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Title: **Revision of Tdoc RP-010423 Update submission for CDMA DS and CDMA TDD**
Source: ~~**ITU Ad Hoc**~~**Drafting group: Motorola, Ericsson, Telecom Italia, Panasonic, Siemens, Cingular, Voicestream**
Agenda item: **8.5**
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[ITU Member][1]

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

In line with Annex 2 to Att. 12 of doc 8F/268 (Workplan of Rec. M.1457 update), this contribution contains the update submission for IMT-2000 CDMA DS and IMT-2000 CDMA TDD. This contribution also contains the Initial Submission of IMT-2000 CDMA HSDPA.

In particular, the material required as specified in the update procedure for revisions of Recommendation ITU-R M.1457 (Annex 1 to Att. 12 of doc 8F/268) and in the Workplan of M.1457 update is addressed in the following annexes:

Annex 1: Update information on technical areas as indicated in the Roadmap (Annex 3 to Att. 12 of doc 8F/268)

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 of the proposed update

Annex 6: rationale for the proposed update

Annex 7: self-evaluation of the proposed update against the evaluation criteria

Annex 8: 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.

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[1] This contribution was developed in 3GPP TSG RAN.

Annex 9: summary of the material that will be submitted to ITU-R WP 8F#6

ANNEX 1

Update information on technical areas as indicated in the Roadmap

In this Annex updated information on the main technical areas indicated in the Roadmap is provided. This is indeed living material: the most updated list of technical areas under investigation within 3GPP TSG RAN, 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. As indicated in the Roadmap, some of the activities described in the following may therefore continue beyond the deadline for inclusion in Rev. 1 of Rec. M.1457, thus not necessarily being submitted for incorporation in Rev. 1 of Rec. M.1457.

A1.1 1.28 Mcps TDD option

Rationale: The joint UTRA TDD concept with the two options (1.28 Mcps TDD and 3.84 Mcps TDD) will accommodate the various needs of the different Regions in a flexible way.

The 1.28 Mcps TDD has recently been introduced in the 3GPP specification suit.

A1.2 Base Station classification

Rationale: Current 3GPP TSG RAN specifications have been done with the same requirements for all types of base stations (Node Bs). For the UTRA evolution requirement specifications for other types of base stations are needed as well to take into account different use scenarios and radio environments.

The objectives of the BS classification activity can be divided into:

- definition of base station classes according to deployment scenarios
- 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 the “RF System Scenarios” technical report

The radio parameters that shall be considered for different base station classes in the technical specifications should, at least, include:

- Frequency error
- Spectrum emission mask
- ACLR minimum requirement
- Reference Sensitivity Level
- ACS
- Blocking Characteristics

- Intermodulation Characteristics
- Performance requirement for multipath fading

A1.3 Hybrid ARQ II/III

Rationale: This feature has been shown to have the potential of efficiently enhancing the performance of packet data transmission by transmitting incremental redundancy at the request of the receiver.

HARQ II/III techniques ~~will be co~~are considered~~vered~~ within the HSDPA (see A1.17). For additional information, please refer to ~~Spec~~TR. ~~No.~~ 25.835 and TR 25.837 available on the 3gpp web site (www.3gpp.org).

A1.4 Node B Synchronization for TDD

Rationale: NodeB synchronisation is beneficial in UTRA TDD to minimise cross-interference in neighbouring cells. The following benefits of the introduction of NodeB synchronisation by means of internal resources are seen:

- A substantial reduction of the cost of the transmission network.
- An autonomous synchronisation procedure without the need of external references.
- An easily extendable method for the purpose of inter-system NodeB synchronisation.

The purpose of this new work item is to enable the synchronisation of NodeBs in UTRA TDD by means of UTRAN's and UE's internal resources such as air interface signals and NodeB cross measurements. NodeB synchronisation involves

- radio frame und multi frame synchronisation and
- intra-system and inter-system synchronisation.

The Node B Synchronization has been included into the specifications for 3.84 Mcps TDD and will be completed for 1.28 Mcps TDD. For additional information, please refer to ~~Spec. No.~~TR 25.836 and TR 25.838.

