

Agenda Item: 8.5
Source: TSG RAN
Title: Proposed Initial submission for updated UTRA FDD and TDD toward Rev. 4 of Rec. ITU-R M.1457

[ITU Member]¹

INITIAL SUBMISSION OF UPDATED MATERIAL ON IMT-2000 CDMA DS AND IMT-2000 CDMA TDD

This contribution contains an initial submission of updated material on IMT-2000 CDMA DS and IMT-2000 CDMA TDD.

In particular, the material required as specified in the update procedure for revisions of Recommendation ITU-R M.1457 (8/LCCE/95) is addressed in the following annexes:

Annex 1: Update information on technical areas indicated in the Roadmap (Att. 5.4 to the Report of the ninth meeting of ITU-R WP8F) that are relevant for 3GPP TSG RAN activity

Annex 2: update of Sections 5.1.2 & 5.3.2

Annex 3: modifications to Sections 5.1.1 and 5.3.1

Annex 4: modifications to the GCS

Annex 5: summary and rationale of the proposed update

Annex 6: self-evaluation of the proposed update against the evaluation criteria

Annex 7: self-declaration that the proposed amendments are self-consistent between Section 5.1.1, Section 5.1.2, and the GCS, as well as between Section 5.3.1, Section 5.3.2, and the GCS.

Annex 8: summary of the material that is planned to be submitted to ITU-R WP 8F.

¹ This contribution was developed in 3GPP TSG RAN.

ANNEX 1

Update information on technical areas indicated in the Roadmap that are relevant for 3GPP TSG RAN activity

In this Annex updated information on the main technical areas indicated in the Roadmap and relevant for 3GPP TSG RAN activity is provided. This is indeed living material: the most updated list of technical areas under investigation within 3GPP, together with a description of the current status of the activities, can be found on the 3GPP web site www.3gpp.org.

The information included in this Annex is put forward to ITU-R WP 8F in order to provide a picture as complete as possible of all the technical activities currently ongoing within 3GPP TSG RAN; this would facilitate discussion in ITU-R WP 8F, taking into account the objective of convergence between radio interfaces. The activities described in the following may therefore continue beyond the deadline for inclusion in Rev. 4 of Rec. M.1457, thus not necessarily being submitted for incorporation in Rev. 4 of Rec. M.1457.

A1.1 Improvements of Radio Interface

Rationale: The purpose of this feature is to enhance the existing functionalities in order to achieve more efficient use of the bandwidth and improved system performance in a backward compatible way.

The main topics are new techniques providing more efficient use of the bandwidth for the radio interface, ensuring backward compatibility in terms of service offering and addressing mechanism at the physical layer as well as at the signalling level.

Will include:

? *Multiple Input Multiple Output antennas (MIMO).* MIMO aims at achieving improvement in system capacity and spectral efficiency by increasing the data throughput in the downlink within the existing 5MHz carrier. This will be achieved by means of deploying multiple antennas at both UE and Node-B side.

? *FS for the viable deployment of UTRA in additional and diverse spectrum arrangements.* The main purpose of this activity is to study deployment of UTRA in some bands identified by ITU-R WRC-2000.

The viable deployment of UTRA in additional and diverse spectrum arrangements are being assessed, including:

- ?? Duplex spacing arrangements other than for Bands I, II and III.
- ?? Arbitrary selectable or variable duplex spacing methods
- ?? Use of asymmetric spectrum arrangements considering the need for additional downlink traffic capacity
- ?? Terminal capabilities and signalling
- ?? Possible interface impacts

? *Improving Receiver Performance Requirements for the FDD UE.* The objective of this Work Item is to establish improvements in the currently existing UE performance requirements.

