~*
Spectrum release		
~~2020~~2026–~~2024~~2030		*Update and revise PMSE regulations for any bands confirmed by change-of-use studies, ensuring alignment with international developments and regional strategies, particularly with GCC and ASMG member states.~~Update and revise PMSE regulations for any bands confirmed by change of use studies, as above.~~*
Further study		
~~2024~~2025–2027	*470–694MHz*	Conduct studies to assess the impact of allocation changes in the 470–694 MHz band on spectrum availability for PMSE. Evaluate potential interference scenarios, sharing opportunities, and spectrum requirements for PMSE equipment.~~Assess the impact of~~

		~~any allocation changes in the 470–694MHz band on spectrum availability for PMSE.~~ Assess the potential for dynamic spectrum sharing and flexible use in light of technological advancements.
Follow international development		
~~2020–~~2024~~2025~~ and beyond	*Various*	The ~~TRA~~TDRA will endeavour to take a proactive approach in following equipment and market developments for PMSE.
2025 and beyond~~2020–2024~~	*The ~~TRA~~TDRA will collaborate with PMSE stakeholders ~~on~~ and monitor international developments in PMSE equipment and market trends, aligning UAE regulations with global best practices and emerging technologies ~~any changes to spectrum use resulting from the Spectrum Outlook 2020–25, which impact the PMSE sector.~~*	

PMR

No significant changes in the PMR sector are expected within the next ~~five~~ six years. ~~The~~ TDRA will continue to follow international developments relevant to PMR and consider their relevance in the UAE.

UWB and SRD

The following table identifies bands subject to potential changes relevant to UWB and SRD, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
~~2020~~2026–~~2022~~2027	*5150–5250MHz*	Update SRD regulations in line with WRC-27 agenda items to allow flexible indoor and outdoor usage, including vehicles and transport systems, at power levels up to 200mW e.i.r.p, with potential options for higher power use cases following studies on coexistence.~~In line with decisions agreed by WRC-19, initiate actions to update SRD regulations to allow usage indoors in trains and cars as well as outdoor usage to a baseline level of up to 200mW eirp, with an option to transmit up to 1W (30 dBm) eirp with a choice of 3 optional eirp masks, as determined by WRC-19 modifications to ITU-R Resolution 229.~~
~~2020~~2026–~~2022~~2027	*5650–5850MHz*	Review and update regulations for the 5650-5850 MHz band to enhance its use for mobile (Wi-Fi and RLANs),

		considering both indoor and outdoor applications, while ensuring coexistence with other services.~~In line with decision taken at WRC-19, update SRD regulations to reflect new primary allocation for mobile use (for Wi-Fi use) in the UAE in the 5650–5850MHz band.~~
2028–2030	*60 GHz (57–71 GHz)*	Evaluate the use of 60 GHz band for outdoor SRD applications following international trends, particularly focusing on Class Authorization frameworks to promote broadband access.
Spectrum release		
~~2020~~2026–~~2024~~2031	*Update and revise UWB and SRD regulations for any bands confirmed by change of use studies, as above.*	
Further study		
~~2020–2022~~	~~*5.925–6.425GHz*~~	~~Undertake sharing and compatibility studies to assess the feasibility of an allocation to the mobile service for use by Wi-Fi in this range, in line with developments in other parts of Region 1 (e.g. CEPT).~~
2026–2028	*Above 100 GHz*	Monitor developments and participate in studies concerning new allocations for UWB and SRD technologies in frequencies above 100 GHz, with focus on innovation and emerging market demands.
Follow international development		
2020–2023	*Below 45MHz*	Follow market and technology developments in SRD applications and ensure that new applications are able to develop in the UAE.
~~2024~~ 2025 and beyond	*6.425–7.125GHz*	Follow developments in relation to sharing between mobile applications in this frequency band.~~ possible additional spectrum for use by Wi-Fi.~~
2027 and beyond	*231.5–275 GHz*	Explore the potential for new applications in radiolocation services and other innovative technologies that could leverage these frequencies, following outcomes from WRC-27.