A1.5 UTRA FDD repeater Specifications

Rationale: Repeaters have proven to be useful for extending the coverage into buildings, train/car tunnels, subways, highways, etc in 2nd generation systems. Also, by installing repeaters at the sector borders or in highly dense areas, the transmitted power from the UE and the base station (Node B) could possibly be lowered, leading to an improvement in C/I and thereby capacity. For the installation of repeaters in cellular networks a specification is needed in e.g. Europe due to regulatory requirements. For operators without the capability of handover to 2nd generation systems, extending the coverage of UTRA will be of importance especially at the initial rollout stage. For operators with capability of handover to 2nd generation

systems, user requirements (e.g. high data rates) may not be met by those systems and extended UTRA coverage might be needed.

Extensive work has been carried out on this work item and 3GPP TSG RAN succeeded to complete the UTRA Repeater specification for Release 4. The following work has been performed

- The core specification TS25.106 "UTRA Repeater; Radio transmission and reception" comprising the RF performance requirements has been created.
- The test specification TS25.143 "UTRA Repeater; Conformance testing" has been created.
- The Repeater EMC requirements are included in the TS25.113.
- Repeater co-existence simulations including Downlink and Uplink have been performed to investigate the system effect of Repeaters.
- A new technical report TR25.956 with the title “UTRA Repeater; Planning Guidelines and System Analysis” has been created to include several aspects of Repeaters.

The remaining work is in the conformance testing specification TS25.143. The intent is to align it with the part of the work in TS25.141 in the measurement uncertainties and test tolerances.

A1.6 ~~DPCCH gating features (former~~ Terminal power saving features~~)~~

Rationale: The UE battery saving, UL/DL interference reduction, and capacity increase are important for deploying the UMTS services.

This activity aims at improving the terminal power saving features, UL/DL interference reduction, and capacity increase. For more detail information, please refer to ~~Spec. No.~~TR 25.840, available on the 3gpp web site (www.3gpp.org).

A1.7 PS-Domain handover for real-time services

Rationale: It is expected that real-time services from the PS domain, such as voice over IP would benefit from fully optimised handover.

This activity aims at designing handover in RAN (mainly Iu) that supports real-time services from PS domain in an optimised way. Appropriate solutions are included in the specifications (for further information, please refer to ~~Spec. No.~~TR 25.936 available on the 3gpp web site – www.3gpp.org).

A1.8 RAB QoS Negotiation/Renegotiation over Iu

Rationale: For services that could accept looser QoS requirements than those requested by the CN in the RAB establishment request, this feature enables UTRAN to propose alternative (looser) QoS. This feature also allows the UTRAN to

renegotiate RAB/QoS parameters for on-going calls/session. Since the UTRAN is responsible for managing the radio resources, it is necessary for the UTRAN to be able to initiate RAB renegotiation for efficient use of the radio interface.

This activity aims at enhancing the Radio Access Bearer setup to something more sophisticated using e.g. QoS profiles to align with the already existing CN solution used in GPRS. This activity should also enhance the management of Radio Access Bearers for on-going calls/session so that QoS parameters can be renegotiated by the UTRAN. Appropriate solutions are included in the specifications.

A1.9 RRM optimisation for Iur and Iub

Rationale: The RRM optimisation for Iub/Iur is aimed at optimising the existing UTRAN procedures thereby increasing the efficiency of UTRAN and the quality of service to the end user.

Already several RRM related optimisations has been introduced since the first version of RSPC:
1) Congestion handling for Dedicated Transport Channels over Iur
- This work task introduced the DRNC capability to perform rate control;
2) DPC rate reduction in soft handover
- This work task introduced the support for DPC-Mode 1 in the UTRAN (already defined for the Uu in R99);
3) Introduction of common measurements over Iur
- This work task enabled an RNC to obtain (cell) load information for a cell in another RNS;
More work is ongoing continuing on further optimisations. Currently two separate work tasks have been started by TSG-RAN:
1) RL Timing adjustment
This work task aims at providing the possibility to adjust the timing of an individual Radio Link (e.g. in soft handover);
2) Separation of resource reservation and radio link activation
This work task aims at separating internal UTRAN resource reservation and radio link activation on the Uu, thereby e.g. improving performance for procedures like channel switching;

A1.10 Radio Access Bearer support enhancements

Rationale: The increasing interest in IP based services demands special optimisation of the means by which a radio access bearer can be provided by UTRAN.

