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| **Report ITU-R M.2483-0**  **(07/2020)** |
| **The outcome of the evaluation, consensus building and decision of the IMT-2020 process (Steps 4 to 7), including characteristics of IMT-2020 radio interfaces** |
| **M Series**  **Mobile, radiodetermination, amateur**  **and related satellite services** |

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

# Policy on Intellectual Property Right (IPR)

ITU-R policy on IPR is described in the Common Patent Policy for ITU-T/ITU-R/ISO/IEC referenced in Resolution ITU‑R 1. Forms to be used for the submission of patent statements and licensing declarations by patent holders are available from <https://www.itu.int/ITU-R/go/patents/en> where the Guidelines for Implementation of the Common Patent Policy for ITU‑T/ITU‑R/ISO/IEC and the ITU-R patent information database can also be found.

|  |  |
| --- | --- |
| Series of ITU-R Reports  (Also available online at <http://www.itu.int/publ/R-REP/en>) | |
| **Series** | Title |
| **BO** | Satellite delivery |
| **BR** | Recording for production, archival and play-out; film for television |
| **BS** | Broadcasting service (sound) |
| **BT** | Broadcasting service (television) |
| **F** | Fixed service |
| **M** | Mobile, radiodetermination, amateur and related satellite services |
| **P** | Radiowave propagation |
| **RA** | Radio astronomy |
| **RS** | Remote sensing systems |
| **S** | Fixed-satellite service |
| **SA** | Space applications and meteorology |
| **SF** | Frequency sharing and coordination between fixed-satellite and fixed service systems |
| **SM** | Spectrum management |

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| ***Note****: This ITU-R Report was approved in English by the Study Group under the procedure detailed in Resolution ITU-R 1.* |

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REPORT ITU-R M.2483-0

The outcome of the evaluation, consensus building and decision of the IMT-2020 process (Steps 4 to 7), including characteristics of IMT-2020 radio interfaces

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# 1 Introduction

Resolution [ITU-R 56](http://www.itu.int/pub/R-RES-R.56) defines a new term “IMT-2020” applicable to those systems, system components and related aspects that provide far more enhanced capabilities than those described in Recommendation [ITU-R M.1645](http://www.itu.int/rec/R-REC-M.1645/en).

In this regard, International Mobile Telecommunications-2020 (IMT-2020) systems are mobile systems that include the new capabilities of IMT that go beyond those of IMT-Advanced. [Recommendation ITU-R M.2083](http://www.itu.int/rec/R-REC-M.2083/en) – IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond, identifies capabilities for IMT‑2020 which would make IMT-2020 more efficient, fast, flexible and reliable when providing diverse services in the intended usage scenarios.

The usage scenario of IMT-2020 will extend to enhanced mobile broadband (eMBB), massive machine type communications (mMTC) and ultra-reliable and low latency communications (URLLC).

IMT-2020 systems support low to high mobility applications and much enhanced data rates in accordance with user and service demands in multiple user environments. IMT‑2020 also has capabilities for enabling massive connections for a wide range of services and guarantee ultra‑reliable and low latency communications for future deployed services even in critical environments.

The capabilities of IMT-2020 include:

– very high peak data rate;

– very high and guaranteed user experienced data rate;

– quite low air interface latency;

– quite high mobility while providing satisfactory quality of service;

– enabling massive connection in very high-density scenario;

– very high energy efficiency for network and device side;

– greatly enhanced spectral efficiency;

– significantly larger area traffic capacity;

– high spectrum and bandwidth flexibility;

– ultra-high reliability and good resilience capability;

– enhanced security and privacy.

These features enable IMT-2020 to address evolving user and industry needs.

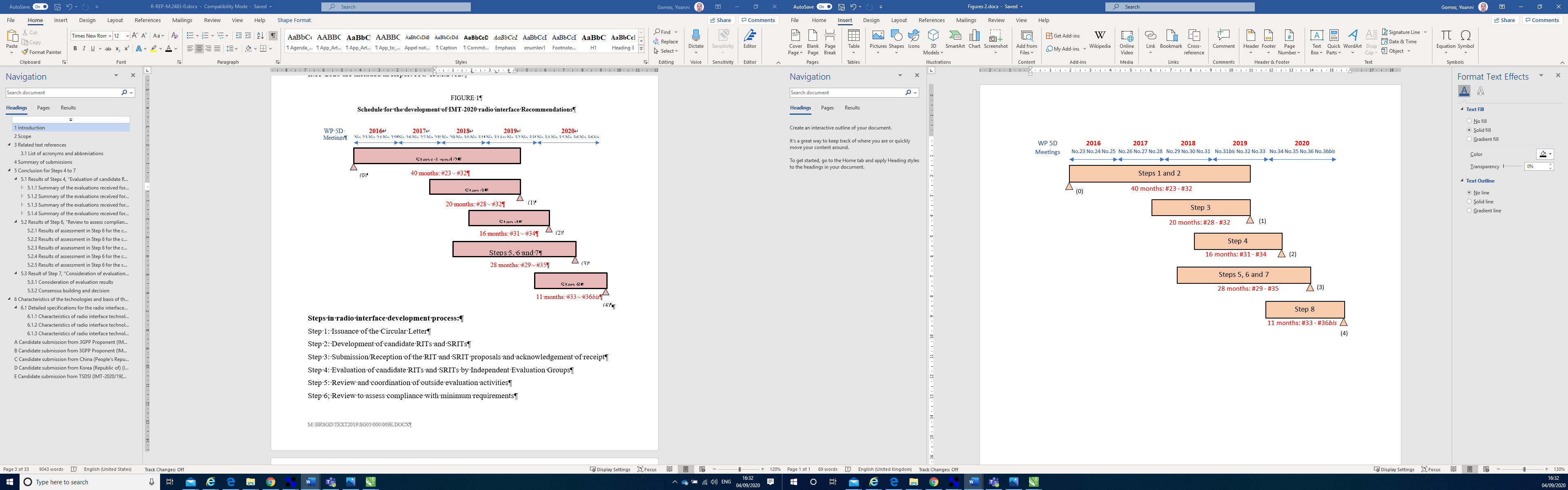
The capabilities of IMT-2020 systems are being continuously enhanced in line with user and industry trends, and consistent with technology developments.

The first invitation for the submission of proposals for candidate radio interface technologies (RITs) or a set of RITs (SRITs) for the terrestrial components of IMT‑2020 was announced by Circular Letter [5/LCCE/59](https://www.itu.int/md/R00-SG05-CIR-0059/en) on 22 March 2016. The Circular Letter and its addenda initiated an ongoing process to evaluate the candidate RITs or SRITs for IMT‑2020, inviting the formation of independent evaluation groups and the subsequent submission of evaluation reports on these candidate RITs or SRITs.

The submission and schedule for the development of IMT-2020 radio interface Recommendations and IMT-2020 terrestrial component radio interface development process are included in Document [IMT-2020/2(Rev.2)](https://www.itu.int/md/R15-IMT.2020-C-0002/en) and are illustrated in Figs 1 and 2 from that Document, reproduced here for reference in understanding the steps of the IMT-2020 process. The requirements, evaluation criteria and submission templates for the development of IMT-2020 are included in [Report ITU-R M.2411](https://www.itu.int/pub/R-REP-M.2411). The minimum requirements related to technical performance for IMT‑2020 radio interface(s) are included in [Report ITU-R M.2410](https://www.itu.int/pub/R-REP-M.2410). The guidelines for evaluation of radio interface technologies for IMT‑2020 are included in [Report ITU‑R M.2412](https://www.itu.int/pub/R-REP-M.2412).

FIGURE 1

Schedule for the development of IMT-2020 radio interface Recommendations



**Steps in radio interface development process:**

|  |  |
| --- | --- |
| Step 1: Issuance of the Circular Letter  Step 2: Development of candidate RITs and SRITs  Step 3: Submission/Reception of the RIT and SRIT proposals and acknowledgement of receipt  Step 4: Evaluation of candidate RITs and SRITs by Independent Evaluation Groups | Step 5: Review and coordination of outside evaluation activities  Step 6: Review to assess compliance with minimum requirements  Step 7: Consideration of evaluation results, consensus building and decision  Step 8: Development of radio interface Recommendation(s) |

**Critical milestones in radio interface development process:**

|  |  |  |  |
| --- | --- | --- | --- |
| (0): Issue an invitation to propose RITs | March 2016 | (2): Cut off for evaluation report to ITU | February 2020 |
| (1): ITU proposed cut off for submission of candidate RIT and SRIT proposals | July 2019 | (3): WP 5D decides framework and key characteristics of IMT-2020 RIT and SRIT | June 2020 |
|  |  | (4): WP 5D completes development of radio interface specification Recommendations | November 2020 |

Figure 2

IMT-2020 terrestrial component radio interface development process

Step 1  
Circular Letter to invite proposals for radio   
interface technologies and evaluations

Step 2  
Development of candidate radio interface technologies

Step 5  
Review and coordination of outside evaluation activities

Step 6  
Review to assess compliance with minimum requirements

Step 7  
Consideration of evaluation results, consensus building and decision

Descriptions of proposed radio interface technologies and evaluation reports

Step 8  
Development of radio interface Recommendation(s)

Radio interface specifications (SPECS), sufficiently detailed to enable worldwide compatibility

Step 9  
Implementation of Recommendation(s)  
Steps 5, 6 and 7

Step 4  
Evaluation of candidate radio interface technologies by independent evaluation groups, grouping of the technologies through consensus building  
Step 8

Coordination between   
independent evaluation groups

ITU-R

Outside ITU-R

Step 3  
Submission/Reception of the RIT and SRIT proposals and acknowledgement of receipt

# 2 Scope

This Report is the record of the work performed after Step 3 (submission/reception of the RIT and SRIT proposals and acknowledgement of receipt) for IMT‑2020 accepted candidate RITs and SRITs, including the evaluation activity and the consensus building. This Report contains the outcome and conclusions of Steps 4 to 7 of the IMT‑2020 process. These steps correspond to:

– Step 4: Evaluation of candidate RITs or SRITs by Independent Evaluation Groups.