? *Base station classification.* In this WI UTRA evolution requirements specific for other type of base stations are needed as well (e.g. micro, pico) are assessed. The main topics are:

- ?? definition of base station classes according to deployment scenarios (e.g. macro, micro, pico)
- ?? identification, review and possible update of radio parameters dependent on deployment scenarios
- ?? identification, review and possible update of UTRAN (Node B) measurement requirements and conformance where the maximum base station output power is reflected, dependent on deployment scenarios
- ?? review and possible update of conformance test specifications
- ?? recording of related information into RF System Scenarios

? *Feasibility Study on UTRA Wideband Distribution Subsystems (WDS).* This study item shall assess the feasibility for a new class of equipment that would allow for improved flexibility of radio access network solutions; this is here called *Wideband Distribution Subsystem, or WDS* – and includes a generic interface to the UTRA FDD Node B. The feasibility study should identify the WDS' requirements for interfacing to Node B, including study on WDS RF multicarrier performances (i.e. Linearity, Transparency, etc.)

- Use of UMTS within bands not currently allotted to UMTS in Regions 1, 2 and 3 (including at least the 800 MHz band in Region 3, the 850 MHz band in Region 2, and the 1700/2100 MHz in Region 2)

A1.2 RAN improvements

Rationale: The main purpose of this feature is to collect all the evolutions of the Radio Network System.

The main topics addressed by this feature cover the transport of the user and signalling plane and the evolution of architecture and protocols over all the RNS interfaces.

Will include:

? *Improvement of RRM across RNS and RNS/BSS.* The objective of this work is to identify tools for facilitating an efficient and cost effective method for radio resource management across RNS and RNS/BSS.

? *Beamforming Enhancements:* this item should define potential new measurements for UTRA FDD so as to efficiently support RRM in case beamforming is used;

? *Feasibility Study on the Evolution of UTRAN Architecture.* The objective of this study item is to study UTRAN architecture evolution considering a new functional split between the nodes. It should be possible to introduce this evolved architecture together with the existing Release'99 based network elements. The study item should consider also impacts on the existing UTRAN interfaces and co-existence with the existing UTRAN architecture as well as potential benefits for the system performance, deployment and radio interface evolution. The study item includes study on new distribution of some RAN functionalities between existing nodes e.g. between

Node Bs and RNCs. The new architecture to be considered shall be such there is no UE impacts i.e. support R99 and later radio interface.

A1.3 Multimedia Broadcast/Multicast Service (MBMS)

Rationale: RAN issues and required changes need to be addressed in order to accommodate Multimedia Broadcast and Multicast services.

This work consists in analysing and providing the necessary changes and additions required to the Radio Access Network for the efficient support of Multimedia Broadcast and Multicast Services.

A1.4 UTRAN Sharing in connected Mode

Rationale: Although the Release-99 specifications have mechanism to provide UE-specific access restrictions for Location Areas of the current PLMN and other PLMN's when the UE is in Idle Mode, insufficient mechanisms are specified to provide similar access restrictions in Connected Mode

This activity has enabled CN+UTRAN to provide a consistent UTRAN mobility access restriction handling based on roaming agreements in both Idle and Connected Mode.

A1.5 Evolution of the Transport in the UTRAN

Rationale: In order to cope with new requirement coming from new service definition, it is necessary to introduce mechanism to support new transport mechanisms or to improve the existing ones.

Typical examples of such mechanisms are the following: introduction of an IP transport inside the RNS and AAL2 QoS optimisation

A1.6 UE Positioning

Rationale: UE positioning is a function of UE and UTRAN (Access Stratum) useful to support location based services (LCS)

UE positioning feature encompasses a collection of positioning methods, allowing different level of accuracy and operational scenarios.

Will include:

? *Open interface between the SMLC and the SRNC within the UTRAN to support Rel-4 positioning methods.* The objective of this work is to extend the Iupc

interface for the support of all Rel'4 positioning methods, i.e. Cell ID based, OTDOA based and A-GPS.

ANNEX 2

Update of Sections 5.1.2 & 5.3.2

SDOs are requested to submit to ITU-R BR Counsellor the reference links for the tables contained in 5.x.2 by the dates indicated by ITU-R. The SDOs should therefore complete the transposition, where appropriate, public enquiry and publication by that date.

