Source: **TSG RAN**

Title: **Liaison from ITU-R TG 8/1 on the approval of Recommendation IMT.RSPC and on the provision of relevant information from External Organizations**

Agenda item: **11.1**

Document for:

Decision	
Discussion	
Information	**X**

The attached document is a liaison from ITU-R TG8/1 to standards development organizations, partnership projects and proponents of radio interfaces to provide relevant information on, and to request certain information and actions from these organizations necessary for completion, approval and publication of Recommendation ITU-R M.[IMT.RSPC].

Attachment: Document 8-1/TEMP/213 Rev1

INTERNATIONAL TELECOMMUNICATION UNION

RADIOCOMMUNICATION STUDY GROUPS

(edited)
Revision 1 to Document 8-1/TEMP/21
9 June 1999
Original: English only

ATTACHMENT

17th Meeting of Task Group 8/1
31 May - 11 June 1999, Beijing, China

Task Group 8/1

LIAISON TO STANDARDS DEVELOPMENT ORGANIZATIONS*, PARTNERSHIP PROJECTS AND PROPONENTS OF RADIO INTERFACES TO PROVIDE RELEVANT INFORMATION ON, AND TO REQUEST CERTAIN INFORMATION AND ACTIONS FROM THESE ORGANIZATIONS NECESSARY FOR COMPLETION, APPROVAL AND PUBLICATION OF RECOMMENDATION ITU-R M.[IMT.RSPC]

1 Background

It is important for the relevant external organizations to have their IMT-2000 radio interface specifications included in Recommendation ITU-R M.[IMT.RSPC]. This inclusion ensures that all IMT-2000 radio interface technologies are properly recognized by members of the ITU.** The purpose of this liaison is to progress the work on RSPC and is intended to address not only the technical aspects but also certain business aspects necessary for completion, approval, and publication of RSPC.

This document includes discussion on:

a) the structure and general content aspects of RSPC;

b) the role of the ITU-R TG 8/1 vis-à-vis the role of the ITU-T, SDOs (Standards Development Organizations) and 3GPPs (3rd Generation Partnership Projects) in developing radio interface specifications;

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* Both Secretariat and Technical Working Parties.

** Draft new ITU-R Recommendation containing the detailed specifications of radio interfaces of IMT-2000, further on in the text referred to as RSPC.

c) a development and maintenance process for RSPC;

d) specific identification of material required from SDOs and 3GPPs for completion of RSPC;

e) a schedule for the completion of RSPC;

f) other aspects such as copyright and change authority that impact RSPC.

The Working Document Towards Preliminary Draft Recommendation Detailed Specifications of Radio Interfaces of IMT-2000, RSPC in *Attachment A* to this document is the most current version of RSPC produced as an output of the 17th Meeting of ITU-R TG 8/1, held from 31 May 1999 to 11 June 1999 in Beijing. *Attachment A* should be consulted as required while reading this document.

Specific questions addressed to recipients of this liaison are shown in bold. Response dates for all requested material is included with each question.

2 Structure and General Content Aspects of RSPC

Use of References

It was decided in ITU-R TG 8/1 that neither the extreme of "all references" nor the extreme of "100% new or incorporated text" is an appropriate approach to complete RPSC within the established deadline. TG 8/1 has decided that significant use of references of externally developed specifications is the most appropriate solution.

ITU-R Guidelines For Use of References

It is to be noted that the use of references in ITU-R Recommendations is currently considered in the Working Guidelines forRadiocommunication Assembly and Study Group documentation contained in Administrative Circular CA/13 of 23 February 1995, Annex 2, §2.8.