– Step 5: Review and coordination of outside evaluation activities.

– Step 6: Review to assess compliance with minimum requirements.

– Step 7: Consideration of evaluation results, consensus building and decision.

The details of these steps are provided in [Document IMT-2020/2(Rev.2)](https://www.itu.int/md/R15-IMT.2020-C-0002)[[1]](#footnote-1).

This Report also states the decisions reached by ITU-R on each of the candidate proposals and provides the technical characteristics of the RITs and SRITs accepted for inclusion in IMT-2020 in the first release of the specifications.

Note that the actual specifications of the agreed IMT-2020 radio interfaces are contained in Recommendation ITU-R M.2150 – Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT‑2020).

# 3 Related text references

IMT-2020 2-02

Recommendation ITU-R [M.1036](https://www.itu.int/rec/R-REC-M.1036-6-201910-I/en) Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations

Recommendation ITU-R [M.2083](https://www.itu.int/rec/R-REC-M.2083/en) IMT vision -Framework and overall objectives of the future development of IMT-2020 and beyond

Recommendation ITU-R [M.1822](https://www.itu.int/rec/R-REC-M.1822/en) Framework for services supported by IMT

Recommendation ITU-R M.2150 Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT‑2020)

Report ITU-R [M.2320](https://www.itu.int/pub/R-REP-M.2320) Future technology trends of terrestrial IMT systems

Report ITU-R [M.2370](https://www.itu.int/pub/R-REP-M.2370) IMT traffic estimates for the years 2020-2030

Report ITU-R [M.2376](https://www.itu.int/pub/R-REP-M.2376) Technical feasibility of IMT in bands above 6 GHz

Report ITU-R [M.2411](https://www.itu.int/pub/R-REP-M.2411) Requirements, evaluation criteria and submission templates for the development of IMT-2020

Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) Requirements related to technical performance for IMT-2020 radio interface(s)

Report ITU-R [M.2412](https://www.itu.int/pub/R-REP-M.2412) Guidelines for evaluation of radio interface technologies for IMT-2020

Resolution [ITU-R 56](https://www.itu.int/pub/R-RES-R.56) Naming for International Mobile Telecommunications

Resolution [ITU-R 65](https://www.itu.int/pub/R-RES-R.65) Principles for the process of development of IMT for 2020 and beyond

Document IMT-2020/1 IMT-2020 Background 2020

Document IMT-2020/2(Rev.2) Submission and evaluation process and consensus building for IMT-2020

Document [IMT-2020/20](https://www.itu.int/md/R15-IMT.2020-C-0020/en) Process and the use of Global Core Specification (GCS), references, and related certifications in conjunction with Recommendation ITU‑R M.[IMT-2020.SPECS]

## 3.1 List of acronyms and abbreviations

IMT International Mobile Telecommunications

RIT Radio interface technology

SRIT Set of radio interface technologies

# 4 Summary of submissions

Following the guidelines of the IMT-2020 process, the candidate technology submissions accepted by ITU-R under Step 3[[2]](#footnote-2) were reviewed and the following were acknowledged as “complete”[[3]](#footnote-3) candidate technology submissions as per § 5 of Report ITU-R [M.2411](https://www.itu.int/pub/R-REP-M.2411):

– [IMT-2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) – Acknowledgement of candidate SRIT submission from 3GPP proponent under step 3 of the IMT-2020 process.

– [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0014/en)14 – Acknowledgement of candidate RIT submission from 3GPP proponent under step 3 of the IMT-2020 process.

– [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 – Acknowledgement of candidate RIT submission from China (People’s Republic of) under step 3 of the IMT-2020 process.

– [IMT-2020/16](https://www.itu.int/md/R15-IMT.2020-C-0016/en) – Acknowledgement of candidate RIT submission from Korea (Republic of) under Step 3 of the IMT-2020 process.

– [IMT-2020/17](https://www.itu.int/md/R15-IMT.2020-C-0017/en)(Rev.1) – Acknowledgement of candidate SRIT submission from ETSI (TC DECT) and DECT Forum under step 3 of the IMT-2020 process.

– [IMT-2020/18](https://www.itu.int/md/R15-IMT.2020-C-0018/en)(Rev.1) – Acknowledgement of candidate RIT submission from Nufront under Step 3 of the IMT-2020 process.

– [IMT-2020/19](https://www.itu.int/md/R15-IMT.2020-C-0019/en)(Rev.1) – Acknowledgement of candidate RIT submission from TSDSI under step 3 of the IMT-2020 process.

For convenience, these submissions are attached in Annex 1 to this Report.

# 5 Conclusion for Steps 4 to 7

## 5.1 Results of Steps 4, “Evaluation of candidate RITs or SRITs by Evaluation Groups” and Step 5, “Review and coordination of outside evaluation activities”

Under Step 4 of IMT-2020 process, candidate RITs or SRITs were evaluated by Independent Evaluation Groups (IEG) that registered with the ITU-R in conformance with the process. In this step, the candidate RITs or SRITs were assessed based on Reports ITU-R [M.2411](https://www.itu.int/pub/R-REP-M.2411) and ITU‑R [M.2412](https://www.itu.int/pub/R-REP-M.2412).

An Evaluation Group discussion area was opened during Step 4 between July 2018 and February 2020 to facilitate activities among IEGs and the proponents, and among IEGs.

Fifteen IEGs registered with ITU-R. As one group withdrew its subscription, a total of fourteen IEGs were expected to be involved in the evaluation process. One IEG did not provide an evaluation report, and hence thirteen final evaluation reports were considered by ITU-R under Steps 4 and 5, as appropriate. These evaluation reports, including their revisions, are included in Annex 2 of this Report. Some of these reports addressed more than one technology proposal.

The list of IEG final evaluation reports for the candidate technology submissions mapping is shown in Table 1 from Document [IMT-2020/38](https://www.itu.int/md/R15-IMT.2020-C-0038/en)(Rev.1).

TABLE 1

Index of documents related to IEG final evaluation reports   
for the candidate technology submissions of IMT-2020 under Step 4

| [IMT-2020/38](https://www.itu.int/md/R15-IMT.2020-C-0038/en)(Rev.1) | Summary of Step 4 of the IMT-2020 process for evaluation  of IMT‑2020 candidate technology submissions | | |
| --- | --- | --- | --- |
| Registered Independent Evaluation Group | Summary of IEG evaluation results | Based on or references IEG Contributions | Evaluation reports history documents |
| [**5G India Forum**](https://www.itu.int/oth/R0A06000083/en) | **IMT-2020/39(Rev.1)** | **5D/136** (Various) | **IMT-2020/11(Rev.1)** |
| [**5G Infrastructure Association**](https://www.itu.int/oth/R0A0600006E/en) | **IMT-2020/40** | **5D/50** (3GPP)  **5D/51** (DECT)  **5D/52** (Nufront)  **5D/53** (TSDSI) | **IMT-2020/33(Rev.1)** |
| [**Africa Evaluation Group**](https://www.itu.int/oth/R0A06000085/en) | **IMT-2020/41** | **5D/123** (DECT)  **5D/124** (TSDSI)  **5D/125** (Nufront) | **IMT-2020/34(Rev.1)** |
| [**ATIS WTSC IMT-2020**](https://www.itu.int/oth/R0A0600006F/en) | **IMT-2020/42** | **5D/54** (document map)  **5D/55** (3GPP RIT/SRIT- technical details document)  **5D/56** (3GPP SRIT)  **5D/57** (3GPP RIT)  **5D/58** (China)  **5D/59** (Korea)  **5D/60** (DECT)  **5D/61** (TSDSI) | **IMT-2020/29(Rev.1)** |

TABLE 1 (*end*)

| [IMT-2020/38](https://www.itu.int/md/R15-IMT.2020-C-0038/en)(Rev.1) | | Summary of Step 4 of the IMT-2020 process for evaluation  of IMT‑2020 candidate technology submissions | | |
| --- | --- | --- | --- | --- |
| [**Beijing National Research Center for Information Science and Technology (Bnrist EG)**](https://www.itu.int/oth/R0A0600009B/en) | **IMT-2020/43(Rev.1)** | | **5D/146** (Nufront) | **IMT-2020/35** |
| [**Canadian Evaluation Group**](https://www.itu.int/oth/R0A06000072/en) | **IMT-2020/44** | | **5D/90** (Various) | **IMT-2020/30(Rev.1)** |
| **ChEG Chinese Evaluation Group** | **IMT-2020/45** | | **5D/69** (Various) | **IMT-2020/10(Rev.2)** |
| [**Chinese Industry and Research Alliance of Telecommunications (CIRAT)**](https://www.itu.int/oth/R0A0600009C/en) | **IMT-2020/46** | | **5D/129** (Nufront) | **IMT-2020/36** |
| [**Telecom Centres of Excellence, India**](https://www.itu.int/oth/R0A06000075/en) | **IMT-2020/47** | | **5D/121** (3GPP)  **5D/122** (TSDSI) | **IMT-2020/9(Rev.2)** |
| [**The Fifth Generation Mobile Communications Promotion Forum, Japan**](https://www.itu.int/oth/R0A06000076/en) | **IMT-2020/48** | | **5D/95** (3GPP RIT)  **5D/96** (3GPP SRIT)  **5D/97** (Nufront) | **IMT-2020/32(Rev.1)** |
| [**Trans-Pacific Evaluation Group**](https://www.itu.int/oth/R0A06000079/en) | **IMT-2020/49** | | **5D/94** (3GPP RIT & SRIT) | **IMT-2020/8(Rev.2)** |
| [**TTA 5G Technology Evaluation Special Project Group**](https://www.itu.int/oth/R0A0600007D/en) | **IMT-2020/50** | | **5D/49** (3GPP RIT) | **IMT-2020/31(Rev.1)** |
| [**Wireless World Research Forum**](https://www.itu.int/oth/R0A06000073/en) | **IMT-2020/51** | | **5D/120** (Nufront & TSDSI) | **IMT-2020/37** |

The IEGs utilized the defined ITU-R evaluation methodology and criteria established in the relevant ITU-R Reports covering IMT-2020. ITU-R concluded that the IEGs had fulfilled their role in the process and that the inclusion of views from organizations external to the ITU‑R had been useful to the work on IMT-2020 and had contributed to the success of the IMT-2020 process.