It is anticipated that the updated Sections 5.1.2 and 5.3.2 (all titles, synopsis and tables with empty references) will be submitted to ITU-R WP 8F (as required by established ITU-R procedures). All reference links (including the SDO doc/version number, status and issued date) will be submitted to ITU-R BR Counsellor by the established deadline, when the transposition process will be completed.

ANNEX 3

Modifications to Sections 5.1.1 and 5.3.1

It is anticipated that the update modifications to Sections 5.1.1 and 5.3.1, if needed, will be submitted by ITU-R WP 8F, as per established procedures. These modifications will capture the outcome of the current activities in 3GPP TSG RAN on some of the technical areas as indicated in the Roadmap and further detailed in Annex 1 of this contribution.

ANNEX 4

Modifications to the GCS

It is anticipated that the new set of the Global Core Specifications for IMT-2000 CDMA DS and IMT-2000 CDMA TDD are planned to be submitted, if needed, to ITU-R WP 8F, as per established procedures.

ANNEX 5

Summary and Rationale of the proposed update

It is anticipated that the summary and the rationale of the modifications to Sections 5.1.1 and 5.3.1 are planned to be submitted to ITU-R WP 8F, as per established procedures.

ANNEX 6

Self-evaluation of the proposed update against the evaluation criteria

The self-evaluation of the “total” radio interfaces (update IMT-2000 CDMA DS and IMT-2000 CDMA TDD) has been made against all evaluation criteria listed in the update procedure contained in 8/LCCE/95. The results are that the proposed updates meet the evaluation criteria as follows:

7.1 “The Evaluation Criteria” (Section 7.1 in 8/LCCE/95)

The “requirements and Objectives of IMT-2000” and the “Minimum Performance Capabilities for IMT-2000” as per Attachments 4 and 6 of Circular Letter 8/LCCE/47 were considered. The values included in Circular Letter 8/LCCE/47 were used. The proposed updates consist of enhancements to the existing IMT-2000 CDMA DS and IMT-2000 CDMA TDD radio interfaces. The evaluation of the proposed update was done in the context of the “total” radio interface. As shown in the tables below, the conclusion is that the IMT-2000 CDMA DS and IMT-2000 CDMA TDD radio interfaces with the proposed enhancements continue to meet all evaluation criteria in “Requirements and Objectives of IMT-2000” and “Minimum Performance Capabilities for IMT-2000”.

TABLE 1
Requirements and Objectives Relevant to the Evaluation of
Candidate Radio Transmission Technologies

IMT-2000 Item Description	Obj/Req	Source	Meets
Voice and data performance requirements			
1. One-way end to end delay less than 40 ms	Req	G.174, § 7.5	YES
2. For mobile videotelephony services, the IMT-2000 terrestrial component should operate so that the maximum overall delay (as defined in ITU-T Recommendation F.720) should not exceed 400 ms, with the one way delay of the transmission path not exceeding 150 ms	Req	Suppl. F.720, F.723, G.114	YES
3. Speech quality should be maintained during $\leq 3\%$ frame erasures over any 10 second period. The speech quality criterion is a reduction of ≤ 0.5 mean opinion score unit (5 point scale) relative to the error-free condition (G.726 at 32 kbit/s)	Req	G.174, § 7.11 and M.1079 § 7.3.1	YES
4. DTMF signal reliable transport (for PSTN is typically less than one DTMF error signal in 10^4)	Req	G.174, § 7.11 and M.1079 § 7.3.1	YES
5. Voiceband data support including G3 facsimile	Req	M.1079 § 7.2.2,	YES