Taking into account the guidelines applicable to ITU-R Recommendations and in the light of the current practice in ITU-T (established by the provisions of ITU-T Recommendation A.5), it is proposed that documents of otherorganizations referred to in the body of draft new Recommendation ITU-R M[IMT.RSPC] should be introduced with a standard note as follows:

> *"Any reference to an external document in this Recommendation means that the external document is considered to be part of this Recommendation. However, such a reference does not give the external document the status, as a stand-alone document, of an ITU Recommendation. Any reference to an external document is accurate at the time of approval of this Recommendation. Since the external document may be revised, users of this Recommendation are advised to contact the source of the external document to determine whether the reference is still current."*

Moreover, the following other conditions should apply with respect to the inclusion of references to documents of otherorganizations in RSPC:

a) the other organization owner of the document:

– is a recognized and qualified body (e.g., accreditedstandardization organization);
– agrees to the use of the reference and to make the document and its revisions available to ITU membership[1] (a written statement should be obtained by the BR Secretariat in this regard before the Recommendation is formally approved);

[1] A full copy of the document and its revisions is to be made available to the ITU-R Secretariat.

b) the document referred to in the Recommendation:

– is a finalized and approved document by the owner organization;

– is clearly identified (type, title, number, version, date, status, etc.);

– has any IPR issue related to it clearly identified.

Relevant external organizations are requested to inform ITU-R TG 8/1 Secretariat as soon as possible after receipt of this liaison the anticipated date of approval of their specifications and which organizations are specifically responsible for approval if more than one. They are also requested to provide sufficient detail for the ITU-R to understand the process flow regarding specification completion, balloting, etc.

Radio Interface Specification Sections of RSPC (Sections 5.X)
TG 8/1 has decided that having the Radio Interface Sections as complete individual sections is the most appropriate presentation of the radio interface specification to ensure completeness.

Relationship of Material Developed by ITU-R TG 8/1 and External Organizations
It has been decided by TG 8/1 that the information contained in each of the Radio Interface Sections of RSPC (Sections 5.Xs) will have three parts:

"ITU Created Material" part (Section 5.X.1s),
"Extract from External Material" part (Section 5.X.2s) and
- "Reference from External Material" part (Section 5.X.3s).

The percentage of each part is anticipated to be approximately 10%, 20%, and 70% respectively, when considering the "information" content of a radio interface specification as delineated within RSPC in each Section 5.X.

"Structure and Style" of Externally Developed Material
For the "Extract from External Material" portion of Sections 5.X, using extracted or incorporated material, TG 8/1 has concluded that specifying the format and structure of this portion is appropriate and does not present a burden on the responding organizations to supply their inputs in accord with the TG 8/1 established criteria. *Annex 1* provides information on how this material should be structured.

For the "Reference from External Material" portion of Sections 5.X, using material included by referencing, it has been decided that ITU-R TG 8/1 should adopt the structure of the detailed specifications coming from external SDOs and 3GPPs and should not attempt to unilaterally edit this material. *Annex 1* provides information on how this material should be structured.

3 Relationship of ITU-R TG 8/1, ITU-T and External Organizations

Figure 1 depicts IMT-2000 network interfaces. This figure has been used within ITU-T, Working Party 3/11, to define the terms of reference of the various subgroups within WP 3/11 that are working on the various facets of IMT-2000 network issues[2]. It can be anticipated that the 3GPPs and SDOs will address all aspects of the blocks and interfaces in this diagram up through and including the Core Network/Public Network (CN/PN) interface. The 3GPPs and SDOs will work the issues of the interfaces between their own network and

[2] "Joint Questions Groups (JQGs) co-ordination aspects," ITU-T Study Group 11 Temporary Document PL/11-83R1 (to be made part of the SG 11 Chairman's Report for the Geneva Meeting, 1-19 March 1999).

the various public networks. They may and are encouraged to be working similar network issues between their own IMT-2000 technology and that of other members of the IMT-2000 family. It can reasonably be expected that these inter-family NNI technical interface issues can be divided into two parts: a network-dependent part and a network independent part.

The role of ITU-R is primarily the radio dependent part, which would be developed by TG8/1 or by incorporation or referencing of radio interface information originally developed by the 3GPPs and SDOs.