Considering the requirements, evaluation criteria and submission templates for the development of IMT-2020 included in [Report ITU-R M.2411](https://www.itu.int/pub/R-REP-M.2411), the minimum requirements related to technical performance for IMT‑2020 radio interface(s) included in Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410), and the guidelines for evaluation of radio interface technologies for IMT‑2020 included in [Report ITU‑R [M.2412](https://www.itu.int/pub/R-REP-M.2412)](https://www.itu.int/pub/R-REP-M.2412), the following conclusions have been reached.

### 5.1.1 Summary of the evaluations received for candidate SRIT/RIT submissions

#### 5.1.1.1 Summary of the evaluations received for the candidate SRIT submission from 3GPP Proponent (Document [IMT-2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en))

There were seven relevant evaluation reports received for the candidate SRIT submission. The relevant received evaluation reports confirmedthat the candidate 3GPP SRIT proposal in [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) fulfils the minimum requirements for the five test environments comprising the three usage scenarios. In addition, it is confirmed that each component RIT of the SRIT also fulfils the minimum requirements of at least two test environments.

#### 5.1.1.2 Summary of the evaluations received for the candidate RIT submission from 3GPP Proponent (Document IMT-2020/14)

There were ten relevant evaluation reports received for the candidate RIT submission. The relevant received evaluation reports confirmedthat the candidate 3GPP RIT proposal in IMT-2020/14 fulfils the minimum requirements for the five test environments comprising the three usage scenarios.

#### 5.1.1.3 Summary of the evaluations received for the candidate RIT submission from China (People’s Republic of) (Document [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15)

It was concluded by ITU-R that the [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 candidate technology proposal was technically identical to the IMT-2020/14 candidate technology proposal and NB-IoT part of [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) candidate technology proposal, so that a single evaluation of IMT-2020/14 and a single evaluation of NB-IoT part of [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) would also be applicable to the candidate technology proposal [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15.

The relevant received evaluation reports confirmed that the candidate China (People’s Republic of) RIT proposal in [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 fulfils the minimum requirements for the five test environments comprising the three usage scenarios as the views expressed in § 5.1.1.1 (specifically the NB‑IoT part) and § 5.1.1.2 (in its entirety) are directly applicable to the [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 candidate technology proposal.

#### 5.1.1.4 Summary of the evaluations received for the candidate RIT submission from Korea (Republic of) (Document IMT-2020/16)

It was concluded by ITU-R that IMT-2020/16 candidate technology proposal was technically identical to the IMT-2020/14 candidate technology proposal, so that a single evaluation would be applicable to both technologies.

The relevant received evaluation reports confirmedthat the candidate Korea (Republic of) RIT proposal in IMT-2020/16 fulfils the minimum requirements for the five test environments comprising the three usage scenarios as the views expressed in § 5.1.2 (in its entirety) is directly applicable to the IMT-2020/16 candidate technology proposal.

#### 5.1.1.5 References to evaluation reports for candidate technology proposals in § 5.1.1

The ITU-R views of the relevant evaluation reports from the IEGs and the individual IEG analyses for the candidate technology submissions in §§ 5.1.1.1 to 5.1.1.4 above are included in Annex 2 of this Report as follows:

– [IMT-2020/39](https://www.itu.int/md/R15-IMT.2020-C-0039/en)(Rev.1) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 and IMT‑2020/16 by 5G India Forum (5GIF) evaluation group.

– [IMT-2020/40](https://www.itu.int/md/R15-IMT.2020-C-0040/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 and IMT‑2020/16 by 5G Infrastructure Association.

– [IMT-2020/41](https://www.itu.int/md/R15-IMT.2020-C-0041/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/14 by Africa Evaluation Group.

– [IMT-2020/42](https://www.itu.int/md/R15-IMT.2020-C-0042/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 and IMT‑2020/16 by Alliance for Telecommunications Industry Solutions WTSC.

– [IMT-2020/44](https://www.itu.int/md/R15-IMT.2020-C-0044/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) and IMT-2020/14 by Canadian Evaluation Group.

– [IMT-2020/45](https://www.itu.int/md/R15-IMT.2020-C-0045/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 and IMT‑2020/16 by Chinese Evaluation Group.

– [IMT-2020 47](https://www.itu.int/md/R15-IMT.2020-C-0047/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/14 by Telecom Centre Of Excellence Group (TCOE) India.

– [IMT-2020/48](https://www.itu.int/md/R15-IMT.2020-C-0048/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) and IMT-2020/14 by The Fifth Generation Mobile Communications Promotion Forum.

– [IMT-2020/49](https://www.itu.int/md/R15-IMT.2020-C-0049/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 and IMT‑2020/16 by Trans-Pacific Evaluation Group.

– [IMT-2020/50](https://www.itu.int/md/R15-IMT.2020-C-0050/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Document IMT-2020/14 by TTA SPG33 5G.

### 5.1.2 Summary of the evaluations received for the candidate SRIT submission from ETSI (TC DECT) and DECT Forum (Document IMT-2020/17(Rev.1))

It was concluded by ITU-R that “3GPP 5G NR” RIT[[4]](#footnote-4) as one component RIT of the IMT‑2020/17(Rev.1) candidate technology proposal is technically identical to the IMT-2020/14 candidate technology proposal, so that a single evaluation would be applicable to both technologies.

There were six relevant evaluation reports received for ETSI (TC DECT) and DECT Forum proposal in IMT-2020/17(Rev.1), in which three received evaluation reports from three IEGs evaluated the 3GPP NR RIT component and four received evaluation reports from four IEGs evaluated the “DECT 2020 NR RIT” component.

Based on the evaluation results for DECT 2020 NR RIT component, which applies only to Urban Macro-URLLC and Urban Macro-mMTC test environments,

– Three received evaluation reports indicated that the evaluation groups were of the opinion that the candidate ETSI (TC DECT) and DECT Forum proposal in IMT‑2020/17(Rev.1) did not meet the minimum requirements of Urban Macro-URLLC test environments.

– One IEG was of the opinion that the candidate ETSI (TC DECT) and DECT Forum proposal in IMT-2020/17(Rev.1) met the minimum requirements of Urban Macro‑URLLC test environments, but it was inconclusive whether it meets the minimum requirements of the Urban Macro-mMTC test environment.

Considering the relevant received evaluation reports, ITU-R has determined that:

– The candidate SRIT submission from ETSI (TC DECT) and DECT Forum will require additional evaluation to conclude the final assessments through Steps 6 and 7 of the current process. This candidate SRIT submission will, therefore, on an exceptional basis continue in the process, rewinding to Step 4 in order to consider additional material. Should this technology submission successfully navigate the rewind to Step 4 and the subsequent Steps 5 to 8 of the current IMT-2020 process extension, the candidate SRIT submission from ETSI (TC DECT) and DECT Forum would consequentially be included in a timely revision to the published first release of Recommendation ITU-R M.2150.

#### 5.1.2.1 References to evaluation reports for the candidate SRIT submission (Document IMT-2020/17(Rev.1)) from ETSI (TC DECT) and DECT Forum

The ITU-R views of the relevant evaluation reports from the IEGs and the individual IEG analyses for the ETSI (TC DECT) and DECT Forum technology are included in Annex 2 of this Report are as follows:

– [IMT-2020/39](https://www.itu.int/md/R15-IMT.2020-C-0039/en)(Rev.1) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/17(Rev.1) (3GPP) by 5G India Forum (5GIF) evaluation group.

– [IMT-2020/40](https://www.itu.int/md/R15-IMT.2020-C-0040/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/17(Rev.1) (DECT) by 5G Infrastructure Association.

– [IMT-2020/42](https://www.itu.int/md/R15-IMT.2020-C-0042/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/17(Rev.1) (3GPP) by Alliance for Telecommunications Industry Solutions WTSC.

– [IMT-2020/44](https://www.itu.int/md/R15-IMT.2020-C-0044/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/17(Rev.1) by Canadian Evaluation Group.

– [IMT-2020/45](https://www.itu.int/md/R15-IMT.2020-C-0045/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/17(Rev.1) (DECT) by Chinese Evaluation Group.

– [IMT-2020/49](https://www.itu.int/md/R15-IMT.2020-C-0049/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/17(Rev.1) (3GPP) by Trans-Pacific Evaluation Group.

### 5.1.3 Summary of the evaluations received for the candidate RIT submission (Document IMT-2020/18(Rev.1)) from Nufront

There are eight relevant evaluation reports received for Nufront in IMT-2020/18(Rev.1), in which eight received evaluation report indicated that

– Five evaluation reports were of the opinion that the candidate Nufront proposal in IMT‑2020/18(Rev.1) did not meet the minimum requirements of eMBB and Urban Macro-URLLC test environments.

– One evaluation report indicated that the candidate Nufront proposal in IMT-2020/18(Rev.1) did not meet the minimum requirements of Urban Macro-URLLC test environments.

– One evaluation report indicated that the evaluation group was inconclusive whether it met the minimum requirements of all required test environments.

– One evaluation report indicated it met the minimum requirements of all required test environments.

Considering the relevant received evaluation reports, ITU-R has determined that:

– The candidate RIT submission from Nufront will require additional evaluation to conclude the final assessment through Steps 6 and Step 7 of the current process. This candidate RIT submission will, therefore, on an exceptional basis continue in the process, rewinding to Step 4 in order to consider additional material. Should this technology submission successfully navigate the rewind to Step 4 and the subsequent Steps 5 to 8 of the current IMT‑2020 process extension, the candidate RIT submission from Nufront would consequentially be included in a timely revision to the published first release of Recommendation ITU-R M.2150.

