**WRC-19 Agenda Item 9.1, Issue 9.1.1**

IWG-2 members were not able to reach consensus on a proposal for WRC-19 Agenda Item 9.1, Issue 9.1.1 regarding the possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980 – 2 010 MHz and 2 170 – 2 200 MHz. The views on the appropriate regulatory changes the FCC should support are provided.

View A is supported by: AT&T, Cisco Systems, Inc., CTIA, EchoStar Corporation, Ericsson, GSMA, Intel Corporation, Jansky-Barmat Telecommunications Inc., Nokia, Samsung Electronics America, Sprint Corporation, Steptoe & Johnson LLP., T-Mobile and Verizon.

View B is supported by: Omnispace, Inmarsat, and Intelsat.

VIEW A

**View A: No Change under Agenda Item 9.1/Issue 9.1.1 for the 1 980 – 2 010 MHz and 2 170 – 2 200 MHz Bands, Mod to Resolution 212 (Rev. WRC-212)**

Agenda item 9.1/Issue 9.1.1 is to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT. Studies between the terrestrial and satellite components of IMT have found several technical and operational measures which can be implemented on a bilateral basis without the need for additional regulatory contraints on an international basis. Therefore, WAC members supporting View A believe that the draft proposal for WRC-19 provided in View A should be the basis for the United States Proposal to the Conference addressing WRC-19 Agenda Item 9.1, Issue 9.1.1, and that the United States should submit this draft proposal to the upcoming meeting of CITEL PCC.II for Agenda Item 9.1, Issue 9.1.1.

View A is supported by the following WAC members: AT&T, Cisco Systems, Inc., CTIA, EchoStar Corporation, Ericsson, GSMA, Intel Corporation, Jansky-Barmat Telecommunications Inc., Nokia, Samsung Electronics America, Sprint Corporation, Steptoe & Johnson LLP., T-Mobile and Verizon.

**BACKGROUND**

With the onset of 5G and increased capacity demands, spectrum allocations must continue to serve the public interest and user demands.  The 1980-2010/2170-2200 MHz bands have licensed and planned IMT deployments, pursuant to ITU-R Recommendations M.1457 and M.2012, and may be flexibly utilized to meet user demands.

Within the past 10 years, satellite operations of IMT, pursuant to ITU-R Recommendations M.1850 and M.818, have also been deployed in these bands by a number of countries.  Both satellite and terrestrial operations have coexisted in these bands without undue burden on either service, achieving compatibility when necessary through bilateral coordination.   A lone unresolved coordination issue between China and Korea prompted the inclusion of Agenda Item 9.1, Issue 9.1.1 on the WRC-19 agenda so that cross-border sharing between the terrestrial and satellite components of IMT could be studied.

**DISCUSSION**

In the United States, the frequency range 1850-2000 MHz is allocated on a coprimary basis to mobile and fixed services and is primarily being used by PCS operators. The 2000-2020 MHz band has also been allocated to the mobile-satellite service on a co-primary basis with mobile and fixed services. Within the band 2000-2020 MHz, the mobile and mobile-satellite licenses have been issued to a single licensee. Today, the mobile-satellite service is in use and the mobile service is being deployed consistent with the issued FCC licenses.

Studies undertaken by ITU-R WP 4C and WP 5D to address WRC-19 Agenda Item 9.1, Issue 9.1.1, as specified by CPM 19-1, suggest that several mitigation techniques exist for fostering the compatibility between the terrestrial and satellite components of IMT in adjacent countries. These techniques may be considered during the bilateral coordination process. Accordingly, there is no need for additional regulatory constraints on an international basis. This is the basis of View A.