Approval of RSPC

RSPC is an ITU Recommendation even though the content of RSPC includes material that has been developed external to the ITU and included into RSPC either by direct incorporation or through the use of referencing of content. The approval of the "complete" Recommendation (incorporating ITU-R created material, incorporation of externally developed material, and the content included by reference) will follow the usual course of ITU-R Recommendation approval procedure:

ITU-R TG 8/1 finalizes and approves RSPC at its 18th meeting by 5 November 1999. RSPC is then submitted to Study Group 8 (9 to 11 November 1999) in English only for consideration of the application of the adoption by correspondence process. SG 8 decides to send RSPC forward for adoption by correspondence and for subsequent approval by correspondence. The English version is immediately dispatched to the ITU-R membership for consideration and the versions in the other languages follow. The consideration period extends for at least two months and ends after RSPC have been available in the working languages for at least one month. At the end of this period, if there are no objections, RSPC is considered to be adopted by SG 8 and is sent forward for approval by correspondence (3 months period).

4 RSPC Development and Maintenance Processes

Figure 2 depicts the process for the development of RSPC. While much of the process may be obvious, the diagram is presented to emphasize the need to conduct as much work in the parallel. It is recommended that the parallel work activities depicted in Figure 2 be utilized to most efficiently complete the work on RSPC after final agreement of the structure. Within ITU-R TG 8/1, sub-working groups (SWGs) under the RSPC working groups will be established as might be inferred from Figure 2 and from *Attachment A.* While there may be separate SWGs to write/coordinate the material for each radio interface technology section (Sections 5.X), the SWGs will co-ordinate their activities to ensure a consistency in RSPC.

Figure 2 also illustrates the dependency of the RSPC completion schedule on the completion of work on air interface detailed specifications by the 3GPPs/SDOs. It should be noted that TG 8/1 may not be able to reference any material that is not in the final agreed state by the 3GPPs/SDOs.

Figure 2 is not intended to illustrate all liaisons necessary to complete RSPC. Many liaisons between TG 8/1 and the 3GPPs/SDOs and between TG 8/1 and ITU-T may be necessary. It should be noted that in adopting the structure of the external organization's material (particularly in Sections 5.X), the referenced/incorporated material on the RAN may contain some information on signaling and other aspects that may be published under the purview of ITU-T. As this text is incorporated by reference and not specifically developed by TG 8/1 it is consistent with the intent of publishing of material based on the division of responsibility

between ITU-R TG 8/1 and ITU-T WP 3/11 as documented in May 1998.[3]

Development Process for ITU-R M.[IMT.RSPC]

Consideration should be given to development of a "real time" liaison between the TG 8/1 RSPC development working group (WG 5) and the external contributing organizations focussing on questions that may arise from this liaison request. A procedure to accommodate rapid dialog in the intervening interval between the receipt of this liaison and the next scheduled meeting of ITU-R TG 8/1 and/or the external organizations should be established between the Secretariats of the ITU-R and the external organizations shortly after the conclusion of the Beijing meeting of TG 8/1.

External organizations are requested to provide a point of contact to ITU-R TG 8/1 Secretariat as soon as possible after receipt of this liaison.

The ITU-R TG 8/1 Secretariat is requested, using the accepted electronic working methods of TG 8/1 to place pertinent information received from the external organizations on the appropriate WG 5 reflector to ensure timely dissemination of this information to WG 5.

TG 8/1 requests that the external organizations have present at the ITU-R TG 8/1 Helsinki meeting (25 October – 5 November, 1999) appropriate representatives to act as a "on-site" liaison co-ordinators to ensure as rapidly as possible satisfactory resolution of liaison questions that may arise regarding their respective radio interfaces within RSPC (e.g. the "Reference From External Material" and "Extract From External Material" parts). In order to ensure proper registration for the meeting following usual ITU-R TG 8/1 procedures, please provide the ITU-R Secretariat pertinent information, in a timely manner, on the attending delegates so appropriate registration materials may be forwarded from the Secretariat office.

Maintenance Process for RSPC

The ITU-R is responsible for maintenance of its Recommendations including all of RSPC. Relevant external organizations are requested to provide ITU with periodic updates of their radio interface specifications as they relate to RSPC. The process for maintaining the RSPC after approval by ITU-R is dependent upon communication between the ITU-R and the appropriate 3GPPs and SDOs. It is recommended that the external organizations notify the ITU of updates to their specifications in a timely manner. Conversely, the ITU is requested to notify the external organizations of pertinent schedules within the ITU to ensure co-ordination with approval cycles of the ITU-R parties having ongoing responsibility for IMT-2000 Recommendations.