#### 5.1.3.1 References to evaluation reports for the candidate RIT submission (Document IMT-2020/18(Rev.1)) from Nufront

The ITU-R views of the relevant evaluation reports from the IEGs and the individual IEG analyses for the Nufront technology are included in Annex 2 of this Report are as follows:

– [IMT-2020/39](https://www.itu.int/md/R15-IMT.2020-C-0039/en)(Rev.1) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/18(Rev.1) by 5G India Forum (5GIF) Evaluation Group.

– [IMT-2020/40](https://www.itu.int/md/R15-IMT.2020-C-0040/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/18(Rev.1) by 5G Infrastructure Association.

– [IMT-2020/41](https://www.itu.int/md/R15-IMT.2020-C-0041/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/18(Rev.1) by Africa Evaluation Group.

– [IMT-2020/43](https://www.itu.int/md/R15-IMT.2020-C-0043/en)(Rev.1) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/18(Rev.1) by Beijing National Research Center for Information Science and Technology evaluation group.

– [IMT-2020/44](https://www.itu.int/md/R15-IMT.2020-C-0044/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/18(Rev.1) by Canadian Evaluation Group.

– [IMT-2020/46](https://www.itu.int/md/R15-IMT.2020-C-0046/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Document IMT-2020/18(Rev.1) by Chines Industry and Research Alliance of Telecommunications Evaluation Group.

– [IMT-2020/48](https://www.itu.int/md/R15-IMT.2020-C-0048/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/18(Rev.1) by The Fifth Generation Mobile Communications Promotion Forum.

– [IMT-2020/51](https://www.itu.int/md/R15-IMT.2020-C-0051/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Document IMT-2020/18(Rev.1) by Wireless World Research Forum.

### 5.1.4 Summary of the evaluations received for the candidate RIT submission (Document IMT-2020/19(Rev.1)) from TSDSI

There were two relevant evaluation reports received for TSDSI in IMT-2020/19(Rev.1). The relevant received evaluation reports confirmed that the candidate TSDSIRIT proposal in IMT‑2020/19(Rev.1) fulfils the minimum requirements for the five test environments comprising the three usage scenarios.

#### 5.1.4.1 References to evaluation reports for the candidate RIT submission (Document IMT-2020/19(Rev.1)) from TSDSI

The ITU-R views of the relevant evaluation reports from the IEGs and the individual IEG analyses for the TSDSI technology are included in Annex 2 of this Report are as follows:

– [IMT-2020/40](https://www.itu.int/md/R15-IMT.2020-C-0040/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/19(Rev.1) by 5G Infrastructure Association.

– [IMT-2020/47](https://www.itu.int/md/R15-IMT.2020-C-0047/en) – Summary results of evaluation of IMT-2020 candidate technology submission specifically for Documents IMT-2020/19(Rev.1) by Telecom Centre Of Excellence Group (TCOE) India.

## 5.2 Results of Step 6, “Review to assess compliance with minimum requirements”

Under Step 6 of the IMT-2020 process and guidelines, an assessment of each proposal was made as to whether it met a version of the minimum technical requirements and evaluation criteria of the IMT‑2020 process in force as described in Report ITU-R [M.2411](https://www.itu.int/pub/R-REP-M.2411). The evaluation methodology is described in Report ITU-R [M.2412](https://www.itu.int/pub/R-REP-M.2412). The version of the minimum technical requirements used is described in Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410).

In this step, the evaluated proposal for a RIT/SRIT is assessed as a qualifying RIT/SRIT, if a RIT/SRIT fulfils the minimum requirements for the five test environments comprising the three usage scenarios.

Such a qualified RIT/SRIT[[5]](#footnote-5) will go forward for further consideration in Step 7.

Based on a review of the evaluations carried out by the IEGs as well as the self-evaluations from the proponents, the conclusions of the ITU-R for Step 6 are presented in the following sub-sections. Thus, the summary view of the evaluations indicated in § 5.1 are directly relevant to this assessment.

Each candidate technology submission is separately addressed for compliance with regard to services, spectrum and technical performance and for confirmation as a qualifying RIT/SRIT.

### 5.2.1 Results of assessment in Step 6 for the candidate SRIT submission (Document [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) from 3GPP Proponent

The ITU-R summary view of the candidate technology submission from the 3GPP ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) is presented below. The individual detailed analysis of compliance for each of the items defined in Report ITU‑R [M.2411](https://www.itu.int/pub/R-REP-M.2411) is included in the Tables in Annex 3 to the present Report.

Compliance related to services

The 3GPP technology proposed by 3GPP ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) meets the minimum requirements for services.

Compliance related to spectrum

The 3GPP technology proposed by 3GPP ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) meets the minimum requirements for spectrum.

Compliance related to technical performance

The 3GPP technology proposed by 3GPP ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) meets the minimum requirements for technical performance.

Assessment of the candidate technology proposal as a qualifying RIT/SRIT

ITU-R confirms that the SRIT of the candidate technology submission in [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) meets the minimum requirements of the Indoor Hotspot-eMBB test environment.

ITU-R confirms that the SRIT of the candidate technology submission in [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) meets the minimum requirements of the Dense Urban-eMBB test environment.

ITU-R confirms that the SRIT of the candidate technology submission in [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) meets the minimum requirements of the Rural-eMBB test environment.

ITU-R confirms that the SRIT of the candidate technology submission in [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) meets the minimum requirements of the Urban Macro-mMTC test environment.

ITU-R confirms that the SRIT of the candidate technology submission in [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) meets the minimum requirements of the Urban Macro-URLLC test environment.

**Step 6 assessment for SRIT proposal (Document** [**IMT‑2020/13**](https://www.itu.int/md/R15-IMT.2020-C-0013/en)**) from 3GPP Proponent**

The evaluated candidate SRIT proposal (Document [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) from 3GPP Proponent is assessed by ITU-R as satisfactorily fulfilling the minimum requirements for the five test environments comprising the three usage scenarios, with each component RIT of the SRIT also fulfilling the minimum requirements of at least two test environments. Thus, this 3GPP Proponent SRIT proposal is ‘a qualifying SRIT’ and therefore will go forward for further consideration in Step 7.

### 5.2.2 Results of assessment in Step 6 for the candidate RIT submission (Document IMT‑2020/14) from 3GPP Proponent

The ITU-R summary view of the candidate technology submission from the 3GPP (IMT-2020/14) is presented below. The individual detailed analysis of compliance for each of the defined items in Report ITU‑R [M.2411](https://www.itu.int/pub/R-REP-M.2411) is included in the tables in Annex 3.

Compliance related to services

The 3GPP technology proposed by 3GPP (IMT-2020/14) meets the minimum requirements for services.

Compliance related to spectrum

The 3GPP technology proposed by 3GPP (IMT-2020/14) meets the minimum requirements for spectrum.

Compliance related to technical performance

The 3GPP technology proposed by 3GPP (IMT-2020/14) meets the minimum requirements for technical performance.

Assessment of the candidate technology proposal as a qualifying RIT/SRIT

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/14 meets the minimum requirements of the Indoor Hotspot-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/14 meets the minimum requirements of the Dense Urban-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/14 meets the minimum requirements of the Rural-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/14 meets the minimum requirements of the Urban Macro-mMTC test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/14 meets the minimum requirements of the Urban Macro-URLLC test environment.

**Step 6 Assessment for RIT proposal (Document IMT-2020/14) from 3GPP Proponent:**

The evaluated candidate RIT proposal (Document IMT-2020/14) from 3GPP Proponent is assessed by ITU-R as satisfactorily fulfilling the minimum requirements for the five test environments comprising the three usage scenarios. Thus, this 3GPP Proponent RIT proposal is ‘a qualifying SRIT’ and therefore will go forward for further consideration in Step 7.

### 5.2.3 Results of assessment in Step 6 for the candidate RIT submission (Document [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15) from China (People’s Republic of)

Since the [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 candidate technology proposal was technically identical to the IMT‑2020/14 candidate technology proposal and NB-IoT part of [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) candidate technology proposal, the evaluation results of IMT-2020/14 and NB-IoT part of [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) would also be applicable to the candidate technology proposal [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15.

The ITU-R summary view of the candidate technology submission from the China (People’s Republic of) ([IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15) is presented below. The individual detailed analysis of compliance for each of the defined items in Report ITU‑R [M.2411](https://www.itu.int/pub/R-REP-M.2411) is included in the Tables in Annex 3 to the present Report.

Compliance related to services

The technology proposed by China (People’s Republic of) ([IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15) meets the minimum requirements for services.

Compliance related to spectrum

The technology proposed by China (People’s Republic of) ([IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15) meets the minimum requirements for spectrum.

Compliance related to technical performance

The technology proposed by China (People’s Republic of) ([IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15) meets the minimum requirements for technical performance.

Assessment of the candidate technology proposal as a qualifying RIT/SRIT

ITU-R confirms that the RIT of the candidate technology submission in [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 meets the minimum requirements of the Indoor Hotspot-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 meets the minimum requirements of the Dense Urban-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 meets the minimum requirements of the Rural-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 meets the minimum requirements of the Urban Macro-mMTC test environment.

ITU-R confirms that the RIT of the candidate technology submission in [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 meets the minimum requirements of the Urban Macro-URLLC test environment.

**Step 6 assessment for RIT proposal (Document** [**IMT‑2020/**](https://www.itu.int/md/R15-IMT.2020-C-0015/en)**15) from China (People’s Republic)**

The evaluated candidate RIT proposal (Document [IMT‑2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15) from China (People’s Republic) is assessed by ITU-R as satisfactorily fulfilling the minimum requirements for the five test environments comprising the three usage scenarios. Thus, this China (People’s Republic) RIT proposal is ‘a qualifying RIT’ and therefore will go forward for further consideration in Step 7.

