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| **World Radiocommunication Conference (WRC-19)Sharm el-Sheikh, Egypt, 28 October – 22 November 2019** |  |
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| PLENARY MEETING | **Addendum 13 toDocument 92-E** |
|  | **7 October 2019** |
|  | **Original: English** |
|  |
| India (Republic of) |
| Proposals for the work of the conference |
|  |
| Agenda item 1.13 |

1.13 to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **238 (WRC-15)**;

# 1 Background

The World Radiocommunication Conference (Geneva, 2015), framed Resolution **238 (WRC-15)** to conduct sharing and compatibility studies on frequency-related matters for International Mobile Telecommunications identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 24.25 GHz and 86 GHz for the future development of International Mobile Telecommunications for 2020 and beyond.

To this effect, the CPM Report to the World Radiocommunication Conference 2019 (WRC-19) was prepared on technical, operational and regulatory/procedural issues relevant to the WRC-19 Agenda. In the CPM Report, the methods to satisfy the agenda item are included in Section 2/1.13/4 and have been organized by frequency bands, as follows: Item A (24.25-27.5 GHz), Item B (31.8-33.4 GHz), Item C (37-40.5 GHz), Item D (40.5-42.5 GHz), Item E (42.5-43.5 GHz), Item F (45.5-47 GHz), Item G (47-47.2 GHz), Item H (47.2-50.2 GHz), Item I (50.4-52.6 GHz), Item J (66-71 GHz), Item K (71-76 GHz) and Item L (81-86 GHz).

# 2 Views and Proposals

To implement International Mobile Telecommunications in frequency range between 24.25 GHz and 86 GHz considering existing and planned satellite usages proposal from India (Republic of) is given below:

# 3 Proposal

## 3.1

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. 2.1)

MOD IND/92A13/1

22-24.75 GHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 24.25-24.45FIXEDMOBILE except aeronautical mobile ADD 5.A113 MOD 5.338A | 24.25-24.45MOBILE except aeronautical mobile ADD 5.A113 MOD 5.338ARADIONAVIGATION | 24.25-24.45FIXEDMOBILE ADD 5.A113 MOD 5.338ARADIONAVIGATION |
| 24.45-24.65FIXEDINTER-SATELLITEMOBILE except aeronautical mobile ADD 5.A113 MOD 5.338A | 24.45-24.65INTER-SATELLITEMOBILE except aeronautical mobile ADD 5.A113 MOD 5.338ARADIONAVIGATION | 24.45-24.65FIXEDINTER-SATELLITEMOBILE ADD 5.A113 MOD 5.338ARADIONAVIGATION |
|  | 5.533 | 5.533 |
| 24.65-24.75FIXEDFIXED-SATELLITE(Earth-to-space) 5.532BINTER-SATELLITEMOBILE except aeronautical mobile ADD 5.A113 MOD 5.338A | 24.65-24.75INTER-SATELLITEMOBILE except aeronautical mobile ADD 5.A113 MOD 5.338ARADIOLOCATION-SATELLITE (Earth-to-space) | 24.65-24.75FIXEDFIXED-SATELLITE(Earth-to-space) 5.532BINTER-SATELLITEMOBILE ADD 5.A113 MOD 5.338A |
|  |  | 5.533 |

MOD IND/92A13/2

24.75-29.9 GHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 24.75-25.25FIXEDFIXED-SATELLITE(Earth-to-space) 5.532BMOBILE except aeronautical mobileADD 5.A113 MOD 5.338A | 24.75-25.25FIXED-SATELLITE(Earth-to-space) 5.535MOBILE except aeronautical mobileADD 5.A113 MOD 5.338A | 24.75-25.25FIXEDFIXED-SATELLITE(Earth-to-space) 5.535MOBILEADD 5.A113 MOD 5.338A |
| 25.25-25.5 FIXED INTER-SATELLITE 5.536 MOBILEADD 5.A113 MOD 5.338A Standard frequency and time signal-satellite (Earth-to-space) |
| 25.5-27EARTH EXPLORATION-SATELLITE (space-to Earth) 5.536B  FIXED INTER-SATELLITE 5.536 MOBILEADD 5.A113 MOD 5.338A SPACE RESEARCH (space-to-Earth) 5.536C Standard frequency and time signal-satellite (Earth-to-space) 5.536A |
| 27-27.5FIXEDINTER-SATELLITE 5.536MOBILE ADD 5.A113 MOD 5.338A | 27-27.5 FIXED FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE ADD 5.A113 MOD 5.338A |