Under the work item Radio Access Bearer Enhancements, the work on header compression for IP packets suitable for a wireless environment has been completed in 3GPP and IETF during year 2000 and beginning of 2001.
The IETF WG ROHC has completed the work on the RObust Header Compression (ROHC) protocol and the Internet Engineering Steering Group (IESG) has approved ROHC as proposed standards in RFCs (RFC 3095: RObust Header Compression

(ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed; RFC 3096: Requirements for robust IP/UDP/RTP header compression).
In 3GPP RAN the support of ROHC has been included and the work on ROHC is completed (3GPP TR 25.844 v4.0.0 "Radio Access Bearer Support Enhancements").

A1.11 Improvement of inter-frequency and inter-system measurements

Rationale: The activity on this technical area will widen the set of methods of implementing the compressed mode for enabling measurements on other frequencies. This will improve the system capacity and operational flexibility in addition to the existing methods.

The purpose of this work item is to work on the compressed mode improvements for improved system performance. The following two technologies have been identified as candidates for compressed mode improvements:
1. Compressed mode with puncturing and flexible positions
2. Combination of the existing methods (including method in point 1)

This activity is still at an early stage of development.

A1.12 Evolution of the transport in 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.

This work item intends to introduce mechanisms necessary to allow an evolution of transport mechanism in the RNS following requirement put by the core network. Typical examples of such mechanisms are the following: introduction of an IP transport inside the RNS and AAL2 QoS optimisation.
The main objective for this activity is to ensure that adequate mechanisms are provided to handle the different type of traffic (i.e. signalling and user flow) inside the RNS to ensure that requirements in terms of QoS and delay are taken into account. This shall be valid also for efficient O&M transport of the different interfaces inside the RNS. This includes the Iub, Iur and any protocol suites at the Iu reference point.

A1.13 Smart Antenna

Rationale: The advantage of smart antennas are well known in the literature.

The objective of this activity was to ensure that Smart Antennas are fully supported by UTRAN, verifying their impacts on the physical and high layers. UTRA can fully exploit the advantages of the use of Smart Antennas. ~~In addition, TSG RAN is further addressing the performance requirements of dedicated pilot for beamforming purposes.~~

A1.14 UE (User Equipment) positioning

Rationale: UE positioning is a function of UE and UTRAN (Access Stratum) which can be utilised for a number of purposes:

- Radio Resource Management
- Support for location based services (LCS)

Different accuracy can be requested when positioning a UE for these purposes.
The purpose of this activity is to increase the accuracy of the UE positioning or define methods allowing UE positioning with less complexity for a given accuracy.

Currently, the following positioning methods are supported by UTRAN:

- Cell coverage based positioning
- OTDOA method with network configurable idle periods; and
- Network assisted GPS method

For 1.28 Mcps TDD the work is ongoing to incorporate OTDOA method with network configurable idle periods into the specifications.
The major new work for 3GPP TSG RAN is to specify an optional open interface between the RNC and a stand-alone SMLC. Two major functions of the SMLC have been identified:

- position calculation based on UE GPS/OTDOA measurements
- provision of assistance data for A-GPS/OTDOA.

The addition of the interface should be compatible with current Iu, Iur and Iub and radio interfaces. The addition of this interface does not preclude the positioning methods to be supported in the SRNC. Whether standalone SMLC is used or not needs to be transparent for the UE and will only impact the SRNC, which supports standalone SMLC.

A1.15 DSCH power control improvement in soft handover

Rationale: The purpose of this activity was to specify improvement for the DSCH power control operation. In particular, a method has been develop so that the DSCH can be sent with more accurate power level, as UTRAN would exploit the information from the SSDT.