### 5.2.4 Results of assessment in Step 6 for the candidate RIT submission (Document IMT‑2020/16) from Korea (Republic of)

Since the IMT-2020/16 candidate technology proposal was technically identical to the IMT‑2020/14 candidate technology proposal, the evaluation results of IMT-2020/14 would also be applicable to the candidate technology proposal IMT-2020/16.

The ITU-R summary view of the candidate technology submission from the Korea (IMT-2020/16) is presented below. The individual detailed analysis of compliance for each of the defined items in Report ITU‑R [M.2411](https://www.itu.int/pub/R-REP-M.2411) is included in the tables in Annex 3.

Compliance related to services

The technology proposed by Korea (IMT-2020/16) meets the minimum requirements for services.

Compliance related to spectrum

The technology proposed by Korea (IMT-2020/16) meets the minimum requirements for spectrum.

Compliance related to technical performance

The technology proposed by Korea (IMT-2020/16) meets the minimum requirements for technical performance.

Assessment of the candidate technology proposal as a qualifying RIT/SRIT

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/16 meets the minimum requirements of the Indoor Hotspot-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/16 meets the minimum requirements of the Dense Urban-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/16 meets the minimum requirements of the Rural-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/16 meets the minimum requirements of the Urban Macro-mMTC test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/16 meets the minimum requirements of the Urban Macro-URLLC test environment.

**Step 6 assessment for RIT proposal (Document IMT-2020/16) from Korea (Republic of):**

The evaluated candidate RIT proposal (Document IMT-2020/16) from Korea (Republic of) is assessed by ITU-R as satisfactorily fulfilling the minimum requirements for the five test environments comprising the three usage scenarios. Thus, this Korea (Republic of) RIT proposal is ‘a qualifying RIT’ and therefore will go forward for further consideration in Step 7.

### 5.2.5 Results of assessment in Step 6 for the candidate RIT submission (Document IMT-2020/19(Rev.1)) from TSDSI

The ITU-R summary view of the candidate technology submission from the TSDSI (IMT‑2020/19(Rev.1)) is presented below. The individual detailed analysis of compliance for each of the defined items in Report ITU‑R [M.2411](https://www.itu.int/pub/R-REP-M.2411) is included in the Tables in Annex 3 to the present Report.

Compliance related to services

The technology proposed by TSDSI (IMT-2020/19(Rev.1)) meets the minimum requirements for services.

Compliance related to spectrum

The technology proposed by TSDSI (IMT-2020/19(Rev.1)) meets the minimum requirements for spectrum.

Compliance related to technical performance

The technology proposed by TSDSI (IMT-2020/19(Rev.1)) meets the minimum requirements for technical performance.

Assessment of the candidate technology proposal as a qualifying RIT/SRIT

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/19(Rev.1) meets the minimum requirements of the Indoor Hotspot-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/19(Rev.1) meets the minimum requirements of the Dense Urban-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/19(Rev.1) meets the minimum requirements of the Rural-eMBB test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/19(Rev.1) meets the minimum requirements of the Urban Macro-mMTC test environment.

ITU-R confirms that the RIT of the candidate technology submission in IMT-2020/19(Rev.1) meets the minimum requirements of the Urban Macro-URLLC test environment.

**Step 6 Assessment for RIT proposal (Document IMT-2020/19(Rev.1)) from TSDSI:**

The evaluated candidate RIT proposal (Document IMT-2020/19(Rev.1)) from TSDSI is assessed by ITU-R as satisfactorily fulfilling the minimum requirements for the five test environments comprising the three usage scenarios. Thus, this TSDSI RIT proposal is ‘a qualifying RIT’ and therefore will go forward for further consideration in Step 7.

## **5.3** Result of Step 7, “Consideration of evaluation results, consensus building and decision”

### 5.3.1 Consideration of evaluation results

Each of the candidate technology submission proposals that has entered Step 7 is acknowledged and listed below (and their respective SRIT or RITs) has individually satisfied the requirements of Resolution ITU-R-65, resolves 6 *e)* and *f)* fulfilling the minimum requirements for the five test environments comprising the three usage scenarios[[6]](#footnote-6).

Therefore, each of these IMT-2020 candidate technology submission proposals listed below will be accepted for inclusion in the standardization phase described in Step 8.

– [[IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)](https://www.itu.int/md/R15-IMT.2020-C-0013/en) – Acknowledgement of candidate SRIT submission from 3GPP proponent under step 3 of the IMT-2020 process.

– [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0014/en)14 – Acknowledgement of candidate RIT submission from 3GPP proponent under step 3 of the IMT-2020 process.

– [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 – Acknowledgement of candidate RIT submission from China (People’s Republic of) under step 3 of the IMT-2020 process.

– [IMT-2020/16](https://www.itu.int/md/R15-IMT.2020-C-0016/en) – Acknowledgement of candidate RIT submission from Korea (Republic of) under Step 3 of the IMT-2020 process

– [IMT-2020/19](https://www.itu.int/md/R15-IMT.2020-C-0019/en)(Rev.1) – Acknowledgement of candidate RIT submission from TSDSI under step 3 of the IMT-2020 process.

### 5.3.2 Consensus building and decision

As concluded in §§ 5.1.1.3 and 5.1.1.4 above:

– [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 (China) candidate technology proposal is technically identical to the IMT‑2020/14 (3GPP RIT) candidate technology proposal and NB-IoT part of [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) (3GPP SRIT) candidate technology proposal;

– IMT-2020/16 (Korea) candidate technology proposal is technically identical to the IMT‑2020/14 (3GPP RIT) candidate technology proposal.

Additionally, consensus building has been performed with the objective of achieving global harmonization and having the potential for wide industry support for the radio interfaces that are developed for IMT‑2020.

As a result of the consensus building in ITU-R among the seven technology proposals, the following groupings are agreed by ITU-R:

– The SRIT proposed in [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) including the NB-IoT part, to which China (People’s Republic of) NB-IoT part of [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 is technically identical, is identified in ITU as “3GPP 5G SRIT”[[7]](#footnote-7), developed by the Third Generation Partnership Project (3GPP), for Step 7 and subsequent IMT-2020 development.

– The RITs proposed in IMT-2020/14, NR part of [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 and IMT-2020/16 are grouped into the technology identified in ITU as “3GPP 5G RIT”[[8]](#footnote-8), developed by the Third Generation Partnership Project (3GPP), for Step 7 and subsequent IMT-2020 development.

Note related to ‘NAME’ (…) in the Tables below: ITU-R currently identifies the technologies using ITU-R placeholder names based on the Proponent’s submission. The RIT/SRIT Proponents will be separately asked to confirm the placeholder name or provide a name for their technology in conjunction with the completion of Step 8 of the IMT-2020 process.

Based on the above consensus views, the following tables summarize the candidate submissions and the conclusions, including any consensus building.

|  |  |
| --- | --- |
| Radio Interface Technologies | NAME: (3GPP 5G:[[9]](#footnote-9) SRIT) |
| Proponents (submission in): | 3GPP Proponent ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en))[[10]](#footnote-10) |
| Determination whether the RIT or SRIT meets the requirements of Resolution ITU‑R 65, *resolves* 6 *e)* and *f)*, for the five test environments comprising the three usage scenarios | YES (Requirements met for five test environments) |
| Inclusion in the standardization phase described in Step 8 | YES |

|  |  |
| --- | --- |
| Radio Interface Technologies | NAME: (3GPP 5G:[[11]](#footnote-11) RIT) |
| Proponents (submission in): | 3GPP Proponent (IMT-2020/14)  China (People’s Republic of) ([IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15)  Korea (Republic of) (IMT-2020/16) |
| Determination whether the RIT or SRIT meets the requirements of Resolution ITU‑R 65, *resolves* 6 *e)* and *f)*, for the five test environments comprising the three usage scenarios | YES (Requirements met for five test environments) |
| Inclusion in the standardization phase described in Step 8 | YES |

|  |  |
| --- | --- |
| Radio Interface Technologies | NAME: (TSDSI RIT) |
| Proponents (submission in): | IMT-2020/19(Rev.1) |
| Determination whether the RIT or SRIT meets the requirements of Resolution ITU‑R 65, *resolves* 6 *e)* and *f)*, for the five test environments comprising the three usage scenarios | YES (Requirements met for five test environments) |
| Inclusion in the standardization phase described in Step 8 | YES |

# 6 Characteristics of the technologies and basis of the specifications for Step 8

In Step 8, a (set of) IMT-2020 terrestrial component radio interface Recommendation(s) is (are) developed within the ITU-R based on the results of Step 7, sufficiently detailed to enable worldwide compatibility of operation and equipment, including roaming.

## 6.1 Detailed specifications for the radio interface technologies for IMT‑2020 in Step 8

Under Step 8 of the IMT-2020 process, the detailed technical specifications for the Terrestrial Radio Interface Technologies in IMT-2020 are contained in Recommendation ITU-R M.2150 – Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020).

Note related to ‘NAME’ (…) in the sections below: ITU-R currently identifies the technologies using ITU-R placeholder names based on the Proponent’s submission. The RIT/SRIT Proponents will be separately asked to confirm the placeholder name or provide a name for their technology in conjunction with the completion of Step 8 of the IMT-2020 process.

### **6.1.1** Characteristics of radio interface technologies for IMT-2020 in Step 8 for the candidate SRIT submission (Document [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) from 3GPP Proponent

Based on the consensus views in § 5.3, (3GPP 5G: SRIT) is accepted for Step 8. The basis for specifying the (3GPP 5G: SRIT) technology in Step 8 is Document [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en).

As provided for in Document [IMT-2020/20](https://www.itu.int/md/R15-IMT.2020-C-0020/en), the GCS Proponent for the (3GPP 5G: SRIT) in Step 8 is “ARIB, ATIS, CCSA, ETSI, TTA, TTC, and TSDSI on behalf of 3GPP”.

For the NB-IoT part of [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 (China, People’s Republic of) and based on the results of consensus building of technically identical technology submissions, the specific characteristics for the NB-IoT part of [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 are included in the specifications referenced in this section.