View A is consistent with the treatment of the terrestrial component of IMT in the mobile service and the satellite component of IMT in the mobile-satellite service adopted in the United States. It retains the flexibility to adopt a variety of technical and operational measures for co-existence, based on realistic system characteristics. Any change to the Radio Regulations would limit the present flexibility for deployments of either component of IMT by individual countries, and more importantly, is outside the scope of the Agenda Item 9.1, Issue 9.1.1. Specifically, changes to the Radio Regulations such as constraints on power emitted by transmitters or transmission limits into the transmit antenna would not comport with the regulatory regime of U.S. and would impose restrictions on mobile operators holding licenses throughout the 1990-2010 MHz band. In addition, it would impose unnecessarily restrictions on operations globally.

In the View A proposal, Resolution 212 (Rev. WRC-15) is also modified to reflect that the studies responsive to this agenda item will be complete by WRC-19 and technical and operational measures to promote compatibility between the terrestrial and satellite components of IMT in different countries will have been documented.

**RECOMMENDATION**

Given that several technical and operational measures have been identified and studied by the ITU-R for the coexistence of the terrestrial and satellite component of IMT, as per the scope of the Agenda Item 9.1, Issue 9.1.1, and the nature of the current regulatory regime within U.S., the supporters of View A believe the United States should take the position of no change (NOC) in the Radio Regulations for the bands addressed under WRC-19 Agenda Item 9.1, Issue 9.1.1 and that the ITU-R Resolution 212 (Rev. WRC 15) be modified, as reflected in the View A proposal below.

**ATTACHMENT TO VIEW A:**

**UNITED STATES OF AMERICA**

**DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE**

**Agenda Item 9.1/Issue 9.1.1:** *to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT*

**Background Information**: The basis for Agenda Item 9.1, Issue 9.1.1 originated at WARC-92 with the addition of No. 5.388. This footnote identified certain frequencies for use by both satellite (MSS), and terrestrial (MS) in what are now called International Mobile Telecommunications (IMT). The frequency ranges in the footnote are 1 885-2 025 and 2 110-2 200 MHz. Within these broader frequency ranges, the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz are allocated to the fixed, mobile, and mobile-satellite services on a co-primary basis. Both the satellite and terrestrial components of IMT have already been deployed or are being considered for further deployment within the 1 980-2 010 MHz and 2 170-2 200 MHz frequency bands as noted in Resolution **212 (WRC-15)**.

Prior ITU-R studies have focused on co-existence and compatibility of terrestrial and satellite components of IMT within the same geographic area. WRC-19 Agenda Item 9.1, Issue 9.1.1 is focused on studying the co-existence and compatibility when the two are deployed in adjacent countries.

Ongoing ITU-R studies in response to this agenda item indicate that while compatibility of the terrestrial and satellite components of IMT in adjacent countries may require certain technical and operational measures, these measures are varied and may not be universally applicable to all possible cross-border cases. Several technical and operational measures have been identified. Administrations presently have the flexibility to adopt a variety of such measures, based on actual system characteristics and confidential information, during the bilateral coordination processes, and this flexibility should be maintained. A change to the Radio Regulations would limit the present flexibility for deployments by individual countries.

**Proposal**:

**NOC** **USA/9.1.1/1**

**Radio Regulations (WRC-15) Volumes 1, 2 and 4**

**Reason**: A change to the Radio Regulations would limit the present flexibility for deployments by individual countries.

**MOD** **USA/9.1.1/2**

RESOLUTION 212 (Rev.WRC‑19)

**Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz**

The World Radiocommunication Conference (Sharm-el-Sheikh, 2019),

*considering*

*a)* that Resolution ITU‑R 56 defines the naming for International Mobile Telecommunications (IMT);

*b)* that the ITU Radiocommunication Sector (ITU‑R), for WRC‑97, recommended approximately 230 MHz for use by the terrestrial and satellite components of IMT;

*c)* that ITU‑R studies forecast that additional spectrum may be required to support the future services of IMT and to accommodate future user requirements and network deployments;

*d)* that ITU‑R has recognized that space techniques are an integral part of IMT;