DSCH (Downlink Shared Channel) has always been part of the UTRA/FDD specification. Typically the transmit power for DSCH can be set depending on the transmit power of the associated downlink Dedicated Physical Channel (DPCH).
The work of adopting this method and improve the DSCH power control in case of a UE in soft handover, i.e. when the associated downlink DPCH is transmitted from more than one cell, have been completed by 3GPP RAN and is described more in detail in (TR 25.841, “DSCH power control improvements in soft handover”).
The method uses the uplink signalling, already existing for SSDT (Site Selection Diversity Transmission), to better estimate the required DSCH transmit power. The method does not imply any UE hardware changes, compared to the current release of the specifications.
TR25.841 also describes some other methods that may further enhance DSCH power control in soft handover. These methods can be considered for future releases.

A1.16 Radio link performance enhancements (feasibility study)

Rationale: In order to improve the link performance it is felt necessary to continue related studies after Release –99 completion and to include possible agreed improvements to the coming UTRA releases. This is a permanent study item to be repeated for every UTRA Release.

Several different possible topics have been identified that could improve the radio link performance. These studies might include improvements to the coming UTRA releases. However, 3GPP RAN has not come to an agreement on topics to include in the current specifications.
One important factor impacting the performance of radio systems is the available diversity (time, frequency, multipath etc.). Due to wide bandwidth, WCDMA systems are especially effective in exploiting the multipath diversity existing in time dispersive radio environments. If little or no multipath diversity is available the performance can degrade quite considerably. One way of improving the situation without significantly increasing the complexity of terminals is to utilize 2 or more transmit antennas that effectively speaking introduce additional radio paths and thereby increase the available diversity. Several schemes for open and closed loop mode transmit diversity with 2 antennas are already specified.
During 2001, 3GPP is studying the possible performance gain from employing additional transmit diversity schemes with more than 2 TX antennas.

A1.17 High Speed downlink packet access

Rationale: This work item proposes to study enhancements that can be applied to UTRA in order to provide very high speed downlink packet access. It's aim is to identify a long term evolution path for the UTRA air interface. In particular, HSDPA allows the increase of throughput and peak data rates with reduction in concomitant delay.

HSDPA is extending UTRA with a new transport channel HS-DSCH (High Speed Downlink Shared Channel). Use of HS-DSCH will enhance the UTRA support for interactive, background, and streaming services, in terms of

- Higher peak data rates
- Improved overall cell throughput [kbps/MHz/cell]
- Reduced delay

~~HS-DSCH~~ HSDPA deployment should be possible in all kinds of environments. However, the focus in the development of the ~~HS-DSCH~~HSDPA functionality is on macro and micro-cell urban environments. An overview of the current status ~~HS-DSCH~~of HSDPA can be found in ~~(~~TR 25.950, "UTRA High Speed Downlink Packet Access"~~)~~ and TR 25.855, "HSDPA – Overall UTRAN description"~~....~~ Below, the principles of ~~HS-DSCH~~HSDPA are briefly described.
~~HS-DSCH~~HSDPA will be specified for both the UTRA/FDD and UTRA/TDD modes. The basic principles of ~~HS-DSCH~~HS-DSCH operation is similar to current UTRA Downlink Shared Channel (DSCH), i.e. downlink transmission to multiple users based on a shared code resource. However, ~~HS-DSCH~~HS-DSCH will support the following techniques, currently not supported by UTRA

- Support for higher-order modulation. In addition to currently used QPSK, 8PSK, 16QAM, and 64QAM is considered to be supported for HS-DSCH.
- Fast link adaptation based on Adaptive Modulation and Coding
- Fast scheduling
- Fast Hybrid ARQ

The following techniques have also been considered for HS-DSCH:

- Fast cell selection
- Advanced antenna solutions based on multiple transmit and multiple receive antennas, so called multi-input-multi-output (MIMO) antenna processing.

However, according to the current plans, these techniques will not be part of the first release of HSDPA. However, studies are continued and these techniques will be considered for inclusion in later releases.