### 6.1.2 Characteristics of radio interface technologies for IMT-2020 in Step 8 for the candidate RIT submission (Document IMT-2020/14) from 3GPP Proponent

Based on the consensus views in § 5.3, (3GPP 5G: RIT) is accepted for Step 8. The basis for specifying the (3GPP 5G: RIT) technology in Step 8 is Document IMT-2020/14.

As provided for in Document IMT-2020/20, the GCS Proponent for the (3GPP 5G: RIT) in Step 8 is “ARIB, ATIS, CCSA, ETSI, TTA, TTC, and TSDSI on behalf of 3GPP”.

For [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 (China, People’s Republic of), and based on the results of consensus building of technically identical technology submissions, the specific characteristics for the [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 are included in the specifications referenced in this section.

For IMT-2020/16 (Korea, Republic of), and based on the results of consensus building of technically identical technology submissions, the specific characteristics for the IMT-2020/16 are included in the specifications referenced in this section.

### 6.1.3 Characteristics of radio interface technologies for IMT-2020 in Step 8 for the candidate RIT submission (Document IMT-2020/19(Rev.1)) from TSDSI

Based on the consensus views in § 5.3, (TSDSI RIT) is accepted for Step 8. The basis for specifying the (TSDSI RIT) technology in Step 8 is Document IMT-2020/19(Rev 1).

As provided for in Document [IMT-2020/20](https://www.itu.int/md/R15-IMT.2020-C-0020/en), the GCS Proponent for the (TSDSI RIT) in Step 8 is “TSDSI”.

Annex 1  
  
Index of IMT-2020 documents for each final submission[[12]](#footnote-12)

| RIT/SRIT Proponent | Acknowledgement of submission (IMT-2020/YYY) | | Observations of SWG evaluation | | Submission history | |
| --- | --- | --- | --- | --- | --- | --- |
| **3GPP (SRIT)** | Document [IMT‑2020/13](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0013) | Acknowledgement of candidate SRIT submission from 3GPP Proponent under Step 3 of the IMT-2020 process | Document [IMT 2020/23](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0023) | Observations of SWG Evaluation - IMT-2020 submission in Documents 5D/1215, 5D/1216 and 5D/1217 | Document [IMT‑2020/3 (Rev.4)](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0003) | Submission received for proposals of candidate radio interface technologies from proponent ‘3GPP’ under step 3 of the IMT-2020 process |
| **3GPP (RIT)** | Document [IMT‑2020/14](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0014) | Acknowledgement of candidate RIT submission from 3GPP Proponent Step 3 of the IMT‑2020 process | Document [IMT 2020/23](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0023) | Observations of SWG Evaluation - IMT-2020 submission in Documents 5D/1215, 5D/1216 and 5D/1217 | Document [IMT‑2020/3 (Rev.4](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0003)) | Submission received for proposals of candidate radio interface technologies from proponent ‘3GPP’ under step 3 of the IMT-2020 process |
| **China  (People’s Republic of)** | Document [IMT‑2020/15](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0015) | Acknowledgement of candidate RIT submission from China (People’s Republic of) under Step 3 of the IMT-2020 process | Document [IMT‑2020/24](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0024) | Observations of SWG Evaluation - IMT-2020 submission in Document 5D/1268 (Proponent China) | Document [IMT‑2020/5 (Rev.4)](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0005) | Submission received for proposals of candidate radio interface technologies from proponent ‘China’ under Step 3 of the IMT-2020 process |
| **Korea (Republic of)** | Document [IMT‑2020/16](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0016) | Acknowledgement of candidate RIT submission from Korea (Republic of) under Step 3 of the IMT-2020 process | Document [IMT‑2020/25](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0025) | Observations of SWG Evaluation - IMT-2020 submission in Document 5D/1233 (Proponent Korea) | Document [IMT‑2020/4 (Rev.4](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0004)) | Submission received for proposals of candidate radio interface technologies from proponent ‘Korea (Rep. of)’ under Step 3 of the IMT-2020 process |
| **ETSI (TC DECT) and DECT Forum** | Document [IMT‑2020/17](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0017) (Rev.1) | Acknowledgement of candidate SRIT submission from ETSI (TC DECT) and DECT Forum under Step 3 of the IMT-2020 process | Document [IMT‑2020/26](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0026) (Rev.1) | Observations of SWG Evaluation - IMT-2020 submission in Documents 5D/1230 and 5D/1253 (Proponents ETSI (TC DECT) & DECT Forum) | Document [IMT‑2020/6 (Rev.4)](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0006) | Submission received for proposals of Candidate Radio Interface Technologies from Proponent ‘ETSI’ and ‘DECT Forum’ under step 3 of the IMT-2020 process |
| **Nufront** | Document [IMT‑2020/18](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0018) (Rev.1) | Acknowledgement of candidate RIT submission from Nufront under Step 3 of the IMT-2020 process | Document [IMT‑2020/27](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0027) (Rev.1) | Observations of SWG Evaluation - IMT-2020 submission in Document 5D/1238 (Proponent Nufront) | Document [IMT‑2020/12](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0012) (Rev.1) | Submission received for proposals of candidate radio interface technologies from proponent ‘Nufront’ under step 3 of the IMT-2020 process |
| **TSDSI** | Document [IMT‑2020/19](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0019) (Rev.1) | Acknowledgement of candidate RIT submission from TSDSI under Step 3 of the IMT-2020 process | Document [IMT‑2020/28](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0028) (Rev.1) | Observations of SWG Evaluation - IMT-2020 submission in Document 5D/1231 (Proponent TSDSI) | Document [IMT‑2020/7 (Rev.4)](https://www.itu.int/md/meetingdoc.asp?lang=en&parent=R15-IMT.2020-C-0007) | Submission received for proposals of candidate radio interface technologies from proponent ‘TSDSI’ under Step 3 of the IMT-2020 process |

Annex 2  
  
Summary and details of Evaluation Reports  
from Independent Evaluation Groups

[IMT-2020/39](https://www.itu.int/md/R15-IMT.2020-C-0039/en)(Rev.1)

Summary results of evaluation by 5G India Forum (5GIF) evaluation group of IMT-2020 candidate technology submission in Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15, IMT-2020/16 and IMT-2020/17(Rev.1) (3GPP)

[IMT-2020/40](https://www.itu.int/md/R15-IMT.2020-C-0040/en)

Summary results of evaluation by 5G Infrastructure Association of IMT-2020 candidate technology submission in Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15, IMT-2020/16 IMT-2020/17 (3GPP), IMT-2020/17(Rev.1) (DECT), IMT-2020/18(Rev.1) and IMT-2020/19(Rev.1)

[IMT-2020/41](https://www.itu.int/md/R15-IMT.2020-C-0041/en)

Summary results of evaluation by Africa Evaluation Group of IMT-2020 candidate technology submission in Documents IMT-2020/14 and IMT-2020/18(Rev.1)

[IMT-2020/42](https://www.itu.int/md/R15-IMT.2020-C-0042/en)

Summary results of evaluation by Alliance for Telecommunications Industry Solutions WTSC of IMT-2020 candidate technology submission in Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15, IMT-2020/16 and IMT-2020/17(Rev.1) (3GPP)

[IMT-2020/43](https://www.itu.int/md/R15-IMT.2020-C-0043/en)(Rev.1)

Summary results of evaluation by Beijing National Research Center for Information Science and Technology evaluation group of IMT-2020 candidate technology submission in Documents IMT‑2020/18(Rev.1)

[IMT-2020/44](https://www.itu.int/md/R15-IMT.2020-C-0044/en)

Summary results of evaluation by Canadian Evaluation Group of IMT-2020 candidate technology submission in Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, IMT-2020/17(Rev.1), IMT-2020/18(Rev.1) and IMT-2020/19(Rev.1)

[IMT-2020/45](https://www.itu.int/md/R15-IMT.2020-C-0045/en)

Summary results of evaluation by Chinese Evaluation Group of IMT-2020 candidate technology submission in Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15, IMT-2020/16 and IMT‑2020/17(Rev.1) (DECT)

[IMT-2020/46](https://www.itu.int/md/R15-IMT.2020-C-0046/en)

Summary results of evaluation by Chines Industry and Research Alliance of Telecommunications Evaluation Group of IMT-2020 candidate technology submission in Document IMT-2020/18(Rev.1)

[IMT-2020 47](https://www.itu.int/md/R15-IMT.2020-C-0047/en)

Summary results of evaluation by Telecom Centre Of Excellence Group (TCOE) India of IMT‑2020 candidate technology submission in Documents IMT-2020/14 and IMT-2020/19(Rev.1)

[IMT-2020/48](https://www.itu.int/md/R15-IMT.2020-C-0048/en)

Summary results of evaluation by The Fifth Generation Mobile Communications Promotion Forum of IMT-2020 candidate technology submission in Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14 and IMT-2020/18(Rev.1)

[IMT-2020/49](https://www.itu.int/md/R15-IMT.2020-C-0049/en)

Summary results of evaluation by Trans-Pacific Evaluation Group of IMT-2020 candidate technology submission in Documents [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en), IMT-2020/14, [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15, IMT-2020/16 and IMT-2020/17(Rev.1) (3GPP)

[IMT-2020/50](https://www.itu.int/md/R15-IMT.2020-C-0050/en)

Summary results of evaluation by TTA SPG33 5G of IMT-2020 candidate technology submission in Document IMT-2020/14

[IMT-2020/51](https://www.itu.int/md/R15-IMT.2020-C-0051/en)

Summary results of evaluation by Wireless World Research Forum of IMT-2020 candidate technology submission in Document IMT-2020/18(Rev.1)

[IMT-2020/38](https://www.itu.int/md/R15-IMT.2020-C-0038/en)(Rev.1)

Summary of Step 4 of the IMT-2020 Process for Evaluation of IMT-2020 Candidate Technology Submissions

Annex 3  
  
Detailed compliance template summaries[[13]](#footnote-13)

# A Candidate submission from 3GPP Proponent ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en))

TABLE A.1

Compliance template for services

|  |  |  |
| --- | --- | --- |
|  | Service capability requirements | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| **5.2.4.1.1** | **Support for wide range of services**  Is the proposal able to support a range of services across different usage scenarios (eMBB, URLLC, and mMTC)? YES / NO  Specify which usage scenarios (eMBB, URLLC, and mMTC) the candidate RIT or candidate SRIT can support. | Yes |

TABLE A.2

Compliance template for spectrum

|  |  |  |
| --- | --- | --- |
|  | Spectrum capability requirements | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| **5.2.4.2.1** | **Frequency bands identified for IMT**  Is the proposal able to utilize at least one frequency band identified for IMT in the ITU Radio Regulations?  YES / NO  Specify in which band(s) the candidate RIT or candidate SRIT can be deployed. | Yes |
| **5.2.4.2.2** | **Higher Frequency range/band(s)**  Is the proposal able to utilize the higher frequency range/band(s) above 24.25 GHz? YES / NO  Specify in which band(s) the candidate RIT or candidate SRIT can be deployed.  NOTE – In the case of the candidate SRIT, at least one of the component RITs need to fulfil this requirement. | Yes |

TABLE A.3

Compliance template for technical performance

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.1** Peak data rate (Gbit/s) *(4.1)* | eMBB | Not applicable | Downlink | 20 | Yes |
| Uplink | 10 | Yes |
| **5.2.4.3.2** Peak spectral efficiency (bit/s/Hz) *(4.2)* | eMBB | Not applicable | Downlink | 30 | Yes |
| Uplink | 15 | Yes |
| **5.2.4.3.3** User experienced data rate (Mbit/s) *(4.3)* | eMBB | Dense urban – eMBB | Downlink | 100 | Yes |
| Uplink | 50 | Yes |

TABLE A.3 (*continued*)

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.4** 5th percentile user spectral efficiency (bit/s/Hz) *(4.4)* | eMBB | Indoor hotspot – eMBB | Downlink | 0.3 | Yes |
| Uplink | 0.21 | Yes |
| eMBB | Dense urban – eMBB | Downlink | 0.225 | Yes |
| Uplink | 0.15 | Yes |
| eMBB | Rural – eMBB | Downlink | 0.12 | Yes |
| Uplink | 0.045 | Yes |
| **5.2.4.3.5** Average spectral efficiency (bit/s/Hz/ TRxP) *(4.5)* | eMBB | Indoor hotspot – eMBB | Downlink | 9 | Yes |
| Uplink | 6.75 | Yes |
| eMBB | Dense urban – eMBB | Downlink | 7.8 | Yes |
| Uplink | 5.4 | Yes |
| eMBB | Rural – eMBB | Downlink | 3.3 | Yes |
| Yes |
| Uplink | 1.6 | Yes |
| Yes |
| **5.2.4.3.6** Area traffic capacity (Mbit/s/m2) *(4.6)* | eMBB | Indoor-hotspot – eMBB | Downlink | 10 | Yes |
| **5.2.4.3.7** User plane latency (ms) *(4.7.1)* | eMBB | Not applicable | Uplink and Downlink | 4 | Yes |
| URLLC | Not applicable | Uplink and Downlink | 1 | Yes |
| **5.2.4.3.8** Control plane latency (ms) *(4.7.2)* | eMBB | Not applicable | Not applicable | 20 | Yes |
| URLLC | Not applicable | Not applicable | 20 | Yes |
| **5.2.4.3.9** Connection density (devices/km2) *(4.8)* | mMTC | Urban macro – mMTC | Uplink | 1 000 000 | Yes |
| **5.2.4.3.10** Energy efficiency *(4.9)* | eMBB | Not applicable | Not applicable | Capability to support a high sleep ratio and long sleep duration | Yes |

TABLE A.3 (*end*)

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.11** Reliability *(4.10)* | URLLC | Urban macro –URLLC | Uplink or Downlink | 1-10−5 success probability of transmitting a layer 2 PDU (protocol data unit) of size 32 bytes within 1 ms in channel quality of coverage edge | Yes |
| **5.2.4.3.12** Mobility classes *(4.11)* | eMBB | Indoor hotspot – eMBB | Uplink | Stationary, Pedestrian | Yes |
| eMBB | Dense urban – eMBB | Uplink | Stationary, Pedestrian, Vehicular (up to 30 km/h) | Yes |
| eMBB | Rural – eMBB | Uplink | Pedestrian, Vehicular, High speed vehicular | Yes |
| **5.2.4.3.13**  Mobility Traffic channel link data rates (bit/s/Hz) *(4.11)* | eMBB | Indoor hotspot – eMBB | Uplink | 1.5 (10 km/h) | Yes |
| eMBB | Dense urban – eMBB | Uplink | 1.12 (30 km/h) | Yes |
| eMBB | Rural – eMBB | Uplink | 0.8 (120 km/h) | Yes |
| 0.45 (500 km/h) | Yes |
| **5.2.4.3.14** Mobility interruption time (ms)  *(4.12)* | eMBB and URLLC | Not applicable | Not applicable | 0 | Yes |
| **5.2.4.3.15** Bandwidth and Scalability *(4.13)* | Not applicable | Not applicable | Not applicable | At least 100 MHz | Yes |
| Up to 1 GHz | Yes |
| Support of multiple different bandwidth values | Yes |

# B Candidate submission from 3GPP Proponent (IMT-2020/14)

TABLE B.1

Compliance template for services

|  |  |  |
| --- | --- | --- |
|  | Service capability requirements | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| **5.2.4.1.1** | **Support for wide range of services**  Is the proposal able to support a range of services across different usage scenarios (eMBB, URLLC, and mMTC)? YES / NO  Specify which usage scenarios (eMBB, URLLC, and mMTC) the candidate RIT or candidate SRIT can support. | Yes |

TABLE B.2

Compliance template for spectrum

|  | Spectrum capability requirements | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- |
| **5.2.4.2.1** | **Frequency bands identified for IMT**  Is the proposal able to utilize at least one frequency band identified for IMT in the ITU Radio Regulations?   YES / NO  Specify in which band(s) the candidate RIT or candidate SRIT can be deployed. | Yes |
| **5.2.4.2.2** | **Higher Frequency range/band(s)**  Is the proposal able to utilize the higher frequency range/band(s) above 24.25 GHz? YES / NO  Specify in which band(s) the candidate RIT or candidate SRIT can be deployed.  NOTE – In the case of the candidate SRIT, at least one of the component RITs need to fulfil this requirement. | Yes |

TABLE B.3

Compliance template for technical performance

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.1** Peak data rate (Gbit/s) *(4.1)* | eMBB | Not applicable | Downlink | 20 | Yes |
| Uplink | 10 | Yes |
| **5.2.4.3.2** Peak spectral efficiency (bit/s/Hz) *(4.2)* | eMBB | Not applicable | Downlink | 30 | Yes |
| Uplink | 15 | Yes |
| **5.2.4.3.3** User experienced data rate (Mbit/s) *(4.3)* | eMBB | Dense urban – eMBB | Downlink | 100 | Yes |
| Uplink | 50 | Yes |
| **5.2.4.3.4** 5th percentile user spectral efficiency (bit/s/Hz) *(4.4)* | eMBB | Indoor hotspot – eMBB | Downlink | 0.3 | Yes |
| Uplink | 0.21 | Yes |
| eMBB | Dense urban – eMBB | Downlink | 0.225 | Yes |
| Uplink | 0.15 | Yes |
| eMBB | Rural – eMBB | Downlink | 0.12 | Yes |
| Uplink | 0.045 | Yes |
| **5.2.4.3.5** Average spectral efficiency (bit/s/Hz/ TRxP) *(4.5)* | eMBB | Indoor hotspot – eMBB | Downlink | 9 | Yes |
| Uplink | 6.75 | Yes |
| eMBB | Dense urban – eMBB | Downlink | 7.8 | Yes |
| Uplink | 5.4 | Yes |
| eMBB | Rural – eMBB | Downlink | 3.3 | Yes |
| Yes |
| Uplink | 1.6 | Yes |
| Yes |
| **5.2.4.3.6** Area traffic capacity (Mbit/s/m2) *(4.6)* | eMBB | Indoor-Hotspot – eMBB | Downlink | 10 | Yes |
| **5.2.4.3.7** User plane latency (ms) *(4.7.1)* | eMBB | Not applicable | Uplink and Downlink | 4 | Yes |
| URLLC | Not applicable | Uplink and Downlink | 1 | Yes |
| **5.2.4.3.8** Control plane latency (ms) *(4.7.2)* | eMBB | Not applicable | Not applicable | 20 | Yes |
| URLLC | Not applicable | Not applicable | 20 | Yes |
| **5.2.4.3.9** Connection density (devices/km2) *(4.8)* | mMTC | Urban macro – mMTC | Uplink | 1 000 000 | Yes |

TABLE B.3 (*end*)

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.10** Energy efficiency *(4.9)* | eMBB | Not applicable | Not applicable | Capability to support a high sleep ratio and long sleep duration | Yes |
| **5.2.4.3.11** Reliability *(4.10)* | URLLC | Urban macro –URLLC | Uplink or Downlink | 1-10−5 success probability of transmitting a layer 2 PDU (protocol data unit) of size 32 bytes within 1 ms in channel quality of coverage edge | Yes |
| **5.2.4.3.12** Mobility classes *(4.11)* | eMBB | Indoor hotspot – eMBB | Uplink | Stationary, Pedestrian | Yes |
| eMBB | Dense urban – eMBB | Uplink | Stationary, Pedestrian, Vehicular (up to 30 km/h) | Yes |
| eMBB | Rural – eMBB | Uplink | Pedestrian, Vehicular, High speed vehicular | Yes |
| **5.2.4.3.13**  Mobility Traffic channel link data rates (bit/s/Hz) *(4.11)* | eMBB | Indoor hotspot – eMBB | Uplink | 1.5 (10 km/h) | Yes |
| eMBB | Dense urban – eMBB | Uplink | 1.12 (30 km/h) | Yes |
| eMBB | Rural – eMBB | Uplink | 0.8 (120 km/h) | Yes |
| 0.45 (500 km/h) | Yes |
| **5.2.4.3.14** Mobility interruption time (ms)  *(4.12)* | eMBB and URLLC | Not applicable | Not applicable | 0 | Yes |
| **5.2.4.3.15** Bandwidth and Scalability *(4.13)* | Not applicable | Not applicable | Not applicable | At least 100 MHz | Yes |
| Up to 1 GHz | Yes |
| Support of multiple different bandwidth values | Yes |

# C Candidate submission from China (People’s Republic of) ([IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15)

For this submission, the tables for the NR part are identical to those in section B (IMT-2020/14), and the tables for the NB‑IoT part are identical to those in Section A ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) of this Annex.