ITS

The following table identifies bands subject to potential changes relevant to ITS, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
~~2020–2024~~2026-2031	*Study the change of use of bands identified as relevant in further studies.*	
Spectrum release		
~~2020~~2026–~~2024~~2031	*Incorporate results of studies above in proposed new spectrum regulations for ITS.*	
Further study		
~~2020~~2026–~~2022~~2029	*5850–5925MHz*	~~Conduct~~ Continue national studies and consult with industry concerning implementation of DSRC and/or C-V2X ('PC5') systems in this band in the UAE, for ITS.
~~2020~~2026–~~2022~~2028	Participate in studies, which look to facilitate global or regional harmonised frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, ~~as determined by WRC-19.~~	
~~2020~~2026–~~2023~~2028	*470–960MHz*	Participate in studies related to ~~Evaluate~~ Evaluating the need of making additional spectrum available for 4G/5G-based railway systems in the UAE, such as 874.4–880 MHz and 919.4–925 MHz bands.
2024 and beyond	*76–81GHz*	Take account of the use of automotive radars operating in the band 76–81GHz when participating in studies on future use of 71–76GHz and 81–86GHz in preparation for WRC-27.
Follow international development		
~~2023~~ **2026 and beyond**	Launch a public consultation to develop specific spectrum regulations for ITS, focusing on emerging technologies and new spectrum needs, as guided by international related standards and frameworks. ~~The TRA to consider launching a public consultation focusing solely on ITS with the aim to produce a specific spectrum regulation for ITS.~~	

Aeronautical radio systems

The following table identifies bands subject to potential changes relevant to aeronautical radio systems, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
~~2020~~2026–~~2024~~2028	*Study the change of use of bands identified as relevant in further studies.*	
Spectrum release		
~~2020~~2026–~~2024~~2031	*Update and revise aeronautical radio systems regulations for any bands confirmed by change of use studies, as above.*	
Further study		
~~2020–2023~~	~~*2850–22000kHz*~~	Participate in the WRC-23 studies looking to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernised HF systems.
~~2020–2023~~	~~*117.975–137MHz*~~	Participate in the WRC-23 studies assessing a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the band, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands.
~~2020–2023~~	~~*4.8–4.99GHz*~~	Participate in the WRC-23 studies assessing possible measures to address protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories.
~~2020–2023~~	~~*12.75–13.25GHz*~~	Participate in the WRC-23 studies to consider use of the band by Earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally.
~~2020–2023~~	~~*15.4–15.7GHz*~~	Participate in the WRC-23 sharing and compatibility studies on possible new primary allocations to the aeronautical mobile service for non-safety aeronautical applications, while ensuring the protection of primary services.

~~**2020–2023**~~	~~*22–22.21GHz*~~	Participate in the WRC-23 sharing and compatibility studies, order to evaluate the possible revision or deletion of the “except aeronautical mobile” restriction to facilitate new air-to-ground and ground-to-air and air-to-air communications of aircraft systems while ensuring the protection of primary services.
~~**2024 and beyond**~~	~~*37.5–39.5GHz*~~	Participate in the WRC-27 studies to develop technical, operational and regulatory measures, to facilitate the use of these bands by aeronautical and maritime Earth stations in motion communicating with geostationary space stations in the fixed-satellite service.
	~~*40.5–42.5GHz*~~	
	~~*47.2–50.2GHz*~~	
	~~*50.4–51.4GHz*~~	
2026–2031	*47.2–50.2 GHz*	Consider the technical and operational conditions for the use of these bands (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary and non-geostationary space stations in the fixed-satellite service, in accordance with Resolution 176 (Rev.WRC-23). Develop regulatory measures to facilitate the use of these bands following WRC-27 outcomes.
2026–2031	*50.4–51.4 GHz*	Examine potential allocations and usage conditions for these frequencies for aeronautical applications, ensuring protection of existing services and alignment with WRC-27 decisions, particularly for Earth-to-space communications with space stations in the fixed-satellite service.
~~**2024**~~ **2026-2028** ~~**and beyond**~~	Participate in the WRC-27 studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications.	
Follow international development		
2020–2024~~2025~~ and beyond	~~*Follow international developments relevant to aeronautical radio systems and consider their relevance in the UAE.*~~ *Monitor and align with international developments related to aeronautical radio systems, including updates from WRC-27, to maintain compatibility with global aviation standard*	

Maritime radio systems

The following table identifies bands subject to potential changes relevant to maritime radio systems, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
~~2020–2022~~	~~156–162.05MHz~~	~~In line with the decisions of WRC-19, initiate actions to implement the allocation of spectrum for autonomous maritime radio devices in this band.~~
~~2020–2022~~	~~156.0125–157.4375MHz~~	~~In line with the decisions of WRC-19, initiate actions to implement the new spectrum allocations to the maritime mobile-satellite service to enable a new VHF data exchange system satellite component.~~
	~~160.6125–162.0375MHz~~	
~~2020–2022~~	~~1621.35–1626.5MHz~~	~~In line with the decisions of WRC-19, initiate actions to implement the primary allocation to the mobile maritime-satellite to be used for the GMDSS, noting requirements as determined by WRC-19 for protection of existing services in adjacent bands (including the Inmarsat system).~~
2026-2031	Study the change of use of bands identified as relevant in further studies.	
Spectrum release		
~~2020~~**2026–**~~2024~~**2031**	*Update and revise maritime radio systems regulations for any bands confirmed by change of use studies, as above.*	