Initially, it is believed that annual maintenance update interval should be followed for RSPC. It is recognized that updates to each radio interface specification will be occurring independently; however, updates of RSPC should be done as a single combined update by the ITU-R endeavoring to accommodate as well as possible the varying schedules among the external organizations. It is suggested that co-ordination by the external organizations among themselves on this issue be done to ensure uniformity of updates.

Timing of the first update release of RSPC should be negotiated between the ITU and the

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[3] "Report of the Joint Experts Meeting with ITU-TSGs 2 and 11" 6-8 May 1998, Geneva, Source Doc 8-1/110, Attachment 21-2, specifically Annex 2 to Attachment 21-2, entitled "High Level Division of Work on IMT-2000 Radio Interface Signaling Between ITU-T WP 3/11 and ITU-R TG 8/1".

external organizations. It is suggested that the first update be released by the ITU-R no later than January 2001. Development of an on-going update schedule and procedure should ideally be worked out prior to final approval of RSPC within ITU-R.The lack of such a process on maintenance in place prior to final approval of RSPC within the ITU-R should not delay such approval or release of RSPC; however, it is urged that the maintenance process negotiations be addressed as a matter of urgency and concluded prior to the final approval timeline within the ITU-R.

External organizations receiving this liaison are requested to address the update process in light of the proposal stated above and to provide their views and suggestions to ITU-R TG 8/1 Secretariat no later than 15 October 1999.

5 Input Requested From External Organizations for Completion of RSPC

Please refer to the current version of theWorking Document Towards Preliminary Draft Recommendation Detailed Specifications of Radio Interfaces of IMT-2000, RSPC in *Attachment A* to this document. Also please refer to Section 6 below.

Information required to be supplied by the relevant external organizations encompasses Section 5.Xs (and its subsections), Section 6 and Section 7 of *Attachment A*. The response date for each set of information is discussed in Section 6 below and is either 1 September or 15 October depending on the specific section in question.

6 RSPC Completion Schedule and Process Flow

The next and concluding meeting of ITU-R TG 8/1 is scheduled for 25 October 1999 through 5 November 1999. TG 8/1 will complete RSPC at this meeting, with final approval being granted in accordance with established ITU-R approval procedures.

Work on all the radio interfaces within RSPC should be completed in an essentially parallel fashion. Figure 2 illustrates one approach for achieving parallelism in the work. Since there will be multiple radio interfaces involved, there will be in addition to the common parts of RSPC multiple radio interface variations andprioritization of completion of one radio interface over another is not an option that should be considered with ITU-R TG 8/1.

In order to complete its work and to ensure that external organization materials are properly understood by WG 5 drafting groups, the following process and schedule has been established for information flows related to information required the various sections of *Attachment A.*

Schedule for Completion of Sections 1.0 through 5.X.1 of RSPC

1 ITU-R TG 8/1, Working Group 5, will in the Helsinki meeting develop these sections using member contributions and possibly drawing upon material supplied by the external organizations in their responses to other sections.

2 In addition, WG 5 will complete incorporation of these sections with all other sections to finish their work and finalize for approval, by the closing plenary of TG 8/1, RSPC.

Schedule for Information required to complete Sections 5.X.2 ("Extract from External Material")

1. **Relevant External Organizations are requested to provide to the ITU-R Secretariat, in electronic form, an initial version of their submissions to this section following the guidelines established in this liaison and *Attachment A* as soon as possible, but no later than 1 September 1999.**

2. ITU-R TG 8/1 WG 5 will, in a focussed drafting group, begin the task of collating, assembling and editing the differing Section 5.X.2s for each radio interface into a unified document. The drafting group will work using electronic methods, conference calls, or if deemed necessary to complete this preliminary editorial effort in a focussed editors meeting. The ITU-R Secretariat is requested to make submissions received, immediately available to the drafting group using agreed upon electronic working methods. The drafting group output will be available to WG 5 by 23 September for review until 27 September.

