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| **42 MEETING OF PERMANENT**  **CONSULTATIVE COMMITTEE II:**  **RADIOCOMMUNICATIONS**  **August 28 to September 01, 2023**  **Ottawa, Canada** | | **OEA/Ser.L/XVII.4.2.42**  **CCP.II-RADIO /doc. 5937/23**  **10 August 2023**  **Original: English** | |
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|  | **PROPOSALS FOR THE WORK OF THE CONFERENCE AGENDA ITEM 10 - LUNAR COMMUNICATIONS** | |  |
|  | **(Item on the Agenda: 3.1 (SGT-5))** | |  |
|  | **(Document submitted by the delegation of the United States of America)** | |  |

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| **Impact on the sector:** |
| This document supports the work of CITEL’s PCC.II Working Group for WRC under 3.1 of the agenda. |

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| **Executive Summary:** |
| Under agenda item 10, the United States proposes a new WRC-27 agenda item to study lunar communications. |

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| United States of America |
| PROPOSALS FOR THE WORK OF THE CONFERENCE |
| Agenda Item 10 |

10to recommend to the Council items for inclusion in the agenda for the next WRC, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the Convention and Resolution **804 (Rev.WRC‑19)**

**BACKGROUND INFORMATION**:

The Artemis Accords[[1]](#footnote-2) lay out a shared vision for principles, established in the Outer Space Treaty of 1967, for cooperation in the civil exploration and use of the Moon, Mars, comets and asteroids for peaceful purposes. The United States space agency, NASA, and space agencies from other ITU Member States, are preparing for a return of human and robotic explorers to the Moon while developing spacecraft, surface vehicles, exploration mission plans toward achieving a sustainable and robust presence on the Moon in the next decade in collaboration with the commercial space industry.

In addition to the traditional means of space-to-Earth and Earth-to-space communication links, direct communications between landers, rovers, extravehicular activity (EVA) astronauts conducting sortie missions and experiments are crucial to enable effective scientific activities and consideration of the health of the crew in the lunar environment. Initial surveys of available technologies have indicated that a network based on commercial standards, such as those developed by 3GPP, can be capable of servicing the reference mission concept of operation involving many user groups over a widespread surface area with high data throughput requirements. However, considering the unique topology of the Moon’s surface, shielded zone of the Moon considerations, unique science opportunities in radio astronomy, and remote sensing in the lunar region/surface, careful consideration and spectrum sharing/compatibility studies are required to determine the suitable bands to support the envisioned lunar surface network using the 3GPP standard or other standards. This proposal also aims to 1) provide potential allocations and/or identifications of spectrum with any needed regulatory provisions to enable radiocommunications on the Moon’s surface and by lunar-orbiting systems communicating with systems on the Moon’s surface, to meet urgent requirements, and 2) study various regulatory framework options to determine the most appropriate international regulatory framework for use of spectrum on the surface of the moon and in the lunar orbit, including an option for developing a framework separate and outside of Article 5 to ensure the most efficient and effective use of spectrum resources on the surface of the moon and in the lunar orbit.

**PROPOSAL:**

The United States proposes an agenda item for WRC-27 to take into account the results of ITU-R studies on sharing and compatibility to urgently consider allocation and/or identification of frequencies for use by administrations in support of the future development of communications networks on the lunar surface and in the lunar orbit. The frequency ranges of interest are: 390-450 MHz, 2 400-2 700 MHz, 3 500-3 800 MHz, 5 150-5 925 MHz, and 25.25-28.35 GHz.

