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| **World Radiocommunication Conference (WRC-15) Geneva, 2–27 November 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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| PLENARY MEETING | **Addendum 8 to Document 62-E** |
|  | **16 October 2015** |
|  | **Original: Chinese** |
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| China (People’s Republic of) | |
| Proposals for the work of the conference | |
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| Agenda item 1.8 | |

1.8 to review the provisions relating to earth stations located on board vessels (ESVs), based on studies conducted in accordance with Resolution **909 (WRC‑12)**;

# 1 Background and progress of study

Consideration of ESVs started in 1997, when WARC-97 approved Resolution 721 (WRC-2000).

WRC-03 adopted Resolution 902 (WRC-03), allowing earth stations on board vessels to operate in the band used by the fixed-satellite service, and introduced footnotes Nos. 5.457A, 5.457B, 5.506A and 5.506B into the RR.

Resolution 902 (WRC-03) specifies the minimum distances from the low-water mark as officially recognized by the coastal State beyond which ESVs can operate. For ESVs operating in the C-band the distance is 300 km, and for those operating in the Ku-band the distance is 125 km.

During the 2007-2012 study period, an input document indicated that the reference models used in Recommendations ITU-R S.1587-1 and ITU-R SF.1650-1 did not reflect current ESV technologies; for instance, some of the typical ESVs in the frequency band 5 925‑6 425 MHz may operate today with e.i.r.p. density levels much lower (even more than 20 dB) than those specified in Resolution 902 (WRC-03). As a consequence, ESV operations at lower power could coordinate more easily with the administrations whose terrestrial stations could operate within 300 km in the C-band and 125 km in the Ku-band. ESVs are allowed to operate at smaller distances without the need to coordinate.

WP4A has concluded the technical studies with respect to agenda item 1.8 and has produced Report S.2363 in support of the CPM Report. The report proposes three methods and a new off-shore distance according to the protection requirement specified in Resolution 902 (WRC‑03).

CPM Methods to satisfy agenda item 1.8

Method A: No change to the Radio Regulations.

Method B: Increasing off-shore protection distance in the C-band.

Method C: Specifying the shortest off-shore protection distances for e.i.r.p. density levels, of ESVs in the horizontal direction.

Method D: specifying the shortest off-shore protection distances for e.i.r.p. density levels, of ESVs in the horizontal direction, taking into account the use of transponders by ESVs.

Method E: Review of the regulatory regime governing operation of ESVs.

# 2 Considerations of scenarios used in the studies

Figure 1 presents the total number of vessels entered in some famous international ports. These ports include Busan, Korea (<https://www.spidc.go.kr:10443/com/url/engPageURL.do?fileNm=statShipInOutPortEng>), Manila, the Philippines (<http://www.ppa.com.ph/>) and Yokohama, Japan (<http://www.city.yokohama.lg.jp/kowan/chinese/>).

These statistical data show that the total number of vessels moving through international ports neither increased significantly nor decreased over the ten years after WRC-03 authorized the use of the frequency band of the fixed-satellite service by ESVs.

Figure 2 shows the total number of ship movements (arrival + departure) in three major Chinese ports.

Shandong

Guangdong

Shanghai

It can be seen that, for the port of Shandong, about 44 000 movements were reported every year from 2003 to 2014, an average of 121 movements a day.

Assuming that every ship was equipped with an ESV in the C-band and that the bandwidth of the fixed service receiver was 11.2 MHz, 2.7 movements per day were expected for the C-band ESVs sharing the same frequency with the fixed service receivers. If all vessels were equipped with an ESV in the Ku-band (500 MHz), assuming the bandwidth of a fixed service receiver to be 14 MHz, the number of movements of ESVs in the Ku-band sharing the same frequency with the fixed service stations would be 3.4 per day.

Studies contained in Recommendation ITU-R SF.1650 anticipated a potential increase in terms of movements of co-frequency vessels. The deployment scenarios that were assumed by WRC-03 when establishing the protection environment for the fixed service are still valid for today’s compatibility study, but the reduction in antenna size could lead to an increase in the number of movements to be considered in the studies.

# 3 Conclusions and proposals

China believes that the traffic statistics from some international ports indicate that the deployment scenarios assumed by the studies are reasonable and have already taken the potential increase in the number of ESV movements into consideration. In addition, spread spectrum technology could be used by current and future ESVs with due protection for the existing services.