Further study		
2020–2023	*12.75–13.25GHz*	Participate in the WRC-23 studies to consider use of the band by Earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally.
2020–2023	Participate in the WRC-23 studies reviewing the possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation.	
	~~37.5–39.5GHz~~	~~Participate in the WRC-27 studies and develop technical, operational and regulatory measures, to facilitate the use~~

~~2024~~2025-~~2027 and beyond~~		~~by aeronautical and maritime Earth stations in motion communicating with geostationary space stations in the fixed-satellite service.~~
	~~*40.5–42.5GHz*~~	
	47.2–50.2GHz	Consider technical and operational conditions for the use of these bands (Earth-to-space) by maritime earth stations in motion, in alignment with WRC-27 agenda items, and develop regulatory measures to facilitate this use, per Resolution 176 (Rev.WRC-23).
	50.4–51.4GHz	
Follow international development		
2020–2024	*Monitor and align with international developments relevant to maritime radio systems, including updates from WRC-27, to ensure compatibility with global maritime standards.* ~~*Follow international developments relevant to maritime radio systems and consider their relevance in the UAE.*~~	

Amateur radio

The following table identifies bands subject to potential changes relevant to amateur services, with the proposed period indicative and subject to change based on the above.

Proposed period	Frequency band	Comment
Change of use		
2026-2031~~**2020–2021**~~		Study the change of use of bands identified as relevant in further studies.~~*50–54MHz*~~ ~~In line with decision taken at WRC-19, initiate actions to implement the allocation of the 50–54MHz band to amateur services on a primary basis in the UAE.~~
Spectrum release		
~~2020~~**2026–2024****2031**		*Update and revise amateur radio systems regulations for any bands confirmed by change of use studies, as above.*
Further study		
2021–2023	*1240–1300MHz*	Participate in the WRC-23 review of the amateur service and the amateur-satellite service allocations to determine if additional measures are required to ensure protection of the radio-navigation satellite (space-to-Earth) service operating in the same band.

2026-2028	*1 610–1 645.5 MHz*	Participate in WRC-27 studies to consider the technical and regulatory conditions for space-to-space links between non-geostationary and geostationary satellites in the mobile-satellite service that may affect the amateur services, in accordance with Resolution 249 (Rev.WRC-23).
Follow international development		
~~2020~~2026–~~2024~~2031	*Follow international developments relevant to amateur systems and consider their relevance in the UAE.*	

Question 17: What are the focus frequency bands for inclusion in the Spectrum Outlook 2026-2031? Please provide the frequency range, the proposed action, year focus is needed and the rationale, as per the table proposed above (which includes examples). The proposed action can be (but not limited to) re-farming, allocation, update of spectrum regulation, technical study, etc.

5. Impact of the UAE Spectrum Outlook

The UAE Spectrum Outlook ~~2020–2025~~2026-2031 has been the result of a comprehensive review of the main spectrum uses, ~~and~~ the evolving demand and technological trends that are affecting spectrum needs. This review process was undertaken in close collaboration with the industry~~, in order~~ to understand stakeholders' concerns and needs in relation to spectrum.

The resulting indicative roadmap summarises the main actions which the ~~TRA~~TDRA may undertake to anticipate ~~in each year as it attempts to foresee which upcoming~~ technological developments ~~have the potential to affect spectrum requirements in~~over the next ~~five~~ six years.

The upcoming ~~five~~six-year period ~~is an exciting one~~promises transformative growth and innovation. Many governments and private-sector organisations worldwide are realising the importance of ICT and are undergoing ~~digitalisation~~digital , ~~in an attempt to~~transformation to reap the benefits of ICT ~~and accelerate progress towards their economic and societal objectives~~. This is also the case of the UAE, where ~~relevant~~ strategies and initiatives have been put forward to stimulate and co-ordinate efforts towards the objective of ~~a happy nation relying on~~ a diversified and flexible knowledge-based economy. The UAE's objective of establishing a global leadership position of UAE in the ICT sector perfectly fits with ~~all this~~these efforts. With a growing number of wireless devices of all forms, ~~shapes~~ and ~~technology~~ technologies and applications supported across all economic sectors, and with the ~~upcoming wave of new~~continuous investment into wireless infrastructure, the challenge now is that spectrum will need to become available to foster innovation and enable investment – while ~~ensuring~~ safeguarding ~~that past~~existing investments in wireless infrastructure ~~is safeguarded~~.