IMT-2000 Item Description	Obj/Req	Source	Meets
6. Support packet switched data services as well as circuit switched data; requirements for data performance given in ITU-TG.174	Req	M.1034 §§ 10.8, 10.9	YES
Radio interfaces and subsystems, network related performance requirements			
7. Network interworking with PSTN and ISDN in accordance with Q.1031 and Q.1032	Req	M.687-1. § 5.4	YES
8. Meet spectral efficiency and radio channel performance requirements of M.1079	Req	M.1034.§ 12.3.3/4	YES
9. Provide phased approach with data rates up to 2 Mbit/s in phase 1	Obj	M.687, § 1.1.14	YES
10. Maintain bearer channel bit-count integrity (e.g. synchronous data services and many encryption techniques)	Obj	M.1034,§ 10.12	YES
11. Support for different cell sizes, for example: Mega cell Radius~100-500 km Macro cell Radius \leq 35km, Speed \leq 500 km/h Micro cell Radius \leq 1km, Speed \leq 100 km/h Pico cell Radius \leq 50m, Speed \leq 10 km/h	Obj	M.1035,§ 10.1	YES
Application of IMT-2000 for fixed services and developing countries			
12. Circuit noise- idle noise levels in 99% of the time about 100pWp	Obj	M.819-1, § 10.3	YES
13. Error performance - as specified in ITU-R F.697	Obj	M.819-1, § 10.4	YES
14. Grade of service better than 1%	Obj	M.819-1, § 10.5	YES

TABLE 2
**Generic Requirements and Objectives Relevant to the Evaluation of
Candidate Radio Transmission Technologies**

IMT-2000 Item Description	Obj/Req	Source	Meets
Radio interfaces and subsystems, network related performance requirements			
1. Security comparable to that of PSTN/ISDN	Obj	M.687-1, § 4.4	YES
2. Support mobility, interactive and distribution services	Req	M.816, § 6	YES
3. Support UPT and maintain common presentation to users	Obj	M.816, § 4	YES
4. Voice quality comparable to the fixed network (applies to both mobile and fixed service)	Req	M819-1, Table 1, M.1079, § 7.1	YES

IMT-2000 Item Description	Obj/Req	Source	Meets
5. Support encryption and maintain encryption when roaming and during handover	Req	M.1034 § 11.3	YES
6. Network access indication similar to PSTN (e.g. dialtone)	Req	M.1034 §§ 11.5	YES
7. Meet safety requirements and legislation	Req	M.1034, § 11.6	YES
8. Meet appropriate EMC regulations	Req	M.1034, § 11.7	YES
9. Support multiple public/private/residential IMT-2000 operators in the same locality	Req	M.1034, § 12.1.2	YES
10. Support multiple mobile station types	Req	M.1034, § 12.1.4	YES
11. Support roaming between IMT-2000 operators and between different IMT-2000 radio interfaces/environments	Req	M.1034, § 12.2.2	YES
12. Support seamless handover between different IMT-2000 environments such that service quality is maintained and signaling is minimized	Req	M.1034, § 12.2.3	YES
13. Simultaneously support multiple cell sizes with flexible base location, support use of repeaters and umbrella cells as well as deployment in low capacity areas	Req	M.1034, § 12.2.5	YES
14. Support multiple operator coexistence in a geographic area	Req	M.1034, § 12.2.5	YES
15. Support different spectrum and flexible band sharing in different countries including flexible spectrum sharing between different IMT-2000 operators (see M.1036)	Req	M.1034, § 12.2.8	YES
16. Support mechanisms for minimizing power and interference between mobile and base stations	Req	M.1034, § 12.2.8.3	YES
17. Support various cell types dependent on environment (M.1035 § 10.1)	Req	M.1034, § 12.2.9	YES
18. High resistance to multipath effects	Req	M.1034, § 12.3.1	YES
19. Support appropriate vehicle speeds (as per § 7) Note: applicable to both terrestrial and satellite proposals	Req	M.1034, § 12.3.2	YES
20. Support possibility of equipment from different vendors	Req	M.1034, § 12.1.3	YES
21. Offer operational reliability at least as good as 2nd generation mobile systems	Req	M.1034, § 12.3.5	YES
22. Ability to use terminal to access services in more than one environment, desirable to access services from one terminal in all environments	Obj	M.1035, § 7.1	YES
23. End-to-end quality during handover comparable to fixed services	Obj	M.1034-1 § 11.2.3.4	YES

