***Jean-Luc Issler’s answer:***

*The proposed changes consist of supressing very important guidance for the adopters. The initial text is appropriate, and result from most of the discussions having taking place during the 883 Agency Review with the participation of Dr Shames by E-mail, with a consensus which has been reached for this subject. The spectrum content is appropriate because, as mentioned in RID SEA-001-883:*

***The Physical Layer frequencies that the source standards have adopted may, in many cases, not be suitable for use in space***

*There are also other CCSDS bleue books mentioning spectrum contents when needed.*

*The 883 standard, for the first time of CCSDS history, would be a CCSDS standard specifying commercial standards which are likely to be not compatible with ITU Radio Regulation in the SZM, related ITU-RECs, SFCG RECs, and protection of Radio Astronomy on the Shielded Zone of the Moon, for an important number of cases of the source standards. That is also why in this new situation, our spectrum text is valid, also to better protect CCSDS and favor smooth adoptions.*

*As mentioned bellow, the mentioned Physical Layer frequencies may not be suitable for space (and in particular on the Moon) due to key informations contained in SFCG and ITU RECs, as well as in the Radio Regulation. To not directly provide these key informations to the knowledge of the adopters in the CCSDS 883 standard would reduce too much the informative part and consequently the efficiency of this standard.*

*The spectrum text proposed to be removed is also essential for the adopter’s true awareness about protection of Radio Astronomy in the Shielded Zone of the Moon, which is a key design criteria of lunar wireless links.*

*That is why some more specific guidances shall be provided to the adopter, in a more detailed paragraph than the too simplified and reduced proposed one*

*I consider that the parts underlined* ***in green*** *are mandatory to keep in 883 CCSDS standard to consider major CNES RIDS made during the agency review to still have disposition. These parts are added to the paragraph proposed bellow by Dr Shames for the said paragraph to be considered as acceptable for me.*

*I have also noted that it is proposed in the other PIDs to remove the spectrum text in paragraph 3 because there is a spectrum text in paragraph 2.4.3, while here the more important spectrum part of this paragraph 2.4.3 is proposed to be removed !*

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CESG POLL ITEM DISPOSITION (PID) INITIATION FORM

AREA PID NUMBER: SEA-883x0r0-006

SUBMITTING AREA: SEA

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REVIEWER'S NAME: Peter Shames

E-MAIL ADDRESS: peter.m.shames@jpl.nasa.gov

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DOCUMENT NUMBER: CCSDS 883.0-B-0

DOCUMENT NAME: SOIS High Data Rate Wireless Proximity Network

 Communications

DATE ISSUED: August 2021

PAGE NUMBER: 2-10,11 PARAGRAPH NUMBER: 2.4.3

PID SHORT TITLE: Inappropriate RFM & spectrum content in link layer std

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DESCRIPTION OF REQUESTED CHANGE: (Use From: "..." To "..." format)

From:

The two communication standards families, 3GPP and Wi-Fi, specified in this Recommended Standard, have explicit spectrum requirements for operation. Utilization of bands different from standard terrestrial 3GPP/Wi-Fi bands that deviate from the corresponding standards negates the stability and quality gains of utilizing these technologies and is incompatible with this Blue Book. Additional technical background regarding configurable operational channel sizes within standard operating bands is contained in *Wireless Network Communications Overview for Space Mission Operations* (reference [E1]). Adopters must coordinate with national spectrum regulatory bodies for approval before deploying radio transmitters into space, with their SFCG representative, and with Radio Astronomy representatives when operations are concerned by the Radio Regulations applicable in the Shielded Zone of the Moon, SZM, [39] and the related ITU Radio Astronomy recommendations [34] [38]. **Note that the SZM, as defined by ITU [38], includes Mars and extends into the solar system. Reference [38] states: “the 300 MHz to 2 GHz range should be reserved for radio astronomy observations”. Reference [39] also indicates that new bands are possible in the SZM between 2 and 3 GHz, and above 3 GHz to be decided in agreement with the Radio Astronomy community. Due to the specific Radio Regulation applicable in the SZM, a transmission in that zone must be coordinated previously with Radio Astronomy, including when declared on a Non Interference Basis.**

**There are Radio Astronomy representatives at the international level (IAU, ITU-WP7D and IUCAF) and at the regional level (CRAF, CORF and RAFCAP).**

**SFCG guard bands must be considered, such as for instance the 3.5 MHz guard band defined between the 2400-2480 MHz wireless lunar band and the 2483.5-2500 MHz orbit to surface communication band.**

However, both selected series of standards are designed for active and dynamic sharing of spectrum in various ways and various levels of operational criticality may be obtained without dedicated spectrum for each link in a system. The IEEE 802.11 technologies are designed for many networks to be implemented in the same location on the same channels, with an evolving ability to manage interference and scheduling in the shared band for independent networks. The 3GPP standards around LTE and 5G are designed for day-to-day operation of multi-cellular networks with each adjacent base station operating on the same channel, with the ability to manage intra-channel and inter-channel scheduling and handover as required to maintain extremely high QoS, when corresponding network protocols are established between base stations.