MOD IND/92A13/3

5.338A In the frequency bands 1 350-1 400 MHz, 1 427-1 452 MHz, 22.55-23.55 GHz, 24.25-27.5 GHz, 30-31.3 GHz, 49.7‑50.2 GHz, 50.4-50.9 GHz, 51.4-52.6 GHz, 81-86 GHz and 92-94 GHz, Resolution **750 (Rev.WRC‑19)** applies.     (WRC‑19)

**Reasons:** For the protection measures for the EESS (passive) in the frequency band 23.6-24 GHz, India supports Option 1 under Condition A2a in the CPM Report and conditions as specified in Resolution **750 (Rev.WRC-19)**.

ADD IND/92A13/4#49836

5.A113The frequency band 24.25-27.5 GHz is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. Resolutions **[IND/A113-IMT 26 GHZ] (WRC‑19)** and **750 (Rev.WRC‑19)** applies.     (WRC‑19)

**Reasons:** India supports identifying the 24.25-27.5 GHz frequency band for IMT globally through Alternative 2 under Method A2 in the CPM Report together with a new WRC Resolution. However, it may be subject to the regulatory provisions to be specified in the new WRC Resolutions **[IND/A113-IMT 26 GHZ] (WRC 19)** and **750 (Rev.WRC 19)**.

MOD IND/92A13/5#49845

RESOLUTION 750 (Rev.WRC‑19)

Compatibility between the Earth exploration-satellite service (passive) and relevant active services

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

…

resolves

1 that unwanted emissions of stations brought into use in the frequency bands and services listed in Table 1‑1 below shall not exceed the corresponding limits in that table, subject to the specified conditions;

…

TABLE 1-1

|  |  |  |  |
| --- | --- | --- | --- |
| EESS (passive) band | Activeservice band | Active service | Limits of unwanted emission power fromactive service stations in a specified bandwidthwithin the EESS (passive) band1 |
| … | … | … | … |
| *Note: The row below applies only to Condition A2a Option 1 in the CPM Report* |
| 23.6-24 GHz | 24.25-27.5 GHz | Mobile | −35 dBW in the 200 MHz of the EESS (passive) band for IMT base stations−35 dBW in the 200 MHz of the EESS (passive) band for IMT mobile stations |

**Reasons:** For the protection measures for the EESS (passive) in the 23.6-24 GHz frequency band, India supports Option 1 under Condition A2a in the CPM Report.

ADD IND/92A13/6#49920

DRAFT NEW RESOLUTION [IND/A113-IMT 26 GHZ] (WRC-19)

International Mobile Telecommunications
in frequency band 24.25-27.5 GHz

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

considering

*a)* that International Mobile Telecommunications (IMT), including IMT‑2000, IMT‑Advanced and IMT‑2020, is the ITU vision of global mobile access;

*b)* that International Mobile Telecommunications (IMT), including IMT‑2000, IMT‑Advanced and IMT‑2020, is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

*c)* that the evolution of IMT is being studied within ITU‑R;

*d)* that harmonized worldwide bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

*e)* that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

*f)* that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

*g)* that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems including MIMO and beam-forming techniques in supporting enhanced broadband;

*h)* that ITU‑R has studied, in preparation for WRC‑19, sharing and compatibility with services allocated in the frequency band 24.25-27.5 GHz and its adjacent band, based on characteristics available at that time;

*i)* that identification of frequency bands allocated to the mobile service on a co-primary basis for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated, and may require additional regulatory actions;

*j)* that the results of ITU‑R compatibility studies of IMT‑2020 systems are probabilistic, and therefore the deployment parameters of IMT‑2020 systems that affect compatibility with satellite receivers may vary during practical implementation and deployment of IMT‑2020 networks;

*k)* that the identification of frequency bands for IMT‑2020 requires technical and regulatory measures to ensure compatibility with and future development of incumbent services having an allocation in identified frequency bands;

*l)* the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service;

*m)* that the pointing elevation of the main beam (electrical and mechanical) should normally be below the horizon for outdoor base stations;