China proposes to follow Method C in the CPM report (specify the minimum off-shore distance according to the e.i.r.p. density level of the ESVs in the horizontal direction) and modify Resolution 902 (WRC-03) accordingly (see Annex 1 for details).

annex 1

MOD CHN/62A8/1

RESOLUTION 902 (REV.WRC-15)

Provisions relating to earth stations located on board vessels which operate in fixed-satellite service networks in the uplink bands 5 925-6 425 MHz and 14-14.5 GHz

The World Radiocommunication Conference (Geneva, 2015),

considering

*a)* that there is a demand for global wideband satellite communication services on vessels;

*b)* that the technology exists that enables earth stations on board vessels (ESVs) to use fixed-satellite service (FSS) networks operating in the uplink bands 5 925-6 425 MHz and 14‑14.5 GHz;

*c)* that ESVs are currently operating through FSS networks in the bands 3 700-4 200 MHz, 5 925-6 425 MHz, 10.7-12.75 GHz and 14-14.5 GHz under No. **4.4**;

*d)* that ESVs have the potential to cause unacceptable interference to other services in the bands 5 925-6 425 MHz and 14-14.5 GHz;

*e)* that, with respect to the bands considered in this Resolution, global coverage is only available in the band 5 925-6 425 MHz and that only a limited number of geostationary FSS systems can provide such global coverage;

*f)* that, without special regulatory provisions, ESVs could place a heavy coordination burden on some administrations, especially those in developing countries;

*g)* that, in order to ensure the protection and future growth of other services, ESVs need to operate under certain technical and operational limitations;

*h)* that, within ITU‑R studies, based on agreed technical assumptions, minimum distances from the low-water mark as officially recognized by the coastal State have been calculated, beyond which an ESV will not have the potential to cause unacceptable interference to other services in the bands 5 925-6 425 MHz and 14-14.5 GHz;

*i)* that, in order to limit the interference into other networks in the FSS, it is necessary to establish maximum off-axis e.i.r.p. density limits on ESV emissions;

*j)* that establishing a minimum antenna diameter for ESVs has an impact on the number of ESVs that will ultimately be deployed, hence it will reduce interference into the fixed service,

noting

*a)* that ESVs may be assigned frequencies to operate in FSS networks in the bands 3 700-4 200 MHz, 5 925-6 425 MHz, 10.7-12.75 GHz and 14-14.5 GHz pursuant to No. **4.4** and shall not claim protection from, nor cause interference to, other services having allocations in these bands;

*b)* that the regulatory procedures of Article **9** apply for ESVs operating at specified fixed points,

resolves

1 that ESVs transmitting in the 5 925-6 425 MHz and 14-14.5 GHz bands shall operate under the regulatory and operational provisions contained in Annex 1 and the technical limitations in Annex 2 of this Resolution;

2 that ESVs transmitting maximum e.i.r.p. spectral density levels such that the required protection distances established in this Resolution are shorter than those contained in Resolution **902 (WRC‑03)** shall operate in accordance with the regulatory conditions established in this Resolution from the date it comes into force;

3 that ESVs transmitting maximum e.i.r.p. spectral density levels such that the required protection distances established in this Resolution are larger than those contained in Resolution **902 (WRC‑03)** shall have one year from the date this Resolution comes into force to conform to the conditions established herein,

encourages concerned administrations

to cooperate with administrations which license ESVs while seeking agreement under the above-mentioned provisions, taking into consideration the provisions of Recommendation **37 (WRC‑03)**,

instructs the Secretary-General

to bring this Resolution to the attention of the Secretary-General of the International Maritime Organization (IMO).

ANNEX 1 TO RESOLUTION 902 (REV.WRC-15)

Regulatory and operational provisions for ESVs transmitting in the 5 925‑6 425 MHz and 14-14.5 GHz bands

1 The administration that issues the licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations follow the provisions of this Annex and thus do not present any potential to cause unacceptable interference to the services of other concerned administrations.

2 ESV service providers shall comply with the technical limitations listed in Annex 2 and, when operating within the minimum distances as identified in item 4 below, with the additional limitations agreed by the licensing and other concerned administrations.

3 In the 3 700‑4 200 MHz band and 10.7-12.75 GHz range, ESVs in motion shall not claim protection from transmissions of terrestrial services operating in accordance with the Radio Regulations.

4 The minimum distances from the low-water mark as officially recognized by the coastal State beyond which ESVs can operate without the prior agreement of any administration are given in Table 1 for the 5 925-6 425 MHz band and in Table 2 for the 14-14.5 GHz band, taking into account the technical limitations in Annex 2. Any transmissions from ESVs within the minimum distances shall be subject to the prior agreement of the concerned administration(s).

5 The potentially concerned administrations referred to in the previous item 4 are those where fixed or mobile services are allocated on a primary basis in the Table of Frequency Allocations of the Radio Regulations:

|  |  |
| --- | --- |
| Frequency bands | Potentially concerned administrations |
| 5 925-6 425 MHz | All three Regions |
| 14-14.25 GHz | Countries listed in No. **5.505**, except those listed in No. **5.506B** |
| 14.25-14.3 GHz | Countries listed in Nos. **5.505**, **5.508** and **5.509**, except those listed in No. **5.506B** |
| 14.3-14.4 GHz | Regions 1 and 3, except countries listed in No. **5.506B** |
| 14.4-14.5 GHz | All three Regions, except countries listed in No. **5.506B** |

6 The ESV system shall include means of identification and mechanisms to immediately cease emissions, whenever the station does not operate in compliance with the provisions of items 2 and 4 above.