*e)* that, in No. **5.388**, WARC‑92 identified frequency bands to accommodate certain mobile services, now called IMT,

*noting*

1. that the terrestrial component of IMT has already been deployed or is being considered for deployment in the frequency bands 1 8852 025 MHz and 2 110-2 200 MHz;

*b)* that the availability of the satellite component of IMT in the frequency bands 1 980‑2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT in the frequency bands identified in No. **5.388** would improve the overall implementation and the attractiveness of IMT,

*c)* that ITU-R studies have identified technical and operational measures that may be implemented to allow co-existence and compatibility between satellite and terrestrial components of IMT when deployed in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in adjacent geographic areas,

*d)*

*resolves*

that administrations which implement IMT:

*a)* should make the necessary frequencies available for system development;

*b)* should use those frequencies when IMT is implemented;

*c)* should use the relevant international technical characteristics, as identified by ITU‑R and ITU‑T Recommendations,

*invites administrations*

1 to give due consideration to the accommodation of other services currently operating in these frequency bands when implementing IMT,

*further invites ITU‑R*

to continue its studies with a view to developing suitable and acceptable technical characteristics for IMT that will facilitate worldwide use and roaming, and ensure that IMT can also meet the telecommunication needs of the developing countries and rural areas.

**Reason**: The studies responsive to this agenda item will be complete by WRC-19 and will document technical and operational measures to promote compatibility between the terrestrial and satellite components of IMT in different countries.

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VIEW B

**VIEW B:**

WAC members Omnispace, Inmarsat, and Intelsat support the objective of WRC-19 agenda item 9.1, issue9.1.1,“to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by mobile service and the mobile-satellite service in different countries and to facilitate development of both the satellite and terrestrial components of IMT.*”* This agenda item is focused on co-existence and compatibility when the satellite and terrestrial component of IMT are deployed in different countries.

The frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz are allocated in the Interational Telecommunication Union (ITU) Radio Regulations to the fixed, mobile, and mobile-satellite services on a co-primary, global basis. Both the satellite and terrestrial components of IMT have already been deployed or are being considered for deployment within the 1 980-2 010 MHz and 2 170-2 200 MHz frequency bands as noted in Resolution **212 (WRC-15)**. More than 400 satellite networks, both geostationary and non-geostationary, have been registered with the International Telecommunication Union in the 1 980-2 010 MHz and 2 170-2 200 MHz frequency bands and are undergoing coordination.

ITU-R studies in response to this agenda item calculate significant interference from IMT terrestrial base stations into IMT satellite receivers when the band 1 980-2 010 MHz is used for the downlink from the IMT terrestrial base station to user equipment. These studies analyzed three geostationary satellite networks and three non-geostationary satellite systems, one in highly elliptical orbit, one in medium earth orbit, and one in low earth orbit. The studies, which came from different administrations, all reached the same conclusion: the interference far exceeded the criterion to protect IMT satellite systems when the band 1 980-2 010 MHz is used for the downlink from the IMT terrestrial base station to user equipment.

In the worst case, the aggregate interference from IMT terrestrial base stations operating in the band 1 980-2 010 MHz is calculated to exceed the protection criterion by more than 50 dB. This level of interference can not be resolved by implementing mitigation methods. Moreover, the interference is not limited to adjacent countries, but is predicted when the satellite IMT deployment is at a distance of as much as 10,000 km from the terrestrial IMT deployment. There is no ITU coordination procedure in the Radio Regulations to address interference from terrestrial transmitters into receiving space stations.

The ITU-R studies show that this potential interference scenario can be most effectively addressed by using the band 1980-2010 MHz only as an uplink band for terrestrial IMT operations, i.e. transmission from IMT terrestrial user equipement to the base station, a frequency arrangement included in Recommendation ITU-R M.1036-5. This could be put into effect by limiting the terminal transmitter output power delivered to the antenna of terrestrial IMT stations to 23 dBm, which is the maximum power for user equipment indicated in ITU-R Report M.2292 (as well as 3GPP TS 25.101) and the basis for the studies for agenda item 9.1.1. The WAC members supporting View B propose to modify Resolution **212 (WRC-15)** to incorporate this power limit.