In order to support the above listed techniques, the following extensions will also be done the UTRA specification:

- Support for transmission time intervals (TTI) shorter than 10 ms.
- Extension of current MAC architecture with a MAC-hs located in the Node B. MAC-hs is responsible for Hybrid ARQ, transport format selection and fast scheduling for HS-DSCH.

The documents TR 25.950, "UTRA High Speed Downlink Packet Access" and TR 25.855, "HSDPA – Overall UTRAN description", are attached to this contribution for information about the current status of HSDPA development in 3GPP.

A1.18 USTS (UL Synchronous Transmission Scheme) (feasibility study)

Rationale: The purpose of this activity is to increase the uplink capacity by means of making a cell receive orthogonalized signals from UEs. USTS is expected to provide good capacity in the uplink with low overhead and minimal impact on hardware and software resources at UE and in the UTRAN.

The feasibility study is still ongoing. For detail information, please refer to ~~Spec. No.~~TR 25.839 and TR 25.854, available on the 3gpp web site (www.3gpp.org).

A1.19 Improved common DL channel for cell FACH state (feasibility study)

Rationale: This effort is motivated by the desire to provide an optimized wireless IP solution for interactive and real time applications. While the existing mechanisms are sufficient for non-real time uni-directional traffic, there is some need for optimization work for bi-directional real time or interactive traffic using Common Channels available in Cell-FACH state.

This activity will study the feasibility of approach, perceived benefits, and scope of work for affected specifications to provide an improved common DL channel for Cell-FACH state. The study may consider an optimised FACH in the CPCH/FACH sub-state, a new use of DSCH as CPCH/DSCH in Cell-FACH state, and a new DL-CPCH. The objective is to optimize the common channel mechanism for various IP traffic including VoIP and other IP applications. This feasibility study is still ongoing.

A1.20 UMTS1800~~/1900~~

Rationale: A decision was made at ~~WA~~WRC 00 to extend the current IMT 2000 frequency allocation to include other bands.

The purpose of this work is to include the support of other bands than current IMT 2000 frequency allocation. The support of these bands will handled in a release independent way, meaning that the support is added in an earlier version as the one currently worked on. The needed changes will be done ~~This wok is carried out as release independent frequency support, where release independent means that the support is added in an earlier release than the one currently worked on,~~ either as a~~n~~ delta specification or as a~~n~~ correction to the existing specification.

In particular, the following bands are ~~being looked at~~considered:

~~The purpose of this work item is to carry on working on the following frequency bands:~~
1710 – 1785 MHz: Up-link (~~mobile~~ UE transmit, ~~base~~ Node B receive)
1805 – 1880 MHz: Down-link (~~base~~ Node B transmit, ~~mobile~~ UE receive)

~~1850 – 1910 MHz: Up-link (UE transmit, Node B receive)~~
~~1930 – 1990 MHz: Down-link (Node B transmit, UE receive)~~

ANNEX 2

Update of Sections 5.1.2 & 5.3.2

As indicated in Annex 2 to Att. 12 of doc 8F/268, Sections 5.x.2 are expected to be completed by April, 1st, 2002, and SDOs are requested to submit to ITU-R BR the reference links for 5.x.2 tables by that date. The SDOs should therefore complete the transposition, where appropriate, public enquiry and publication by the same date.

It is anticipated that Sections 5.1.2 and 5.3.2 (all titles, synopsis and tables with empty references) will be submitted to ITU-R WP 8F#6 (as required by the update procedure – TEMP/86) as part of the Best and Final Submission on IMT-2000 CDMA DS and IMT-2000 CDMA TDD. All reference links (including the SDO doc/version number, status and issued date) will be submitted to ITU-R BR by April, 1st, 2002, when the transposition process will be completed, in line with the above mentioned Workplan.