7 Cessation of emissions as referred to in item 6 above shall be implemented in such a way that the corresponding mechanisms cannot be bypassed on board the vessel, except under the provisions of No. **4.9**.

8 ESVs shall be equipped so as to:

– enable the licensing administration under the provisions of Article **18** to verify earth station performance; and

– enable the cessation of ESV emissions immediately upon request by an administration whose services may be affected.

9 Each licence-holder shall provide a point of contact to the administration with which agreements have been reached for the purpose of reporting unacceptable interference caused by the ESV.

10 When ESVs operating beyond the territorial sea but within the minimum distance (as referred to in item 4 above) fail to comply with the terms required by the concerned administration pursuant to items 2 and 4, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation.

Table 1

Values for the 5 925-6 425 MHz band ESVs

|  |  |
| --- | --- |
| Maximum e.i.r.p. transmitted toward the horizon (dBW in 11.2 MHz) | Minimum distance from low-water mark\* (km) |
| 20.8 | 323 |
| 10.8 | 227 |
| 0.8 | 130 |
| −9.2 | 64 |
| \* Low-water mark as officially recognized by the coastal State. | |

Table 2

Values for the 14-14.5 GHz band ESVs

|  |  |
| --- | --- |
| Maximum e.i.r.p. transmitted toward the horizon (dBW in 14 MHz) | Minimum distance from low-water mark\* (km) |
| 16.3 | 125 |
| 6.3 | 85 |
| −3.7 | 29 |
| \* Low-water mark as officially recognized by the coastal State. | |

ANNEX 2 TO RESOLUTION 902 (REV.WRC‑15)

Technical limitations applicable to ESVs transmitting in the bands 5 925‑6 425 MHz and 14-14.5 GHz

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| --- | --- | --- |
|  | 5 925-6 425 MHz | 14-14.5 GHz |
| Minimum diameter of ESV antenna | 1.2 m | 0.6 m |
| Tracking accuracy of ESV antenna | ±0.2° (peak) | ±0.2° (peak) |
| Maximum ESV e.i.r.p. spectral density toward the horizon | 17 dB(W/MHz) | 12.5 dB(W/MHz) |
| Maximum ESV e.i.r.p. towards the horizon | 20.8 dBW | 16.3 dBW |
| Maximum off-axis e.i.r.p. density1 | See below | See below |
| .  1 In any case, the e.i.r.p. off-axis limits shall be compliant with the FSS intersystem coordination agreements that may agree to more stringent off-axis e.i.r.p. levels. | | |

Off-axis limits

For earth stations on board vessels operating in the 5 925-6 425 MHz band, at any angle φ specified below, off the main-lobe axis of an earth-station antenna, the maximum e.i.r.p. in any direction within 3° of the GSO shall not exceed the following values:

**5 925-6 425 MHz**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Angle off-axis* | | | | | *Maximum e.i.r.p. per 4 kHz band* | | |
| 2.5° | ≤ | φ | ≤ | 7° | | (32 − 25 log φ) dB(W/4 kHz) |
| 7° | < | φ | ≤ | 9.2° | | 11 dB(W/4 kHz) |
| 9.2° | < | φ | ≤ | 48° | | (35 − 25 log φ) dB(W/4 kHz) |
| 48° | < | φ | ≤ | 180° | | −7  dB(W/4 kHz) |

For ESV operating in the 14-14.5 GHz band, at any angle φ specified below, off the main-lobe axis of an earth station antenna, the maximum e.i.r.p. in any direction within 3° of the GSO shall not exceed the following values:

**14-14.5 GHz**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Angle off-axis* | | | | | | | | | *Maximum e.i.r.p. per 40 kHz band* | |
| 2° | ≤ | | φ | | ≤ | | 7° | | (33 − 25 log  φ) dB(W/40 kHz) | |
| 7° | < | | φ | | ≤ | | 9.2° | | 12 dB(W/40 kHz) | |
| 9.2° | < | | φ | | ≤ | | 48° | | (36 − 25 log φ) dB(W/40 kHz) | |
| 48° | < | | φ | | ≤ | | 180° | | −6  dB(W/40 kHz) | |
|  | |  | |  | |  | |  |  |  |

**Reasons:** The traffic statistics from some international ports indicate that the deployment scenarios assumed by the studies are reasonable and the spread-spectrum technology could be used by ESVs on board at present and in the future. Therefore, with proper protection for the existing services, operating conditions for ESVs could be relaxed.

SUP CHN/62A8/2

RESOLUTION 909 (WRC‑12)

Provisions relating to earth stations located on board vessels   
which operate in fixed-satellite service networks in the   
uplink bands 5 925-6 425 MHz and 14-14.5 GHz

**Reasons:** In view of the proposed modifications to Resolution 902 (WRC-03), Resolution 909 (WRC‑12) has served its purpose.

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