IMT-2000 Item Description	Obj/Req	Source	Meets
24. Support multiple operator networks in a geographic area without requiring time synchronization	Obj		YES
25. Layer 3 contains functions such as call control, mobility management and radio resource management some of which are radio dependent. It is desirable to maintain layer 3 radio transmission independent as far as possible	Obj	M.1035, § 8	YES
26. Desirable that transmission quality requirements from the upper layer to physical layers be common for all services	Obj	M.1035, § 8.1	YES
27. The link access control layer should as far as possible not contain radio transmission dependent functions	Obj	M.1035, § 8.3	YES
28. Traffic channels should offer a functionally equivalent capability to the ISDN B channels	Obj	M.1035, § 9.3.2	YES
29. Continually measure the radio link quality on forward and reverse channels	Obj	M.1035, § 11.1	YES
30. Facilitate the implementation and use of terminal battery saving techniques	Obj	M.1035, § 12.5	YES
31. Accommodate various types of traffic and traffic mixes	Obj	M.1036, § 1.10	YES
Application of IMT-2000 for fixed services and developing countries			
32. Repeaters for covering long distances between terminals and base stations, small rural exchanges with wireless trunks etc.	Req	M.819-1, Table 1	YES
33. Withstand rugged outdoor environment with wide temperature and humidity variations	Req	M.819-1, Table 1	YES
34. Provision of service to fixed users in either rural or urban areas	Obj	M.819-1, § 4.1	YES
35. Coverage for large cells (terrestrial)	Obj	M.819-1, § 7.2	YES
36. Support for higher encoding bit rates for remote areas	Obj	M.819-1, § 10.1	YES
Satellite component (Not required for RTT submission)			
37. Links between the terrestrial and the satellite control elements for handover and exchange of other information	Req	M.818-1, § 3.0	N/A
38. Take account for constraints for sharing frequency bands with other services (WARC-92)	Obj	M.818-1, § 4.0	N/A
39. Compatible multiple access schemes for terrestrial and satellite components	Obj	M.818-1, § 6.0	N/A
40. Service should be comparable quality to terrestrial component as far as possible	Obj	M.818-1, § 10.0	N/A
41. Use of satellites to serve large cells for fixed users	Obj	M.819-2, § 7.1	N/A

IMT-2000 Item Description	Obj/Req	Source	Meets
42. Key features (e.g. coverage, optimization, number of systems)	Obj	M.1167, § 6.1	N/A
43. Radio interface general considerations	Req	M.1167, § 8.1.1	N/A
44. Doppler effects	Req	M.1167, § 8.1.2	N/A

TABLE 3

**Subjective Requirements and Objectives Relevant to the
Evaluation of Candidate Radio Transmission Technologies**

IMT-2000 Item Description	Obj/Req	Source	Meets
1. Fixed Service- Power consumption as low as possible for solar and other sources	Req	M.819-1. Table 1	YES
2. Minimize number of radio interfaces and radio sub-system complexity, maximize commonality (M.1035, § 7.1)	Req	M.1034, § 12.2.1	YES
3. Minimize need for special interworking functions	Req	M.1034, § 12.2.4	YES
4. Minimum of frequency planning and inter-network coordination and simple resource management under time-varying traffic	Req	M.1034, § 12.2.6	YES
5. Support for traffic growth, phased functionality, new services or technology evolution	Req	M.1034, § 12.2.7	YES
6. Facilitate the use of appropriate diversity techniques avoiding significant complexity if possible	Req	M.1034, § 12.2.10	YES
7. Maximize operational flexibility	Req	M.1034, § 12.2.11	YES
8. Designed for acceptable technological risk and minimal impact from faults	Req	M.1034, § 12.2.12	YES
9. When several cell types are available, select the cell that is the most cost and capacity efficient	Obj	M.1034, § 10.3.3	YES
10. Minimize terminal costs, size and power consumption, where appropriate and consistent with other requirements	Obj	M.1036, § 1.12	YES