ANNEX 3

Modifications to Sections 5.1.1 and 5.3.1

Doc 8F/105 Annexes 1 & 2 (submitted to ITU-R WP 8F#3, re-submitted as Doc. 8F/231 and carried forward to ITU-R WP8F#5) are still valid. They do not include the modifications to Sections 5.1.1 and 5.3.1 that may be required to 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. It is therefore proposed to carry forward doc 8F/231 to ITU-R WP 8F#6. It is anticipated that the update modifications to Sections 5.1.1 and 5.3.1 will be submitted as part of the Best and Final Submission on IMT-2000 CDMA DS and IMT-2000 CDMA TDD, expected by ITU-R WP 8F#6, as indicated in the Workplan approved at ITU-R WP 8F#4 (Annex 2 to Att. 12 of doc 8F/268).

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 will be submitted to ITU-R WP 8F#6 as part of the Best and Final Submission on IMT-2000 CDMA DS and IMT-2000 CDMA TDD, in line with the update procedure contained in Annex 1 to Att. 12 of doc 8F/268.

ANNEX 5

Summary of the proposed update

Doc 8F/105 Annex 3 (submitted to ITU-R WP 8F#3, re-submitted as Doc. 8F/231 and carried forward to ITU-R WP8F#5) contains the summary of the modifications to Sections 5.1.1 and 5.3.1 as per Annexes 1 & 2 of the same document. It does not contain the summary of the modifications to Sections 5.1.1 and 5.3.1 that may be required to 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. As already indicated, it is proposed to carry forward doc 8F/231 to ITU-R WP 8F#6. It is anticipated that the complete summary (including the rationale) of the modifications to Sections 5.1.1 and 5.3.1 will be submitted as part of the Best and Final Submission on IMT-2000 CDMA DS and IMT-2000 CDMA TDD, expected by ITU-R WP 8F#6, as indicated in the Workplan approved at ITU-R WP 8F#4 and in line with the update procedure (Annex 1 to Att. 12 of doc 8F/268).

ANNEX 6

Rationale for the proposed update

Complement to Annex 3 of Doc 8F/105 (submitted to ITU-R WP 8F#3, re-submitted as Doc. 8F/231 and carried forward to ITU-R WP8F#5):

a) Inclusion of PDCP and BMC sublayers:

The Packet Data Convergence Protocol (PDCP) sublayer enables the mapping of network PDUs from one network protocol to one RLC entity, providing compression/decompression of network PDU control info.

The Broadcast/Multicast Control (BMC) sublayer provides a broadcast/multicast transmission service in the user plane.

b) Update CPCH access procedure:

The introduction of downlink channels increase the efficiency of the CPCH access procedure [from R1-00265]

c) Deletion of ODMA related material

This material was no longer considered to be relevant (ODMA is no longer a consideration).

As indicated in Annex 3 of the present contribution, other modifications to Sections 5.1.1 and 5.3.1 that may be required to 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. As indicated in Annex 5 of the present contribution, it is anticipated that the summary and the rationale of these additional modifications to Sections 5.1.1 and 5.3.1 will be submitted as part of the Best and Final Submission on IMT-2000 CDMA DS and IMT-2000 CDMA TDD, expected by ITU-R WP 8F#6, as indicated in the Workplan approved at ITU-R WP 8F#4 (Annex 2 to Att. 12 of doc 8F/268) and in line with the update procedure (Annex 1 to Att. 12 of doc 8F/268).

ANNEX 7

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 Annex 1 to Att. 12 of doc 8F/268. The results are that the proposed updates meet the evaluation criteria as follows:

7.1 "The Evaluation Criteria" (Section 7.1 in 8/LCCE/85+Corr.1)

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 technical impact on the other IMT-2000 radio interfaces, taking into account the objective of convergence amongst IMT-2000 radio interfaces, will be further investigated in a specific meeting to which experts of the different IMT-2000 radio interfaces will be invited. 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 $\leq$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	YES

IMT-2000 Item Description	Obj/Req	Source	Meets
		§ 7.3.1	
5. Voiceband data support including G3 facsimile	Req	M.1079 § 7.2.2,	YES
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

IMT-2000 Item Description	Obj/Req	Source	Meets
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
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	Obj	M.1035,	YES

IMT-2000 Item Description	Obj/Req	Source	Meets
environment, desirable to access services from one terminal in all environments		§ 7.1	
23. End-to-end quality during handover comparable to fixed services	Obj	*M.1034-1* § 11.2.3.4	YES
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	Obj	M.818-1,	N/A

IMT-2000 Item Description	Obj/Req	Source	Meets
as far as possible		§ 10.0	
41. Use of satellites to serve large cells for fixed users	Obj	M.819-2, § 7.1	N/A
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. With reference to the compatibility with the other existing IMT-2000 radio interfaces, it will be further investigated in a specific meeting to which experts on the different IMT-2000 radio interfaces will be invited.