**Proposals:**

ADD USA/4253A27/1

Draft New Resolution [USA-A2027]

Agenda for the 2027 world radiocommunication conference

The World Radiocommunication Conference (Dubai, 2023),

considering

*a)* that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference (WRC) should be established four to six years in advance and that a final agenda shall be established by the ITU Council two years before the conference;

*b)* Article 13 of the ITU Constitution relating to the competence and scheduling of WRCs and Article 7 of the Convention relating to their agendas;

*c)* the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and WRCs,

recognizing

*a)* that this conference has identified a number of urgent issues requiring further examination by WRC‑27;

*b)* that, in preparing this agenda, some items proposed by administrations could not be included and have had to be deferred to future conference agendas,

resolves

to recommend to the Council that a WRC be held in 2027 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC‑19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

[…]

1.X to conduct studies on the spectrum needs and regulatory measures for possible new allocations and/or identifications, with any needed regulatory provisions, to support communication systems located on the lunar surface or in the lunar orbit in the frequency bands 390-450 MHz, 2 400-2 700 MHz, 3 500-3 800 MHz, 5 150-5 925 MHz, and 25.25-28.35 GHz and to study a potential regulatory framework for future lunar communications in accordance with Resolution [**USA-B2027] (WRC23)**;

[…]

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC‑23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

1 to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting (CPM) and to prepare a report to WRC‑23;

2 to submit a draft report on any difficulties or inconsistencies encountered in the application of the Radio Regulations referred in agenda item 9.2 to the second session of the CPM and to submit the final report at least five months before the next WRC,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

**Reasons:** To create an agenda item for WRC-27 to study the feasibility and compatibility of spectrum use, including possible new allocation and/or identifications for radiocommunications on the moon for communications networks located on the lunar surface, or in the lunar orbit communicating with stations on the lunar surface, in certain frequency bands and to study a potential regulatory framework for future communications on the Moon’s surface.

ADD USA/4253A27/2

Draft New Resolution [USA-B2027]

Studies on frequency-related matters, including possible additional allocations and/or identifications for future development of communications on the lunar surface and between lunar orbit and the lunar surface

The World Radiocommunication Conference (Dubai, 2023),

considering

*a)* that there is increased interest to conduct scientific experiments, exploration activities, and potential future space commerce in the vicinity of the Moon, including on its surface;

*b)* that communication technology is well-developed and widely deployed on the Earth using industry standards that could be applied to lunar communications;

*c)* that point-to-multipoint systems on the lunar near side surface used for scientific or technological research purposes could operate in the space research service (space-to-space) currently;

*d)* that the lunar surface has unique atmospheric, soil, and topography conditions;

*e)* that the interests of scientific discovery, space exploration, and space commerce are of a global nature,

noting

Section V of Article **22** addresses protection of radio astronomy in the shielded zone of the Moon,

*noting further*

that the Artemis accords which promote safe, sustainable, and responsible space exploration have been signed by ITU Member States from all three Regions,

recognizing

a) that a regulatory framework for lunar communications may be needed given the unique circumstances of the moon as a celestial satellite;

b) that studies of sharing and compatibility between potential systems on the moon’s surface and systems orbiting the moon would need to take into account any other affected services in the same or, as appropriate, adjacent bands,

resolves to invite the ITU Radiocommunication Sector

1 to study the spectrum needs of communications systems which may operate on the lunar surface, or communications systems in lunar orbit communicating with systems on the lunar surface, in the frequency bands 390-450 MHz, 2 400‑2 700 MHz, 3 500-3 800 MHz, 5 150-5 925 MHz, and 25.25-28.35 GHz;

2 to study the technical and operational characteristics of systems that are planned for operation in the frequency bands in *resolves to invite the ITU Radiocommunication Sector* *1*;

3 to study the propagation considerations for lunar surface systems and lunar-orbiting systems operating in the frequency ranges in *resolves to invite the ITU Radiocommunication Sector* 1;

4 to study sharing and compatibility between the systems identified in *resolves to invite the ITU Radiocommunication Sector* *1* and other affected services in the same or, as appropriate, adjacent bands, to enable frequency bands for use in the vicinity of the Moon, including for potential new frequency allocations and/or identifications with appropriate regulatory provisions for communications on the lunar surface or in lunar orbit communicating with systems on the lunar surface;