Since footnote No. **5.389B** of the Radio Regulations mandates that the use of the band 1980-1990 MHz by the mobile-satellite service shall not cause harmful interference to or constrain the development of the mobile service in certain countries in Region 2, the power limit would apply only to the band 1990-2010 MHz in the countries listed in footnote **5.389B**.

The WAC members supporting View B endorse the outcome of the studies under this agenda item, which show significant interference from IMT terrestrial base stations into IMT satellite receivers when the band 1 980-2 010 MHz is used for the downlink from the IMT terrestrial base station to user equipment. The View B proposal provides a mechanism to address this interference through modifications to Resolution **212 (WRC-15)**, thereby enabling the development of the band 1 980-2 010 MHz by both the satellite and terrestrial components of IMT and satisfying the objective of agenda item 9.1.1.

The modifications to Resolution **212 (WRC-15)** contained in View A only note “that ITU-R studies have identified technical and operarational measures that may be implemented to allow co-existance and compatability between satellite and terrestrial components” without addressing the critical interference case in the ITU-R studies or providing a remedy for addressing it. As observed above, there is no ITU coordination procedure for this case and the expected interference exceeds levels that can be mitigated by technical and operational measures. The View A approach does not ensure the development of the band 1 980-2 010 MHz by both the satellite and terrestrial components of IMT as called for in the agenda item.

**ATTACHMENT TO VIEW B:**

**UNITED STATES OF AMERICA**

**DRAFT PROPOSALS FOR THE WORK OF THE CONFERENCE**

**Agenda Item 9.1/Issue 9.1.1:** *to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT*

**Background Information**: Footnote 5.388 indicates that the frequency bands 1 885-2 025 and 2 110-2 200 MHz are intended for use, on a worldwide basis, for International Mobile Telecommunications (IMT) and should be made available for IMT in accordance with Resolution **212 (Rev. WRC-15)**. Within these broader frequency ranges, the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz are allocated to the fixed, mobile, and mobile-satellite services on a co-primary basis. Both the satellite and terrestrial components of IMT have already been deployed or are being considered for further deployment within the 1 980-2 010 MHz and 2 170-2 200 MHz frequency bands as noted in Resolution **212 (WRC-15)**. Frequency Arrangements for terrestrial IMT are contained in Recommendation ITU-R M.1036-5.

Resolution **212 (Rev.WRC-15)** invites *“ITU-R to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT”*.

Prior ITU-R studies have focused on co-existence and compatibility of terrestrial and satellite components of IMT within the same geographical area. WRC-19 Agenda Item 9.1, Issue 9.1.1 is focused on studying the co-existence and compatibility when the two are deployed in different geographical areas.

With the exception of one scenario, ITU-R studies in response to this agenda item indicated compatibility may be achieved between the terrestrial and satellite components of IMT in different geographical areas. In most cases, technical and operational measures may be needed and could be agreed during coordination. However, ITU-R studies show that the aggregate interference from IMT terrestrial base stations into IMT satellite receivers in the band 1 980-2 010 MHz is predicted to exceed the protection criterion by more than 50 dB in the worst cases, more than mitigation measures alone could address. Additionally, there is no coordination procedure in the Radio Regulations to address interference from terrestrial IMT into receiving satellite IMT space stations.