Existing spectrum allocations used in the 802.11 and 3GPP standards are allocated by the ITU for terrestrial use on Earth and not in space, and may not be directly transferrable for use in the lunar region. For any type of communications (mission critical or not), the bands planned to be used (non-space and space bands) must be requested to ITU and used for wireless proximity communications in space on a non-interference basis, after having reached a coordination agreement with the Radio Astronomy representatives if the communication could occur in the Shielded Zone of the Moon, according to the applicable Radio Regulations [38] [39].  Mission planners shall also consult with Space Frequency Coordination Group (SFCG) Recommendations [33] or liaise with their Agency’s SFCG representative as to the appropriate frequency bands to use for wireless proximity links in space, especially in the lunar and Mars regions. If the intended lunar surface wireless frequency band is not in reference [33], their Agency’s SFCG representative will have to make a waiver request to SFCG.

NOTE – Proper spectrum coordination with the Space Frequency Spectrum Group, SFCG, with Radio Astronomy representatives when SZM is concerned, and national frequency standards bodies is required.

To:

The two communication standards families, 3GPP and Wi-Fi, specified in this Recommended Standard, have explicit spectrum requirements for operation. Both sets of standards are designed for active and dynamic sharing of spectrum in various ways and various levels of operational criticality may be obtained without dedicated spectrum for each link in a system. The IEEE 802.11 technologies are designed for many networks to be implemented in the same location on the same channels, with an evolving ability to manage interference and scheduling in the shared band for independent networks. The 3GPP standards around LTE and 5G are designed for day-to-day operation of multi-cellular networks with each adjacent base station operating on the same channel, with the ability to manage intra-channel and inter-channel scheduling and handover as required to maintain extremely high QoS, when corresponding network protocols are established between base stations.

**Note that the SZM, as defined by ITU [38], includes Mars and extends into the solar system. Reference [38] states: “the 300 MHz to 2 GHz range should be reserved for radio astronomy observations”. Reference [39] also indicates that new bands are possible in the SZM between 2 and 3 GHz, and above 3 GHz to be decided in agreement with the Radio Astronomy community. Due to the specific Radio Regulation applicable in the SZM, a transmission in that zone must be coordinated previously with Radio Astronomy, including when declared on a Non Interference Basis.**

**There are Radio Astronomy representatives at the international level (IAU, ITU-WP7D and IUCAF) and at the regional level (CRAF, CORF and RAFCAP).**

**SFCG guard bands must be considered, such as for instance the 3.5 MHz guard band defined between the 2400-2480 MHz wireless lunar band and the 2483.5-2500 MHz orbit to surface communication band.**

However, spectrum allocations used in the 802.11 and 3GPP standards are allocated by the ITU for terrestrial use on Earth and not in space, and may not be directly transferrable for use in the lunar region nor at Mars. For any type of space mission communications (mission critical or not), the bands planned to be used (non-space and space bands) must be requested from the ITU and used for wireless proximity communications in space on a non-interference basis. Mission planners should also consult with Space Frequency Coordination Group (SFCG) Recommendations [33] or liaise with their Agency’s SFCG representative as to the appropriate frequency bands to use for wireless proximity links in space, especially in the lunar and Mars regions. If the intended lunar surface wireless frequency band is not in reference [33], their Agency’s SFCG representative will have to make a waiver request to SFCG. There are special Radio Astronomy constraints for the Shielded Zone of the Moon, according to the applicable Radio Regulations [38] [39], and coordination is required.

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CATEGORY OF REQUESTED CHANGE:

 Technical Fact \_\_\_ Recommended \_X\_ Editorial \_\_\_

NOTES:

TECHNICAL FACT: Major technical change of sufficient magnitude as to

 render the Recommendation inaccurate and unacceptable if not

 corrected. (Supporting analysis/rationale is essential.)

RECOMMENDED: Change of a nature that would, if incorporated, produce

 a marked improvement in document quality and acceptance.

EDITORIAL: Typographical or other factual error needing correction.

 (This type of change will be made without feedback to submitter.)

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SUPPORTING ANALYSIS:

This lengthy discussion of frequency considerations is out of place in this document. It is worthy of mention, because frequency channels are a part of these standards, but it is really and RFM WG subject.

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DISPOSITION: