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International Telecommunication Union
Radiocommunication Sector

Report ITU-R M.2543-0

(11/2024)

M Series: Mobile, radiodetermination, amateur and related satellite services

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

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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.*

Electronic Publication
Geneva, 2024

REPORT ITU-R M.2543-0

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

(2024)

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1 Introduction

As defined in Resolution ITU-R 56, International Mobile Telecommunications-2020 (IMT-2020) systems are mobile systems that include new radio interface(s) which support the new capabilities of systems beyond IMT-2000 and IMT-Advanced. Based on Report ITU-R M.2514, the capabilities of the satellite component of IMT-2020, include three service categories i.e. enhanced Mobile Broadband (eMBB-s), massive Machine Type Communications (mMTC-s) and High Reliability Communications (HRC-s) which are defined to support the multitude of applications and services for IMT-2020 satellite component. In Recommendation ITU-R M.2083 – IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond, it is presented that various access technologies including a combination of different fixed, terrestrial and satellite networks should interwork in IMT-2020. Each component should fulfil its own role, but also be integrated[1] with other components to provide service continuity as well as reinforced availability to achieve ubiquitous seamless coverage.

The use and objective of satellite radio interfaces is expected to be complementary to terrestrial IMT-2020 operations, given satellites' unique ability to address coverage challenges and use-cases.

The satellite component can be used to provide many different applications, for example:

– Global connectivity to end-user devices.
– Network resilience through high availability combined with high reliability for HRC-s.
– Connectivity for transportation purposes.
– Content delivery in broadcast or multicast mode to end-user devices.
– Machine-type communications.

Use cases include:

– Coverage continuity: moving pedestrian (consumer smartphones) should be able to maintain access to a large range of communication services and applications while moving out to remote areas for e.g. remote working, leisure, etc.
– Connecting populations in unserved or underserved areas.
– Connectivity to transport: buses, trains, vessels (leisure or cruise) or airplanes.
– Public safety: to provide communication services (e.g. messaging, voice, video) to emergency responders (e.g. fire brigade, medical personnel).
– Automotive: this may include traffic flow optimisation, automotive diagnostic, safety status reporting.
– Utilities: e.g. surveillance of oil/gas, energy/water supply infrastructures, wind farms.
– Transport (road, railway, maritime, aeronautic): Fleet management, asset tracking, digital signage, remote roads alerts.

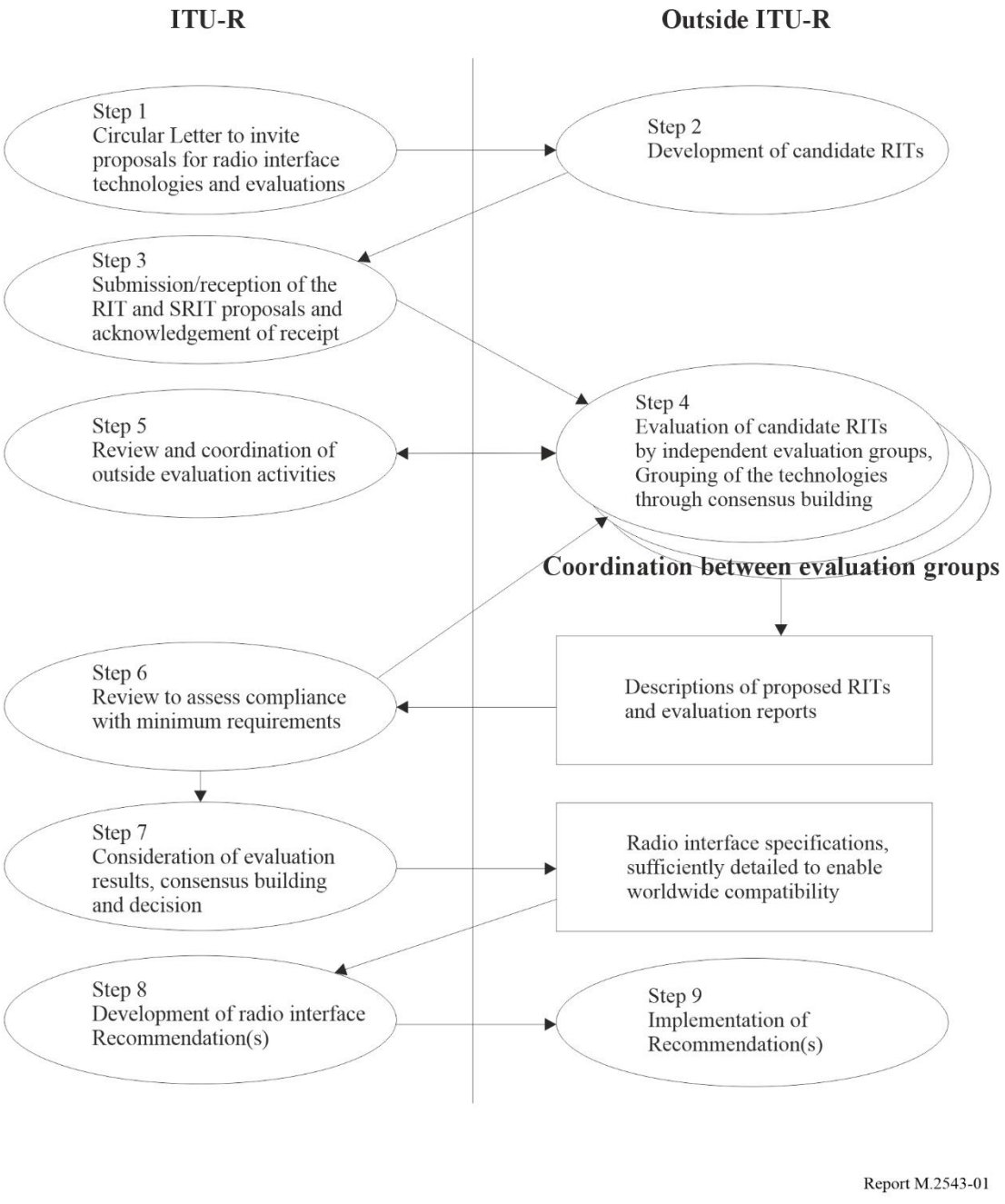
Circular Letter 4/LCCE/134 was sent on November 2022 to invite the submission of proposals for candidate radio interface technologies for the satellite component of IMT-2020. The Radiocommunication Bureau established an "IMT-2020-Satellite" webpage (https://www.itu.int/en/ITU-R/study-groups/rsg4/Pages/imt-2020-sat-submission-eval.aspx) to facilitate the development of proposals and the work of the Evaluation Groups.

[1] Integration means that the satellite and terrestrial components of the network are able to work together seamlessly to provide coverage continuity to end users.

The submission and evaluation process for the IMT-2020 satellite radio interface is included in Document IMT-2020-SAT/2 and is illustrated in its Fig. A2-2, reproduced below as Fig. 1 for easy reference in understanding the steps of the IMT-2020 satellite process. The requirements, evaluation criteria and submission templates for the development of the IMT-2020 satellite radio interface are included in Report ITU-R M.2514. The requirements related to the technical performance for IMT-2020 satellite radio interface(s) as well as the guidelines for the evaluation of satellite radio interface technologies for IMT-2020 are also included in Report ITU-R M.2514.

FIGURE 1

IMT-2020 satellite component radio interface development process



2 Scope

This Report is the record of the work performed after receipt of the proposals for the IMT-2020 satellite candidate RITs, including the evaluation activity and the consensus building. This Report contains the outcome and conclusions of Steps 4 to 7 of the IMT-2020 satellite process. These steps correspond to:

– 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.

The details of these steps are provided in Document IMT-2020-SAT/2.

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 for the satellite component of IMT-2020.

Note that the actual specifications of the agreed IMT-2020 satellite radio interfaces will be contained in a future Recommendation on Detailed specifications of the satellite radio interfaces of International Mobile Telecommunications-2020 (IMT-2020), which is being developed[2].

3 Related text references

Resolution ITU-R 56	Naming for International Mobile Telecommunications
Resolution ITU-R 65	Principles for the process of future development of IMT for 2020 and beyond
Recommendation ITU-R M.1224	Vocabulary of Terms for International Mobile Telecommunications (IMT)
Recommendation ITU-R M.1645	Framework and overall objectives of the future development of IMT-2000 and systems beyond IMT-2000
Recommendation ITU-R M.1822	Framework for services supported by IMT
Recommendation ITU-R M.1850	Detailed specifications of the radio interfaces for the satellite component of International Mobile Telecommunications-2000 (IMT-2000)
Recommendation ITU-R M.2047	Detailed specifications of the satellite radio interfaces of International Mobile Telecommunications-Advanced (IMT-Advanced)
Recommendation ITU-R M.2083	IMT Vision − Framework and overall objectives of the future development of IMT for 2020 and beyond
Report ITU-R M.2514	Vision, requirements and evaluation guidelines for the satellite radio interface(s) of IMT-2020

ITU Handbook on Satellite Communications, third edition, 2002, West Sussex: John Wiley & Sons

ITU Handbook on Small Satellites, Edition of 2023

Document IMT-2020-SAT/2	Submission and evaluation process and consensus building for satellite radio interface technology proposals of IMT-2020.

[2] Once the Recommendation has been approved, the exact reference to the Recommendation will be added as an editorial action.

3.1 List of acronyms and abbreviations

IMT International Mobile Telecommunications

RIT Radio interface technology

SRIT Set of radio interface technologies

UE User equipment

4 Summary of submissions

Following the guidelines of the IMT-2020 satellite process, the candidate technology submissions provided to the ITU-R in December 2023 were reviewed and the following were acknowledged as "complete" candidate technology submissions as per § 8 of Report ITU-R M.2514:

– Document IMT-2020-SAT/3 – Acknowledgement of candidate submission from Alliance for Telecommunications Industry Solutions under Step 3 of the satellite IMT-2020 process (3GPP 5G NTN candidate for inclusion in the satellite component of IMT-2020: submission 1 (SRIT)).

– Document IMT-2020-SAT/4 – Acknowledgement of candidate submission from Alliance for Telecommunications Industry Solutions under Step 3 of the satellite IMT-2020 process (3GPP 5G NTN candidate for inclusion in the satellite component of IMT-2020: submission 2 (RIT)).

For convenience, these submissions are included in Annex 1.

The following technologies were part of the submissions:

– 3GPP PROPONENT SUBMISSION OF SRIT (Doc. IMT-2020-SAT/3).
  - NR NTN and IoT NTN.

– 3GPP PROPONENT SUBMISSION OF RIT (Doc. IMT-2020-SAT/4).
  - NR NTN.

5 Conclusion for Steps 4 to 7

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

Under Step 4 of the IMT-2020 satellite process, the candidate RITs were evaluated by Independent Evaluation Groups that were registered in the ITU-R. In this step the candidate RITs were assessed based on Report ITU-R M.2514.

In Step 5, the ITU-R monitored the progress of the evaluation activities and provided appropriate responses to problems or requests for guidance to facilitate consensus building.

A total of four Independent Evaluation Groups were registered in the ITU-R. Four evaluation reports from the Independent Evaluation Groups were submitted and discussed in ITU-R under Steps 4 and 5. These evaluation reports from the respective Independent Evaluation Groups are included in Annex 2.

The list of IEG evaluation reports for the candidate technology submissions is shown in Table 1.

TABLE 1

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

Independent Evaluation Group	Interim Evaluation Report	Final Evaluation Report
ATIS Evaluation Group	4B/23	4B/57
ETSI	4B/22	4B/78
5GIF	4B/26	4B/77
SatComForum	4B/15	4B/75

Close online and offline collaboration between the IEGs has been conducted to capture any discrepancies in the evaluations and to coordinate the work, with three online meetings:

– IEG coordination #1: 28 March 2024.

– IEG coordination #2: 15 May 2024.

– IEG coordination #3: 28 August 2024.

The IEGs utilized the defined ITU-R evaluation methodology and criteria established in Report ITU-R M.2514. 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 satellite process and had contributed to the success of the IMT-2020 satellite process.

Considering the requirements, evaluation criteria and submission templates for the development of IMT-2020 included in Report ITU-R M.2514, as well as the minimum requirements related to technical performance for IMT-2020 satellite radio interface(s) and the guidelines for evaluation of related satellite radio interface technologies, the following conclusions have been reached.

5.1.1 Summary of the evaluations received for the candidate SRIT submission from 3GPP Proponent (Document IMT-2020-SAT/3)

There was one evaluation report received for the candidate SRIT submission. The received evaluation report confirmed that the candidate 3GPP SRIT proposal in Document IMT-2020-SAT/3 fulfils the minimum requirements with each component RIT fulfilling the minimum requirements of at least one test environment and together as an SRIT fulfilling the minimum requirements of three test environments comprising the three usage scenarios.

5.1.2 Summary of the evaluations received for the candidate RIT submission from 3GPP Proponent (Document IMT-2020-SAT/4)

There were four evaluation reports received for the candidate RIT submission. The received evaluation reports confirmed that the candidate 3GPP RIT proposal in Document IMT-2020-SAT/4 fulfils the minimum requirements for the three test environments comprising the three usage scenarios.

5.1.3 References to evaluation reports for candidate technology proposals in § 5.1

The summary and details of the evaluation reports from the IEGs and the individual IEG analyses for the candidate technology submissions in §§ 5.1.1 and 5.1.2 above are included in Annex 2 of this Report as follows:

– Document IMT-2020-SAT/10 – Summary results of evaluation by ATIS Evaluation Group of IMT-2020 satellite candidate technology submission in Documents IMT-2020-SAT/3 and IMT-2020-SAT/4 (3GPP).

– Document IMT-2020-SAT/11 – Summary results of evaluation by European Telecommunications Standards Institute (ETSI) Evaluation Group of IMT-2020 satellite candidate technology submission in Document IMT-2020-SAT/4 (3GPP).

– Document IMT-2020-SAT/12 – Summary results of evaluation by 5G India Forum (5G IF) Evaluation Group of IMT-2020 satellite candidate technology submission in Document IMT-2020-SAT/4 (3GPP).
– Document IMT-2020-SAT/13 – Summary results of evaluation by SatComForum Evaluation Group of IMT-2020 satellite candidate technology submission in Document IMT-2020-SAT/4 (3GPP).

5.2 Results of Step 6, "Review to assess compliance with minimum requirements"

Under Step 6 of the IMT-2020 satellite process, 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 satellite process in force, as described in Report ITU-R M.2514. The evaluation methodology and the version of the minimum technical requirements used are described in Report ITU-R M.2514.

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

Such a qualified RIT/SRIT will go forward for further consideration in Step 7.

Based on a review of the evaluations carried out by the Independent Evaluation Groups as well as the self-evaluations from the proponents, the conclusions of the ITU-R for Step 6 are presented in the following subsections. Each candidate technology submission is separately addressed for compliance with regard to services, spectrum and technical performance and for confirmation as a qualifying RIT.

5.2.1 Result of assessment in Step 6 for the candidate SRIT submission (Doc. IMT-2020-SAT/3) from 3GPP Proponent

The ITU-R summary review of the candidate technology submission from 3GPP (Doc. IMT-2020-SAT/3) is presented below. The individual detailed analysis of compliance for each of the defined items in Report ITU-R M.2514 is included in the Tables in Annex 3 to the present Report.

Compliance related to services

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

Compliance related to spectrum

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

Compliance related to technical performance

The 3GPP technology proposed by 3GPP (Doc. IMT-2020-SAT/3) 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 Document IMT-2020-SAT/3 meets the minimum requirements of the Rural-eMBB-s test environment.

ITU-R confirms that the SRIT of the candidate technology submission in Document IMT-2020-SAT/3 meets the minimum requirements of the Rural-mMTC-s test environment.

ITU-R confirms that the SRIT of the candidate technology submission in Document IMT-2020-SAT/3 meets the minimum requirements of the Rural-HRC-s test environment.

Step 6 assessment for SRIT proposal (Document IMT-2020-SAT/3) from 3GPP Proponent

The evaluated candidate SRIT proposal (Document IMT-2020-SAT/3) from 3GPP Proponent is assessed by ITU-R as satisfactorily fulfilling the minimum requirements for the three test environments comprising the three usage scenarios, with each component RIT of the SRIT also fulfilling the minimum requirements of at least one test environment. 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 (Doc. IMT-2020-SAT/4) from 3GPP Proponent

The ITU-R summary review of the candidate technology submission from 3GPP (Doc. IMT-2020-SAT/4) is presented below. The individual detailed analysis of compliance for each of the defined items in Report ITU-R M.2514 is included in the tables in Annex 3 to the present Report.

Compliance related to services

The 3GPP technology proposed by 3GPP (Doc. IMT-2020-SAT/4) meets the minimum requirements for services.

Compliance related to spectrum

The 3GPP technology proposed by 3GPP (Doc. IMT-2020-SAT/4) meets the minimum requirements for spectrum.

Compliance related to technical performance

The 3GPP technology proposed by 3GPP (Doc. IMT-2020-SAT/4) 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 Document IMT-2020-SAT/4 meets the minimum requirements of the Rural-eMBB-s test environment.

ITU-R confirms that the RIT of the candidate technology submission in Document IMT-2020-SAT/4 meets the minimum requirements of the Rural-mMTC-s test environment.

ITU-R confirms that the RIT of the candidate technology submission in Document IMT-2020-SAT/4 meets the minimum requirements of the Rural-HRC-s test environment.

Step 6 assessment for RIT proposal (Document IMT-2020-SAT/4) from 3GPP Proponent

The evaluated candidate RIT proposal (Document IMT-2020-SAT/4) from 3GPP Proponent is assessed by ITU-R as satisfactorily fulfilling the minimum requirements for the three test environments comprising the three usage scenarios. Thus, this 3GPP Proponent RIT proposal is 'a qualifying RIT' and therefore will go forward for further consideration in Step 7.

5.3 Results 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, as 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 three test environments comprising the three usage scenarios[3].

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

– Document IMT-2020-SAT/3 – Acknowledgement of candidate SRIT submission from 3GPP proponent under step 3 of the IMT-2020 satellite process.

– Document IMT-2020-SAT/4 – Acknowledgement of candidate RIT submission from 3GPP proponent under step 3 of the IMT-2020 satellite process.

5.3.2 Consensus building and decision

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

Radio Interface Technologies	**NAME: (3GPP 5G NTN:[4] SRIT)**
Proponents (submission in):	3GPP Proponent (Doc. IMT-2020-SAT/3)
Determination whether the RIT or SRIT meets the requirements of Resolution ITU-R 65, *resolves* 6 *e)* and *f)*, for the three test environments comprising the three usage scenarios	YES
Inclusion in the standardization phase described in Step 8	YES

Radio Interface Technologies	**NAME: (3GPP 5G NTN:[5] RIT)**
Proponents (submission in):	3GPP Proponent (Doc. IMT-2020-SAT/4)
Determination whether the RIT or SRIT meets the requirements of Resolution ITU-R 65, *resolves* 6 *e)* and *f)*, for the three test environments comprising the three usage scenarios	YES
Inclusion in the standardization phase described in Step 8	YES

6 Characteristics of the satellite radio interface technologies of IMT-2020 and basis of the specifications for Step 8

In Step 8, an IMT-2020 satellite radio interface Recommendation is developed within the ITU-R, on the basis of the results of Step 7, sufficiently detailed to enable worldwide compatibility of operation and equipment, including roaming.

6.1 Characteristics of the satellite radio interface technologies for IMT-2020

Under Step 8 of the IMT-2020 satellite process, the detailed technical specifications for the Satellite Radio Interface Technologies in IMT-2020 will be provided in a future ITU-R Recommendation.

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[3] In order to reach Step 7, each component RIT of the SRIT needed to still fulfil the minimum requirements of at least one test environment to be assessed as a ‘qualifying SRIT’ in Step 6.

[4] Developed by 3GPP as 5G, Release 17 and beyond.

[5] Developed by 3GPP as 5G, Release 17 and beyond.

6.1.1 Characteristics of satellite radio interface technologies for IMT-2020 in Step 8 for the candidate SRIT submission (Document IMT-2020-SAT/3) from 3GPP Proponent

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

6.1.2 Characteristics of satellite radio interface technologies for IMT-2020 in Step 8 for the candidate RIT submission (Document IMT-2020-SAT/4) from 3GPP Proponent

Based on the consensus views in § 5.3, (3GPP 5G NTN: RIT) is accepted for Step 8. The basis for specifying the (3GPP 5G NTN: RIT) technology in Step 8 is Document IMT-2020-SAT/4.

Annex 1

Submission of candidate satellite technologies

Index of IMT-2020-SAT documents for each final submission

RIT/SRIT Proponent	Acknowledgement of submission (IMT-2020-SAT/YYY)		Submission history	
3GPP (SRIT)	Document IMT-2020-SAT/3	Acknowledgement of candidate submission from Alliance for Telecommunications Industry Solutions under Step 3 of the satellite IMT-2020 process (3GPP 5G NTN candidate for inclusion in the satellite component of IMT-2020: submission 1 (SRIT))	Document 4B/4 (2023-2027 Study Period)	3GPP technology submission of 3GPP 5G NTN solutions for the satellite component of IMT-2020
3GPP (RIT)	Document IMT-2020-SAT/4	Acknowledgement of candidate submission from Alliance for Telecommunications Industry Solutions under Step 3 of the satellite IMT-2020 process (3GPP 5G NTN candidate for inclusion in the satellite component of IMT-2020: submission 2 (RIT))	Document 4B/4 (2023-2027 Study Period)	3GPP technology submission of 3GPP 5G NTN solutions for the satellite component of IMT-2020

Annex 2

Summary and details of evaluation reports from independent evaluation groups

Document IMT-2020-SAT/10

Summary results of evaluation by ATIS Evaluation Group of IMT-2020 satellite candidate technology submission in Documents IMT-2020-SAT/3 and IMT-2020-SAT/4 (3GPP).

Document IMT-2020-SAT/11

Summary results of evaluation by European Telecommunications Standards Institute (ETSI) Evaluation Group of IMT-2020 satellite candidate technology submission in Document IMT-2020-SAT/4 (3GPP).

Document IMT-2020-SAT/12

Summary results of evaluation by 5G India Forum (5G IF) Evaluation Group of IMT-2020 satellite candidate technology submission in Document IMT-2020-SAT/4 (3GPP).

Document IMT-2020-SAT/13

Summary results of evaluation by SatComForum Evaluation Group of IMT-2020 satellite candidate technology submission in Document IMT-2020-SAT/4 (3GPP).

Annex 3

Detailed compliance template summaries[6]

A Candidate submission from 3GPP Proponent (Doc. IMT-2020-SAT/3)

TABLE A.1

Compliance template for services

	Service-related minimum capabilities within the satellite radio interface(s)	ITU-R confirmation that the requirement is met by the candidate technology proposal
8.2.6.1	**Support of a wide range of services** Does the proposal support a wide range of services? Yes/No	Yes

6 See References in Report ITU-R M.2514 (§ 8.2.6).

TABLE A.2

Compliance template for spectrum

	Spectrum capability requirements	ITU-R confirmation that the requirement is met by the candidate technology proposal
8.2.6.2	**Spectrum bands** Is the proposal able to utilize at least one band identified for IMT? Yes/No Specify in which band(s) the candidate satellite radio interface(s) can be deployed	Yes

TABLE A.3

Compliance template for technical performance

Minimum technical requirements items (8.2.6.3), and Report ITU-R M.2514-0 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		
Peak data rate (7.2.1)	eMBB-s	N/A	Uplink	2 Mbit/s	Yes
			Downlink	70 Mbit/s	Yes
Peak spectral efficiency (7.2.2)	eMBB-s	N/A	Uplink	1.5 bit/s/Hz	Yes
			Downlink	3 bit/s/Hz	Yes
User experienced data rate (7.2.3)	eMBB-s	Rural	Uplink	100 kbit/s	Yes
			Downlink	1 Mbit/s	Yes
5th percentile user spectral efficiency (7.2.4)	eMBB-s	Rural	Uplink	0.003 bit/s/Hz	Yes
			Downlink	0.03 bit/s/Hz	Yes
Average spectral efficiency (7.2.5)	eMBB-s	Rural	Uplink	0.1 bit/s/Hz	Yes
			Downlink	0.5 bit/s/Hz	Yes
Area traffic capacity (7.2.6)	eMBB-s	Rural	Uplink	1.5 kbit/s/km^2	Yes
			Downlink	8 kbit/s/km^2	Yes
User Plane latency (7.2.7.1)	eMBB-s	N/A	N/A	10 ms	Yes
Control Plane latency (7.2.7.2)	eMBB-s	N/A	N/A	40 ms	Yes
Connection density (7.2.8)	mMTC-s	Rural	N/A	500 devices/km^2	Yes
Energy efficiency (7.2.9)	eMBB-s	N/A	N/A	High sleep ratio and long sleep duration	Yes
Reliability (7.2.10)	HRC-s	Rural	N/A	1-10^{-3}	Yes
Mobility – UE speed (7.2.11)	eMBB-s	Rural	N/A	250 km/h	Yes
Mobility − Traffic channel link data rate (7.2.11)	eMBB-s	Rural	N/A	0.005 bit/s/Hz	Yes
Mobility interruption time (7.2.12)	eMBB-s	N/A	N/A	50 ms	Yes
Bandwidth (7.2.13)	N/A	N/A	N/A	At least up to and including 30 MHz	Yes

B Candidate submission from 3GPP Proponent (Doc. IMT-2020-SAT/4)

TABLE B.1

Compliance template for services

	Service-related minimum capabilities within the satellite radio interface(s)	ITU-R confirmation that the requirement is met by the candidate technology proposal
8.2.6.1	**Support of a wide range of services** Does the proposal support a wide range of services? Yes/No	Yes

TABLE B.2

Compliance template for spectrum

	Spectrum capability requirements	ITU-R confirmation that the requirement is met by the candidate technology proposal
8.2.6.2	**Spectrum bands** Is the proposal able to utilize at least one band identified for IMT? Yes/No Specify in which band(s) the candidate satellite radio interface(s) can be deployed	Yes

TABLE B.3

Compliance template for technical performance

Minimum technical requirements items (8.2.6.3), and Report ITU-R M.2514 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		
Peak data rate (7.2.1)	eMBB-s	N/A	Uplink	2 Mbit/s	Yes
			Downlink	70 Mbit/s	Yes
Peak spectral efficiency (7.2.2)	eMBB-s	N/A	Uplink	1.5 bit/s/Hz	Yes
			Downlink	3 bit/s/Hz	Yes
User experienced data rate (7.2.3)	eMBB-s	Rural	Uplink	100 kbit/s	Yes
			Downlink	1 Mbit/s	Yes
5th percentile user spectral efficiency (7.2.4)	eMBB-s	Rural	Uplink	0.003 bit/s/Hz	Yes
			Downlink	0.03 bit/s/Hz	Yes
Average spectral efficiency (7.2.5)	eMBB-s	Rural	Uplink	0.1 bit/s/Hz	Yes
			Downlink	0.5 bit/s/Hz	Yes
Area traffic capacity (7.2.6)	eMBB-s	Rural	Uplink	1.5 kbit/s/km^2	Yes
			Downlink	8 kbit/s/km^2	Yes
User Plane latency (7.2.7.1)	eMBB-s	N/A	N/A	10 ms	Yes
Control Plane latency (7.2.7.2)	eMBB-s	N/A	N/A	40 ms	Yes
Connection density (7.2.8)	mMTC-s	Rural	N/A	500 devices/km^2	Yes
Energy efficiency (7.2.9)	eMBB-s	N/A	N/A	High sleep ratio and long sleep duration	Yes
Reliability (7.2.10)	HRC-s	Rural	N/A	1-10^{-3}	Yes
Mobility – UE speed (7.2.11)	eMBB-s	Rural	N/A	250 km/h	Yes
Mobility – Traffic channel link data rate (7.2.11)	eMBB-s	Rural	N/A	0.005 bit/s/Hz	Yes
Mobility interruption time (7.2.12)	eMBB-s	N/A	N/A	50 ms	Yes
Bandwidth (7.2.13)	N/A	N/A	N/A	At least up to and including 30 MHz	Yes