The ITU-R studies show that this potential interference scenario can be most effectively limited by using the band 1980-2010 MHz as an uplink band for terrestrial IMT operations (i.e. used for UE transmit only). This could be put into effect by limiting the terminal transmitter output power delivered to the antenna of terrestrial IMT stations to 23 dBm, which is the maximum power for user equipment indicated in ITU-R Report M.2292 (as well as 3GPP TS 25.101)

and the basis for the studies for agenda item 9.1.1. Since RR No. **5.389B** mandates that the use of the band 1980-1990 MHz by the mobile-satellite service shall not cause harmful interference to or constrain the development of the mobile service in certain countries in Region 2, the power limit would apply only to the band 1990-2010 MHz in the countries listed in footnote **5.389B**.[[1]](#footnote-1)

**Proposal**:

**MOD** **USA/9.1.1/1**

RESOLUTION 212 (Rev.WRC‑19)

**Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz**

The World Radiocommunication Conference ( Sharm-el-Sheikh, 2019),

*considering*

*a)* that Resolution ITU‑R 56 defines the naming for International Mobile Telecommunications (IMT);

*b)* that the ITU Radiocommunication Sector (ITU‑R), for WRC‑97, recommended approximately 230 MHz for use by the terrestrial and satellite components of IMT;

*c)* that ITU‑R studies forecast that additional spectrum may be required to support the future services of IMT and to accommodate future user requirements and network deployments;

*d)* that ITU‑R has recognized that satellite services are an integral part of IMT;

*e)* that, in No. **5.388**, WARC‑92 identified frequency bands to accommodate certain mobile services, now called IMT,

*noting*

1. that the terrestrial component of IMT (in the mobile service) has already been deployed or is being considered for deployment in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz;

*b)* that the satellite component of IMT (in the mobile service and mobile-satellite service) has already been deployed and further deployment in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz is expected;

*c)* that the availability of the satellite component of IMT in the frequency bands 1 980‑2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT in the frequency bands identified in No. **5.388** would improve the overall implementation and the attractiveness of IMT,

noting further

*a)* that co‑coverage, co-frequency deployment of independent satellite and terrestrial IMT components is not feasible unless techniques, such as the use of an appropriate guardband or other mitigation techniques, are applied to ensure coexistence and compatibility between the terrestrial and satellite components of IMT but that co-coverage, co-frequency deployment of dependent hybrid IMT satellite systems with a complementary ground component is feasible;

*b)* that, when the satellite and terrestrial components of IMT are deployed in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in adjacent geographical areas, technical or operational measures may need to be implemented to avoid harmful interference;

*c)* that some difficulties have been raised in addressing potential interference between the satellite and terrestrial components of IMT,

resolves

that administrations which implement IMT:

*a)* should make the necessary frequencies available for system development;

*b)* should use those frequencies when IMT is implemented;

*c)* should use the relevant international technical characteristics, as identified by ITU‑R and ITU‑T Recommendations;

*d)* shall limit the transmitter output power delivered to the antenna of stations in the mobile service to 23 dBm in the band 1980-2010 MHz, except in the 1980-1990 MHz band for countries listed in RR No. **5.389B** in Region 2,

invites administrations

to give due consideration to the accommodation of other services currently operating in these frequency bands when implementing IMT,

further invites ITU‑R

to continue its studies with a view to developing suitable and acceptable technical characteristics for IMT that will facilitate worldwide use and roaming, and ensure that IMT can also meet the telecommunication needs of the developing countries and rural areas.

**Reasons**: ITU-R studies in response to this agenda item showed that limiting the terminal transmitter output power delivered to the antenna of stations in the mobile service to 23 dBm, which is the maximum power for user equipment indicated in ITU-R Report M.2292 (as well as 3GPP TS 25.101), would enable the development of the band 1 980-2 010 MHz by both the satellite and terrestrial components of IMT and satisfy the objective of agenda item 9.1.1.

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1. Region 2 has primary allocations to the fixed, mobile and mobile-satellite service in the band 2 010-2 025 MHz. When used for terrestrial IMT, the band 2 010-2 025 MHz should similiarly be used only for the uplink from the mobile user station to the base station in order to enable the development of both the satellite and terrestrial components of IMT. [↑](#footnote-ref-1)