*n)* that the coverage of outdoor hotspot has been assumed in sharing studies to be achieved with the deployment of base stations communicating with terminals on the ground and a very limited number of indoor terminals with positive elevation, resulting in an elevation of the main beam of outdoor base stations normally below the horizon, thus with high discrimination towards the satellites,

noting

Recommendation ITU‑R M.2083 “IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond”,

recognizing

*a)* that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band by any application of the services to which it is allocated;

*b)* that Resolution **750 (Rev.WRC‑19)** establishes limits on unwanted emissions in the frequency band 23.6-24 GHz from IMT base stations and IMT mobile stations within the 24.25-27.5 GHz frequency band;

*c)* that spurious emission limits of Recommendation ITU‑R SM.329 Category B (−60 dB(W/MHz)) are sufficient to protect the EESS (passive ) within the bands 50.2-50.4 GHz and 52.6-54.25 GHz from the second harmonic of IMT base station emissions in the 24.25-27.5 GHz band,

resolves

1 that administrations wishing to implement IMT consider the use of frequency band 24.25-27.5 GHz identified for IMT in No. **5.A113**, and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT taking into account the latest relevant ITU‑R Recommendations;

2 in order to ensure the coexistence between IMT in the frequency band 24.25-27.5 GHz as identified by WRC‑19 in Article **5** and other services to which the frequency band is allocated including the protection of these other services, administrations shall apply the condition(s);

3the operation of IMT within the frequency band 24.25-27.5 GHz shall protect the existing and future SRS/EESS earth stations;

4the operation of IMT within the frequency band 24.25-27.5 GHz shall protect the existing and future FSS earth stations;

5 that administrations shall apply the following condition for the frequency band 24.25‑27.5 GHz:

 When deploying outdoor base stations, it shall be ensured that each antenna normally[[1]](#footnote-1)1 transmits only with the main beam pointing below the horizon and the antenna shall have mechanical pointing below the horizon except when the base station is only receiving,

The antenna pattern shall comply with Recommendation ITU‑R M.2101. In addition, IMT base stations shall comply with the TRP limits given in Table 1:

Table 1

TRP\* limits for IMT base stations

|  |  |
| --- | --- |
| Frequency bands | dB(W/200 MHz) |
| 24.25-27.5 GHz | 7 |
| \* Possible example of definition of TRP: Total radiated power (TRP) is the sum of all power radiated by an antenna connected to a transmitter. This level applies for all foreseen modes of operation (i.e. maximum in‑band power, electrical pointing, carrier configurations). |

invites ITU‑R

1 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency band 24.25-27.5 GHz, taking into account the results of sharing and compatibility studies;

2 to regularly review the impact of the evolution of IMT technical and operational characteristics (including deployment and base-station density) on sharing and compatibility with other services (e.g. space services) and, as necessary, to take into account the results of these reviews in the development or revision of ITU‑R Recommendations/Reports, e.g. on IMT characteristics.

## 3.2

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. 2.1)

MOD IND/92A13/7#49849

34.2-40 GHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 37-37.5 FIXED MOBILE except aeronautical mobile ADD 5.B113 SPACE RESEARCH (space-to-Earth)  5.547 |
| 37.5-38 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile ADD 5.B113 SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth)  5.547 |
| 38-39.5 FIXED FIXED-SATELLITE (space-to-Earth) MOBILE ADD 5.B113 Earth exploration-satellite (space-to-Earth)  5.547 |
| 39.5-40 FIXED FIXED-SATELLITE (space-to-Earth) 5.516B MOBILE ADD 5.B113 MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth)  5.547 |

MOD IND/92A13/8#49867

40-47.5 GHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 42.5-43.5 FIXED FIXED-SATELLITE (Earth-to-space) 5.552 MOBILE except aeronautical mobile ADD 5.B113 RADIO ASTRONOMY 5.149 5.547 |

MOD IND/92A13/9#49860

40-47.5 GHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 40.5-41FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE ADD 5.B113BROADCASTINGBROADCASTING-SATELLITE5.547 | 40.5-41FIXEDFIXED-SATELLITE (space-to-Earth) 5.516BMOBILE ADD 5.B113BROADCASTINGBROADCASTING-SATELLITEMobile-satellite (space-to-Earth)5.547 | 40.5-41FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE ADD 5.B113BROADCASTINGBROADCASTING-SATELLITE5.547 |
| 41-42.5 FIXED FIXED-SATELLITE (space-to-Earth) 5.516B MOBILE ADD 5.B113 BROADCASTING BROADCASTING-SATELLITE 5.547 5.551F 5.551H 5.551I |

