

Agenda Item: 7.1
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Title: Update submission for UTRA FDD and TDD toward Rev. 5 of Rec. ITU-R M.1457
Document for: Approval

[ITU Member]¹

UPDATE SUBMISSION FOR IMT-2000 CDMA DS AND IMT-2000 CDMA TDD

Following Doc 8F/119 (submitted to ITU-R WP8F#12), this contribution contains the update submission for 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

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#14.

¹ This contribution was developed in 3GPP TSG RAN.

ANNEX 1

Update information on technical areas indicated in the Roadmap

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. 5 of Rec. M.1457, thus not necessarily being submitted for incorporation in Rev. 5 of Rec. M.1457.

- **Improvements of Radio Interface**

Rationale: The objective for this feature is to ensure that mechanisms are provided to allow enhancement of the radio interface in a backward compatible manner.

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.

It includes:

- *Improved Receiver Performance Requirements for HSDPA:* The purpose of this work item is to specify improved receiver performance requirements in realistic environments for HSDPA capable UE, which will enhance system performance and end user service quality.

- **Multiple Input Multiple Output Antennas (MIMO)**

Rationale: The purpose of this work item is to improve system capacity and spectral efficiency by increasing the data throughput in the downlink within the existing 5 MHz carrier.

The objective can be achieved by means of deploying multiple antennas at both UE and Node-B side. The technical objective of this work item is the integration of MIMO functionality in UTRA, both FDD and TDD.

- **RAN improvements**

Rationale: This work item intends to introduce new mechanisms allowing improvements on all aspects dealing with the radio network subsystem internal interfaces, as well as the interface towards the core network.

This includes transport of user and signalling plane as well as protocols over all interfaces of the radio network subsystem.

It includes:

- *Network Assisted Cell Change (NACC) from UTRAN to GERAN:* NACC offers the possibility to reduce the delay when transiting between GPRS cells by providing the system information of the target cells.
- *RAB support enhancement:* This work item should have the scope of adding necessary functionality to the Uu, Iur and Iu interface in order to efficiently support RT traffic, e.g. VoIP. Examples of such functionality are: Radio Access Bearer multiplexing in PDCP, Support of variable formats over Iu and unequal error protection over Uu, Channel type switching for logical channels.
- *Iu enhancements for IMS support in the RAN:* This Work Item proposes to refine the requirements for the IMS support from a RAN thorough perspective and evaluate possible further enhancements for the release 6 allowing some further optimisations of the handling of IMS RAB by an RNC.
- *Remote Control of Electrical Tilting Antennas:* the objective of this Work item is to specify a standardised open interface to enable local RET (Remote Electrical Tilting) antenna-controlling functionality situated in the Node B to allow the RET antenna system being provided by a third party vendor and to be able to control the antenna from the Network Manager.
- *Improved Access to UE Measurement Data for CRNC to support TDD RRM:* In order to effectively perform Dynamic Channel Allocation, the CRNC needs access to measurements that characterize interference and path loss on both a cell and time slot basis. The objective of this Work Item is to establish means of providing the CRNC with UE measurement data.

- **Subscriber and Equipment Trace support in UTRAN**

Rationale: Subscriber and Equipment Trace provides very detailed information at call level on one or more specific mobile(s). This data is an additional source of information to Performance Measurements and allows going further in monitoring and optimisation operations.

Contrary to Performance Measurements, which are a permanent source of information, Trace is activated/deactivated on user demand for a limited period of time for specific analysis purposes.

- **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. Possible study areas are:

- analysis and creation/modification of UTRAN functions needed to be standardized for the efficient support of MBMS
- impact on the logical/transport/physical channels
- impact on the radio interface protocols
- impact on the “MBMS context” concept on RAB signalling

- impacts on Iub and Iur and Iu-ps
- decision making process between point-to-point or point-to-multipoint configurations needed for MBMS Multicast mode
- interaction between MBMS and Iu-flex

- **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.

It includes:

- *UE positioning enhancements.* The purpose of this work item are to increase the accuracy of the UE positioning or define methods allowing UE positioning with less complexity for a given accuracy.
- *A-GPS minimum performance specification.* This WI is to develop A-GPS minimum performance specification for both UE based and UE assisted.

- **Enhancement of the support of network sharing in the UTRAN.**

Rationale: Network sharing may be used to lower the initial rollout cost for new radio networks. In addition, network sharing provides possibilities for operators not owning a 3G license to be able to deliver 3G services.

This work is aimed to develop stage-3 support to “Network Sharing” feature, taking into account Stage 1 and stage 2 requirements.

- **FDD Enhanced Uplink**

Rationale: The uplink DCH operation and performance may be enhanced in order to support services like video-clips, multimedia, e-mail, telematics, gaming, video-streaming.

The technical objective of this work item is the Enhanced Uplink functionality in UTRA FDD, in order to improve the performance of uplink dedicated transport channels. The improvements should take into account backwards compatibility aspects.

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 ≤35km, Speed ≤500 km/h Micro cell Radius ≤1km, Speed ≤100 km/h Pico cell Radius ≤50m, Speed ≤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, CCSA, ETSI, ATIS, 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.