5 to study the suitability of applying various regulatory definitions, provisions and procedures for operations in the vicinity of the moon;

6 to study appropriate modifications to the Radio Regulations with a view to develop a potential regulatory framework for lunar surface communications and for lunar orbiting systems communicating with lunar surface stations as may be needed given the unique circumstances of the moon as a celestial satellite;

7 to complete these studies by WRC-27,

invites administrations

to participate in the studies by submitting contributions to ITU‑R,

invites the 2027 World Radiocommunication Conference

1. to consider, based on the results of the above studies, the allocation and/or identification of frequency bands in part or all of the frequency bands listed in*resolves to invite the ITU Radiocommunication Sector 1) above* for use in the vicinity of the Moon*;*
2. to invite a future competent conference to revise these allocations and/or identifications and make other appropriate regulatory changes with a view to establish a regulatory framework taking into account  *resolves to invite the ITU Radiocommunication Sector 5 above*.

**Reasons:** To provide a Resolution supporting the agenda item.

ATTACHMENT

DRAFT PROPOSAL FOR AGENDA ITEM

***Subject:*** Propose a WRC-27 agenda item to study possible frequency allocations and/or identifications for lunar surface communications.

***Origin:*** United States of America

**Proposal:** to consider frequency allocations and/or identifications for lunar surface communications in accordance with **Resolution [USA-B2027**] **(WRC‑23)**.

*Background/reason:*

The Artemis Accords lays out a shared vision for principles, grounded in the Outer Space Treaty of 1967, for cooperation in the civil exploration and use of the Moon, Mars, Comets and Asteroids for peaceful purposes. NASA and numerous space agencies around the world, as partners in the Artemis missions, are preparing for a return of humans to the Moon while developing spacecraft, surface vehicles, exploration mission plans toward achieving a sustainable and robust presence on the Moon in the next decade. In addition to the traditional means of space-to-Earth and Earth-to-space communication links, direct communications between landers, rovers, extravehicular activity (EVA) astronauts conducting sortie missions and experiments is crucial to enable effective scientific activities consideration the health of the crew in the lunar environment. Scientific discoveries and technological advancements resulting from space exploration could create new industries and technologies that facilitate future space commerce. Initial survey of available technologies has indicated that a network based on commercial standards such as those developed by 3GPP can be capable of servicing reference mission concept of operation involving many user groups over a widespread surface area with high data throughput requirements. This future conference agenda item proposes to study the spectrum needs of communications systems on the moon, system characteristics, sharing and compatibility between such systems and the development of a potential new regulatory framework. The frequency ranges of interests are: 390-450 MHz, 2 400­‑2 700 MHz, 3 500‑3 800 MHz, 5 150‑5925 MHz, and 25.25-28.35 GHz.

***Radiocommunication services concerned:***fixed, mobile, fixed satellite service, mobile satellite service,radiodetermination-satellite service, radionavigation-satellite service, radio astronomy service, active and passive remote sensing systems, space operation and space research services.

***Indication of possible difficulties:*** none foreseen

***Previous/ongoing studies on the issue:*** none

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| ***Studies to be carried out by:*** WP 7B | ***with the participation of:*** WPs 4A, 4C, 5A, 5B, 5C, 5D, 7C, 7D |

***ITU-R Study Groups concerned:*** SG 7

***ITU resource implications, including financial implications (refer to CV126):*** minimal

***Common regional proposal:*** TBD ***Multi-country proposal:*** No

***Number of countries:***

***Remarks***

1. As of July 2023 the Artemis Accords were signed by the governments of: Argentina, Australia, Bahrain, Brazil, Canada, Colombia, Czech Republic, Ecuador, France, India, Israel, Italy, Japan, the Republic of Korea, Luxembourg, Mexico, New Zealand, Nigeria, Poland, Romania, Rwanda, Saudi Arabia, Singapore, Spain, Ukraine, the United Arab Emirates, the United Kingdom, and the United States. [↑](#footnote-ref-2)