MOD IND/92A13/10#49850

40-47.5 GHz

|  |
| --- |
| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 40-40.5 EARTH EXPLORATION-SATELLITE (Earth-to-space) FIXED FIXED-SATELLITE (space-to-Earth) 5.516B MOBILE ADD 5.B113 MOBILE-SATELLITE (space-to-Earth) SPACE RESEARCH (Earth-to-space) Earth exploration-satellite (space-to-Earth) |

ADD IND/92A13/11#49852

5.B113The frequency band 37-43.5 GHz or portions thereof is identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. [Resolution **[IND/B113-IMT 40/50 GHZ] (WRC‑19)** applies.]     (WRC‑19)

ADD IND/92A13/12#49927

DRAFT NEW RESOLUTION [IND/B113-IMT 40/50 GHZ] (WRC‑19)

**International Mobile Telecommunications in frequency bands 37-43.5 GHz**

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

*considering*

*a)* that International Mobile Telecommunications (IMT), including IMT-2000, IMT‑Advanced and IMT-2020, is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;

*b)* that the evolution of IMT is being studied within ITU‑R;

*c)* that adequate and timely availability of spectrum and supporting regulatory provisions is essential to realize the objectives in Recommendation ITU‑R M.2083;

*d)* that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;

*e)* that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;

*f)* that ultra-low latency and very high bit-rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;

*g)* that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems including MIMO and beam-forming techniques in supporting enhanced broadband;

*h)* that harmonized worldwide bands for IMT are desirable in order to achieve global roaming and the benefits of economies of scale;

*i)* that ITU‑R has studied, in preparation for WRC‑19, sharing and compatibility with services allocated in the frequency bands 37-43.5 GHz and their adjacent bands, based on the characteristics available at that time;

*j)* that the results of ITU‑R compatibility studies of IMT‑2020 systems are probabilistic, and therefore the deployment parameters of IMT‑2020 systems that affect compatibility with satellite receivers may vary during practical implementation and deployment of IMT‑2020 networks;

*k)* that identification of frequency bands allocated to the mobile service for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated, and may require additional regulatory actions;

*l)* that the identification of frequency bands for IMT‑2020 requires technical and regulatory measures to ensure compatibility with and future development of incumbent services having an allocation in identified frequency bands;

*m)* the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service,

noting

Recommendation ITU‑R M.2083 “IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond”,

recognizing

*a)* that the identification of a frequency band for IMT does not establish priority in the Radio Regulations and does not preclude the use of the frequency band by any application of the services to which it is allocated;

*b)* the identification of high-density applications in the fixed-satellite service in the space-to-Earth direction in the bands 39.5-40 GHz in Region 1, 40-40.5 GHz in all Regions and 40.5-42 GHz in Region 2 and in the Earth-to-space direction in the bands 47.5-47.9 GHz in Region 1, 48.2-48.54 GHz in Region 1, 49.44-50.2 GHz in Region 1 and 48.2-50.2 GHz in Region 2 (see No. **5.516B**);

*c)* that Resolution **752 (WRC‑07)** established a power limit of −10 dBW for stations in the mobile service in the 36-37 GHz band in order to facilitate sharing between active and passive services in this band;

*d)* that the relevant standards organizations have standardized an unwanted emission level of −13 dBm/MHz from IMT stations operating in the 37-40 GHz band, which is below the limit in *recognizing c);*

*e)* that for the purpose of protecting the radio astronomy service in the frequency band 42.5-43.5 GHz, No. **5.149** applies,

resolves

1 that administrations wishing to implement IMT consider the use of frequency band[s] [37-43.5 GHz, 45.5-50.2 GHz and 50.4-52.6 GHz] identified for IMT in No[s]. [**5.B113, 5.C113, 5D.113**] and the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT taking into account the latest relevant ITU‑R Recommendation;

2 in order to ensure the coexistence between IMT in the frequency band[s] [37-43.5 GHz, 45.5-50.2 GHz and 50.4-52.6 GHz] as identified by WRC‑19 in Article **5** and other services to which the frequency band is allocated including the protection of these other services, administrations shall apply the condition(s);