8.2 Harmonization within multiple proposals

With specific reference to the optimisation of packet data transmission, a meeting will be held in order to investigate the potential for harmonisation amongst the different proposals that have been submitted to ITU-R on advanced packet data capabilities. Experts on the different proposals will be invited to this meeting.

"Other Considerations" (Section 9 in 8/LCCE/85+Corr.1)

9.1 Benefits of the proposed enhancement

The proposed updates improve the performance and the flexibility of UTRAN, enabling an easier and more efficient provision of various multimedia services in a variety of operating environments, with specific reference to packet services. In particular, higher data rates are now available for individual users, allowing substantial increase in system throughput on the downlink. This would enable for instance the provision of Internet access exploiting the applications currently available only in the wired telecommunication networks. Also the provision of real-time services on the PS domain (such as voice over IP) and of services requiring accurate

UE positioning have been optimised. In addition, the joint UTRA TDD concept with the two options (1.28 Mcps TDD and 3.84 Mcps TDD) will accommodate the various needs of the different Regions in a flexible way. These benefit can be easily implanted thanks to the backward compatibility with current 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 concepts used are actually shared with other standards development organizations (e.g., adaptive modulation and coding, hybrid ARQ, etc.). In particular, with specific reference to the optimisation of packet data transmission, a meeting between experts on the different IMT-2000 radio interface updates will be held in order to investigate the potential of harmonisation between the various technologies that have been submitted to ITU-R.

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. In particular, the enhancements of packet data transmission are within the key area on fast packet access mode that has been identified by ITU-R WP 8F for year 2001.

ANNEX 8

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

It is anticipated that 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 will be submitted as part of the Best and Final Submission on IMT-2000 CDMA DS and IMT-2000 CDMA TDD (i.e., when the above listed sections of M.1457 will actually be available), expected by ITU-R WP 8F#6, as indicated in the Workplan approved at ITU-R WP 8F#4 (Annex 2 to Att. 12 of doc 8F/268) and in line with the update procedure (Annex 1 to Att. 12 of doc 8F/268).

ANNEX 9

Summary of the material that will be submitted to ITU-R WP 8F#6

It is anticipated that the following material will be submitted in its final form in the Best and Final Submission on IMT-2000 CDMA DS and IMT-2000 CDMA TDD, expected by ITU-R WP 8F#6, as indicated in the Workplan approved at ITU-R WP 8F#4 (Annex 2 to Att. 12 of doc 8F/268) and in line with the update procedure (Annex 1 to Att. 12 of doc 8F/268).

The understanding of 3GPP TSG RAN is that the following material in its final form, together with the other material contained in the present contribution, fulfil all requests in the updated procedure for revisions of Rec. ITU-R M.1457 and it is fully compliant with the mentioned procedure.

- 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 by April, 1st, 2002, when the transposition process will be completed)

- Final version of revised Sections 5.1.1 and 5.3.1: this will replace current Annexes 1 & 2 of Doc 8F/105 (submitted to ITU-R WP 8F#3, re-submitted as Doc. 8F/231 and carried forward to ITU-R WP8F#5) including also the modifications that may be required to 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.

- New set of Global Core Specifications

- Summary, including the rationale, of the modifications to Sections 5.1.1 and 5.3.1 that may be required to 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.

- Update text for the self-evaluation (criteria 7.1, 8.1, 8.2, and 9.2 as per Annex 7 of the present contribution) to reflect the outcome of the meeting between experts of the different radio interfaces to investigate the potential for convergence between the proposed updates submitted to ITU-R WP 8F.

- 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