The tables for this submission: the NR part is identical to the one in Section B (IMT-2020/14) and the NB‑IoT part is identical to the one in Section A ([IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en)) of this Annex.

# D Candidate submission from Korea (Republic of) (IMT-2020/16)

The tables for this submission are identical to those in Section B (IMT-2020/14) of this Annex.

# E Candidate submission from TSDSI (IMT-2020/19(Rev.1))

TABLE E.1

Compliance template for services

|  |  |  |
| --- | --- | --- |
|  | Service capability requirements | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| **5.2.4.1.1** | **Support for wide range of services**  Is the proposal able to support a range of services across different usage scenarios (eMBB, URLLC, and mMTC)? YES / NO  Specify which usage scenarios (eMBB, URLLC, and mMTC) the candidate RIT or candidate SRIT can support. | Yes |

TABLE E.2

Compliance template for spectrum

|  |  |  |
| --- | --- | --- |
|  | Spectrum capability requirements | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| **5.2.4.2.1** | **Frequency bands identified for IMT**  Is the proposal able to utilize at least one frequency band identified for IMT in the ITU Radio Regulations? YES / NO  Specify in which band(s) the candidate RIT or candidate SRIT can be deployed. | Yes |
| **5.2.4.2.2** | **Higher frequency range/band(s)**  Is the proposal able to utilize the higher frequency range/band(s) above 24.25 GHz? YES / NO  Specify in which band(s) the candidate RIT or candidate SRIT can be deployed.  NOTE – In the case of the candidate SRIT, at least one of the component RITs need to fulfil this requirement. | Yes |

TABLE E.3

Compliance template for technical performance

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.1** Peak data rate (Gbit/s) *(4.1)* | eMBB | Not applicable | Downlink | 20 | Yes |
| Uplink | 10 | Yes |
| **5.2.4.3.2** Peak spectral efficiency (bit/s/Hz) *(4.2)* | eMBB | Not applicable | Downlink | 30 | Yes |
| Uplink | 15 | Yes |
| **5.2.4.3.3** User experienced data rate (Mbit/s) *(4.3)* | eMBB | Dense urban – eMBB | Downlink | 100 | Yes |
| Uplink | 50 | Yes |
| **5.2.4.3.4** 5th percentile user spectral efficiency (bit/s/Hz) *(4.4)* | eMBB | Indoor hotspot – eMBB | Downlink | 0.3 | Yes |
| Uplink | 0.21 | Yes |
| eMBB | Dense urban – eMBB | Downlink | 0.225 | Yes |
| Uplink | 0.15 | Yes |
| eMBB | Rural – eMBB | Downlink | 0.12 | Yes |
| Uplink | 0.045 | Yes |
| **5.2.4.3.5** Average spectral efficiency (bit/s/Hz/TRxP) *(4.5)* | eMBB | Indoor hotspot – eMBB | Downlink | 9 | Yes |
| Uplink | 6.75 | Yes |
| eMBB | Dense urban – eMBB | Downlink | 7.8 | Yes |
| Uplink | 5.4 | Yes |
| eMBB | Rural – eMBB | Downlink | 3.3 | Yes |
| Yes |
| Uplink | 1.6 | Yes |
| Yes |
| **5.2.4.3.6** Area traffic capacity (Mbit/s/m2) *(4.6)* | eMBB | Indoor-hotspot – eMBB | Downlink | 10 | Yes |
| **5.2.4.3.7** User plane latency (ms) *(4.7.1)* | eMBB | Not applicable | Uplink and Downlink | 4 | Yes |
| URLLC | Not applicable | Uplink and Downlink | 1 | Yes |

TABLE E.3 (*continued*)

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.8** Control plane latency (ms) *(4.7.2)* | eMBB | Not applicable | Not applicable | 20 | Yes |
| URLLC | Not applicable | Not applicable | 20 | Yes |
| **5.2.4.3.9** Connection density (devices/km2) *(4.8)* | mMTC | Urban Macro – mMTC | Uplink | 1 000 000 | Yes |
| **5.2.4.3.10** Energy efficiency *(4.9)* | eMBB | Not applicable | Not applicable | Capability to support a high sleep ratio and long sleep duration | Yes |
| **5.2.4.3.11** Reliability *(4.10)* | URLLC | Urban macro –URLLC | Uplink or Downlink | 1-10−5 success probability of transmitting a layer 2 PDU (protocol data unit) of size 32 bytes within 1 ms in channel quality of coverage edge | Yes |
| **5.2.4.3.12** Mobility classes *(4.11)* | eMBB | Indoor hotspot – eMBB | Uplink | Stationary, pedestrian | Yes |
| eMBB | Dense urban – eMBB | Uplink | Stationary, pedestrian,  vehicular (up to 30 km/h) | Yes |
| eMBB | Rural – eMBB | Uplink | Pedestrian, vehicular, high speed vehicular | Yes |
| **5.2.4.3.13**  Mobility Traffic channel link data rates (bit/s/Hz) *(4.11)* | eMBB | Indoor hotspot – eMBB | Uplink | 1.5 (10 km/h) | Yes |
| eMBB | Dense urban – eMBB | Uplink | 1.12 (30 km/h) | Yes |
| eMBB | Rural – eMBB | Uplink | 0.8 (120 km/h) | Yes |
| 0.45 (500 km/h) | Yes |
| **5.2.4.3.14** Mobility interruption time (ms)  *(4.12)* | eMBB and URLLC | Not applicable | Not applicable | 0 | Yes |

TABLE E.3 (*end*)

| Minimum technical performance requirements item (5.2.4.3.x), units, and Report ITU-R [M.2410](https://www.itu.int/pub/R-REP-M.2410) section reference | Category | | | Required value | ITU-R confirmation that the requirement is met by the candidate technology proposal |
| --- | --- | --- | --- | --- | --- |
| Usage scenario | Test environment | Downlink or uplink |  |  |
| **5.2.4.3.15** Bandwidth and Scalability *(4.13)* | Not applicable | Not applicable | Not applicable | At least 100 MHz | Yes |
| Up to 1 GHz | Yes |
| Support of multiple different bandwidth values | Yes |

1. IMT-2020 documents referred to in this Report are found on the ITU-R web page: “IMT-2020 submission and evaluation process (<https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-2020/Pages/submission-eval.aspx>)”. [↑](#footnote-ref-1)
2. As announced in [Circular Letter 5/LCCE/59 Addendum 5](https://www.itu.int/dms_pub/itu-r/md/00/sg05/cir/R00-SG05-CIR-0059!A5!MSW-E.docx). [↑](#footnote-ref-2)
3. In the IMT-2020 process, an acknowledgement of a “complete” submission under Step 3 does not imply any conclusions on the results of the formal evaluation under Step 4 to 7. A submission is acknowledged as “complete” if it fulfilled, for that candidate technology submission, supplying all requested information in the format specified following the guidance of Report [ITU-R M.2411](https://www.itu.int/pub/R-REP-M.2411-2017) *–* Requirements, evaluation criteria and submission templates for the development of IMT-2020. [↑](#footnote-ref-3)
4. “3GPP 5G NR” RIT is the “3GPP 5G candidate for inclusion in IMT-2020: Submission 2 for IMT‑2020 (RIT)” in Document IMT-2020/14. [↑](#footnote-ref-4)
5. As defined in Step 2, each component RIT of the SRIT needs to still fulfil the minimum requirements of at least two test environments. [↑](#footnote-ref-5)
6. In order to reach Step 7, each component RIT of the SRIT needed to still fulfil the minimum requirements of at least two test environments to be assessed as a ‘qualifying SRIT’ in Step 6. [↑](#footnote-ref-6)
7. Developed by 3GPP as 5G Release 15, Release 16 and Beyond. [↑](#footnote-ref-7)
8. Developed by 3GPP as 5G Release 15, Release 16 and Beyond. [↑](#footnote-ref-8)
9. Developed by 3GPP as 5G, Release 15 and beyond (as indicated in Documents 5D/1215 and 5D/1216). [↑](#footnote-ref-9)
10. The NB-IoT part of [IMT-2020/](https://www.itu.int/md/R15-IMT.2020-C-0015/en)15 (China) candidate technology proposal is technically identical to the specifications for the NB-IoT part of [IMT‑2020/13](https://www.itu.int/md/R15-IMT.2020-C-0013/en) (3GPP SRIT). [↑](#footnote-ref-10)
11. Developed by 3GPP as 5G, Release 15 and beyond (as indicated in Documents 5D/1215 and 5D/1217). [↑](#footnote-ref-11)
12. Source: Report on the Thirty-third Meeting of Working Party 5D (Geneva, 10-13 December 2019) [Doc. 5D/37 Chapter 1](https://www.itu.int/dms_ties/itu-r/md/19/wp5d/c/R19-WP5D-C-0037!H01!MSW-E.docx), § 3.4.3. [↑](#footnote-ref-12)
13. [Reference Report ITU-R [M.2411](https://www.itu.int/pub/R-REP-M.2411), § 5.2.4.]. [↑](#footnote-ref-13)