3 that unwanted emissions of IMT stations brought into use in the frequency bands and services listed in Table 1 below shall not exceed the corresponding limits in that table, subject to the specified conditions;

TABLE 1

|  |  |  |  |
| --- | --- | --- | --- |
| EESS (passive) band | Activeservice band | Active service | Limits of unwanted emission power fromIMT‑2020 stations in a specified bandwidthwithin the EESS (passive) band1 |
| 36-37 GHz | 37‑40.5 GHz | Mobile | [TBD\*] dB(W/100 MHz) for BS and [TBD\*] dB(W/100 MHz) for UE. |
| 1 The unwanted emission power level is understood to be in terms of total radiated power (TRP) in the unwanted domain. TRP is the aggregate of the radiated power from all antenna elements.... |

*Note \*: See Section 2/1.13/3.2.3.3 of the CPM Report*

4the operation of IMT within the frequency bands 37-40.5 GHz and 40.5-42.5 GHz shall protect the existing and future FSS receiving earth stations;

5the operation of IMT within the frequency band 37-38 GHz shall protect the existing and future SRS receiving earth stations;

6 that administrations shall apply the following condition for the frequency band 37.0‑43.5 GHz:

 When deploying outdoor IMT base stations, it shall be ensured that each antenna normally[[2]](#footnote-2)1 transmits only with the main beam pointing below the horizon and the antenna shall have mechanical pointing below the horizon except when the base station is only receiving. The antenna pattern shall be kept within the limits of approximation envelope according to Recommendation ITU‑R M.2101. In addition, IMT base stations shall comply with the TRP limits given in Table 2:

Table 2

TRP limits for IMT base stations

|  |  |
| --- | --- |
| Frequency bands | dB(W/200 MHz) |
| 42.5‑43.5 GHz | [−9.5/−4/10] |
| 47.2-50.2 GHz and 50.4-51.4 GHz | [−4/10] |

invites administrations

1 to ensure that, when considering, nationally or regionally, the spectrum to be used for IMT, due attention is paid to the need for spectrum for earth stations that could be deployed in a ubiquitous manner (i.e. small user earth stations) and for earth stations that could be coordinated (i.e. gateways) in both downlink (37.5-42.5 GHz) and uplink (42.5-43.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz) directions, taking into account spectrum identified for the HDFSS as per No. **5.516B**;

2to adopt provisions to enable the deployment of future gateway FSS earth stations in the frequency bands 37.5-40.5 GHz, 40.5-42.5 GHz, 42.5-43.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz, or portions thereof;

3to adopt provisions to enable the deployment of future earth stations in the SRS (space-to-Earth) in the frequency band 37-38 GHz and the SRS (Earth-to-space) and EESS (Earth-to-space) in the frequency band 40-40.5 GHz,

invites ITU‑R

1 to develop harmonized frequency arrangements to facilitate IMT deployment in the frequency bands 37-43.5 GHz taking into account the results of sharing and compatibility studies;

2 to continue providing guidance to ensure that IMT can meet the telecommunication needs of the developing countries and rural areas in the context of the studies referred to above;

3 to develop generic unwanted emission characteristics for mobile and base stations of the terrestrial radio interfaces of IMT-2020;

4 to develop an ITU‑R Recommendation to assist administrations in ensuring the coexistence between existing and future FSS earth stations and IMT operating in the frequency bands 37.5-40.5 GHz, 40.5-42.5 GHz, 42.5-43.5 GHz from IMT deployments in neighbouring countries;

5 to regularly update characteristics of IMT deployments (including base station density) and to study/assess the impact on sharing and compatibility with other services resulting from these deployments,

instructs the Secretary-General

to report to a future competent conference on the results of studies in *invites ITU-R* 5 above.

ARTICLE 5

Frequency allocations

Section IV – Table of Frequency Allocations
(See No. 2.1)

NOC IND/92A13/13#49943

47.5-51.4 GHz

NOC IND/92A13/14#49945

51.4-55.78 GHz

NOC IND/92A13/15#49946

66-81 GHz

NOC IND/92A13/16#49948

81-86 GHz

\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. 1 With reference to *considering k)* it is assumed that only a very limited number of indoor terminals with positive elevation will be communicating with base stations. [↑](#footnote-ref-1)
2. 1 With reference to *considering i)* it is assumed that only a very limited number of indoor terminals with positive elevation will be communicating with base stations. [↑](#footnote-ref-2)