TABLE 4

Minimum Performance Capabilities

Test environments	Indoor Office	Outdoor to Indoor and Pedestrian	Vehicular
Mobility Considerations	mobility type (low)	mobility type (medium)	mobility type (high)
Handover	Yes	Yes	Yes
Support of general service capabilities			
Packet data	Yes	Yes	Yes
Asymmetric services	Yes	Yes	Yes
Multimedia	Yes	Yes	Yes
Variable bit rate	Yes	Yes	Yes

8.1 Compatibility with the existing IMT-2000 radio interfaces

The proposed updates are backward compatible with the existing IMT-2000 CDMA DS and IMT-2000 CDMA TDD radio interfaces. The key RF parameters are not modified, and all features supported in the existing IMT-2000 CDMA DS and IMT-2000 CDMA TDD are still supported in the proposed update.

8.2 Harmonization within multiple proposals

Harmonization with multiple proposals has been done to the extent possible respecting the compatibility with the existing IMT-2000 radio interface.

“Other Considerations” (Section 9 in 8/LCCE/95)**9.1 Benefits of the proposed enhancement**

The proposed enhancements improve the performance of IMT-2000 CDMA DS and IMT-2000 CDMA TDD radio interfaces.

9.2 Harmonization and consensus building

All the radio interface specifications included in the proposed update were unanimously approved in 3GPP by all Organisational Partners (ARIB, CWTS, ETSI, T1, TTA, and TTC). The WP8F activity toward the consensus of ITU members will be facilitated by the evidence that many of the IMT-2000 technology updates and concepts used are actually shared with other standards development organisations.

9.3 Enhanced performance capabilities

The proposed update is fully in line with the ongoing activities on the vision for the enhancements of IMT-2000, also reflected in the Roadmap for the future updates of Rec. ITU-R M.1457.

ANNEX 7

Self-declaration that the proposed amendments are self-consistent between Section 5.1.1, Section 5.1.2, and the GCS, as well as between Section 5.3.1, Section 5.3.2, and the GCS

A formal statement that the proposed amendments are self-consistent between Sections 5.1.1, 5.1.2, and the GCS, as well as between Sections 5.3.1, 5.3.2, and the GCS is planned to be submitted to ITU-R WP8F, as per established procedures (i.e., when the above listed sections of M.1457 will actually be available).

ANNEX 8

Summary of the material that is planned to be submitted to ITU-R WP 8F

It is planned that the following material will be submitted in its final form to ITU-R WP 8F, as per established procedures.

The understanding of 3GPP TSG RAN is that the following material received in its final form by the established deadlines, together with the other material contained in the present contribution, is fully compliant with the established procedures.

- ?? Revised Sections 5.1.2 and 5.3.2: all titles, synopsis and tables with empty references. All reference links - including the SDO doc/version number, status and issued date - will be submitted by SDOs to ITU-R BR Counsellor by the established deadline, when the transposition process has to be completed; by the same deadline also the Certifications of references and transposition will be submitted.
- ?? Final version of revised Sections 5.1.1 and 5.3.1.
- ?? New set of Global Core Specifications
- ?? Summary and rationale of the modifications to Sections 5.1.1 and 5.3.1.
- ?? Final text for the self-evaluation (criteria 7.1, 8.1, 8.2, and 9.2 as per Annex 6 of the present contribution).
- ?? Formal self-declaration of consistency between Section 5.1.1, Section 5.1.2, and the GCS, as well as between Section 5.3.1, Section 5.3.2, and the GCS

SDOs will also submit the Letters of conveyance to ITU-R BR Counsellor, as per established procedures.