The ~~TRA~~TDRA's transparent approach, driven by the principles that ~~lead~~ guides its ~~the TRA~~TDRA's action and in particular actions, particularly in ~~terms of~~ spectrum management, ~~is bringing~~brings alignment and predictability to the wireless industry ~~as a whole~~ – including spectrum users, service providers, and ~~not only all spectrum users but also their~~ technology partners. ~~The TRA~~TDRA believes ~~is of the view that~~ this approach will in turn allow the wireless industry in the UAE to unlock ~~further~~ the immense potential ~~the colossal benefits~~ of spectrum as an enabler and an innovation catalyst for ~~other~~ industries that rely on ~~which use~~ wireless technologies for economic activities, as well as for the safety, ~~the~~ security and ~~the happiness~~well-being of citizens and residents of the UAE.

Annex A List of acronyms and abbreviations

The table below lists the acronyms and abbreviations used in this report.

Acronym	Meaning
5G	5th generation mobile communication network
3GPP	3rd Generation Partnership Project
4D	Four dimensions
4G	4th generation mobile communication network
5G	5th generation mobile communication network
AM	Amplitude modulation
AM(R)S	Aeronautical mobile (R) service
ARNS	Aeronautical radio-navigation service
ASMG	Arab Spectrum Management Group
A-SMGCS	Advanced surface movement guidance and control systems
AWAIC	Wireless avionics intra-communications
BVLOS	Beyond visual line of sight
CBRS	Citizens Broadband Radio Services
CEPT	European Conference of Postal and Telecommunications Administrations
C-V2X	Communication - Vehicle to X
DAB	Digital audio broadcast
DSRC	Digital short-range communications
DTT	Digital terrestrial TV
EESS	Earth exploration satellite services
eMBB	Enhanced mobile broadband
E-S	Earth to space
ESIM	Earth stations in motion
FM	Frequency modulation
FSS	Fixed satellite service
FWA	Fixed wireless access
GCAA	General Civil Aviation Authority
GCC	Gulf Cooperation Council
GHz	Gigahertz
GMDSS	Global maritime distress and safety system

Acronym	Meaning
GSM-R	Global system for mobile communications – railway
GSO	Geostationary-satellite orbit
HAPS	High-altitude platform stations
HDFSS	High-density fixed satellite systems
HF	High frequency
ICAO	International Civil Aviation Organisation
ICT	Information communication technology
IMT	International mobile telecommunications
IMT(5G)	Fifth generation of international mobile telecommunications
IoT	Internet of Things
ITS	Intelligent transport systems
ITU	International Telecommunication Union
ITU-R	ITU radiocommunication sector
kHz	kilohertz
LEO	Low Earth orbit
LF	Low frequency
LTE	Long-term evolution
M2M	Machine to machine
MetSat	Meteorological satellite
MF	Medium frequency
MHz	Megahertz
mMTC	Massive machine-type communications
mmWave	Millimetre wave
MSS	Mobile satellite service
NB-IOT	Narrowband Internet of Things
NGSO	Non-geostationary satellite orbit
PMR	Private mobile radio
PMSE	Programme making and special events
RLAN	Radio local area network
RSTT	Railway radio systems between train and trackside
SAR	Synthetic-aperture radar
SAS	Spectrum access system

Acronym	Meaning
s-E	Space to Earth
TCO	Total cost of ownership
TETRA	Terrestrial trunked radio
~~TRA~~TDRA	Telecommunication and Digital Government Regulatory Authority
TV	Television
UAE	United Arab Emirates
UAM	Urban air mobility
UAS	Unmanned aircraft systems
UAS CNPC	Unmanned aircraft systems control and non-payload communications links
UHF	Ultra-high frequency
UK	United Kingdom
USA	United States of America
UWB and SRD	Ultra-wide band and short-range devices
VHF	Very high frequency
VLF	Very low frequency
Wi-Fi	Wireless fidelity
WP5A	Working party 5A (ITU-R)
WPT	Wireless power transmission
WPT-EV	Wireless power transmission for electric vehicle
WRC-19	World Radiocommunication Conference 2019
WRC-23	World Radiocommunication Conference 2023
WRC-27	World Radiocommunication Conference 2027
WRC-31	World Radiocommunication Conference 2031

3 General comments

3.1 Further to the specific matters discussed, and questions asked above, please identify any additional issues which you feel are relevant for consideration in this consultation. Please provide specific support and/or explanation of your viewpoints as well as recommendations regarding how such issues might be resolved.