3. **T**he ITU-R Secretariat is requested, by 27 September, 1999, to send back to the responding external organizations the "composite" of all Section 5.X.2s to provide a complete picture of this portion of RSPC. **Relevant external organizations are requested to review this material and to provide comments and their "best and final" updates this material to the ITU-R Secretariat by the final response deadline of 15 October 1999, again using electronic form.**

4. ITU-R TG 8/1 WG 5 will, in the Helsinki meeting, complete the task of collating, assembling and editing the differing Section 5.X.3s for each radio interface into a unified final document.

NOTE – ITU-R, after reviewing schedules of many of the external organizations, recognizes that the material received to meet the 1 September date may not be final material from the external organizations due to their internal development and approval schedules. It is thought, however, that the iterative procedure discussed above can be accommodated by the external organization schedules and will result in an improved incorporation of material from the relevant external organizations.

The required date for information requested in this liaison necessary to complete all Section 5.X.2s of RSPC should be received in electronic form at the ITU-R TG 8/1 Secretariat office on or before 1 September 1999. Subsequent revisions must be received on or before 15 October 1999.

Schedule for Information required to complete Sections 5.X.3 ("Reference from External Material")

1. Relevant External Organizations are requested to provide to the ITU-R Secretariat, in electronic form, a "best and final" version of their submissions to this section following the guidelines established in this liaison and *Attachment A* as soon as possible, but no later than 15 October, 1999.

2. ITU-R TG 8/1 WG 5 will, in the Helsinki meeting, complete the task of collating, assembling and editing the differing Section 5.X.3s for each radio interface into a unified final document.

NOTE – ITU-R, after reviewing schedules of many of the external organizations, believes that the material received to meet the 15 October date will be final material from the external organizations considering their internal development schedules.

The required date for information requested in this liaison necessary to complete all Section 5.X.3s of RSPC should be received in electronic form at the ITU-R TG8/1 Secretariat on or before 15 October 1999.

Schedule for Information required to complete Section 6 (Satellite Component)

1. Relevant External Organizations are requested to provide to the ITU-R Secretariat, in electronic form, information appropriate to this section following the guidelines established in this liaison and *Attachment A* as soon as possible, but no later than 15 October, 1999.

2. ITU-R TG 8/1 WG 5 will, in the Helsinki meeting, complete the task of collating, assembling and editing the information supplied in contributions on Section 6 for each radio interface into a unified final document.

The required date for information requested in this liaison necessary to complete all Section 6 of RSPC should be received in electronic form at the ITU-R TG8/1 Secretariat on or before 15 October 1999.

Schedule for Information required to complete Section 7 (Generic Unwanted Emission Limits)

1. Relevant External Organizations are requested to provide to the ITU-R Secretariat, in electronic form, information appropriate to this section following the guidelines established in this liaison and *Attachment A* as soon as possible, but no later than 15 October, 1999.

2. ITU-R TG 8/1 WG 5 will, in the Helsinki meeting, complete the task of collating and assembling and editing the information supplied in contributions on Section 7 for each radio interface into a unified final document.

The required date for information requested in this liaison necessary to complete all Section 7 of RSPC should be received in electronic form at the ITU-R TG 8/1 Secretariat on or before 15 October 1999.

General Schedule Question

Relevant external organizations are requested to inform ITU-R TG 8/1 Secretariat as soon as possible after receipt of this liaison if the requested dates for information on Sections 5.X.2 and 5.X.3 above can or cannot be accommodated.

7 Copyright and Licensing Aspects of Non-ITU-R Specifications, including Ownership.

Relevant external organizations are requested to, as soon as possible, inform the ITU-R Secretariat of their views on the concepts expressed in the following sections on copyright, licensing, publication and change authority. Furthermore, relevant external organizations are requested to begin the administrative process with the ITU-R to establish mechanisms to accomplish the concepts expressed in the following sections. The deadline for completion of these administrative processes should be prior to final approval of RSPC within the ITU-R.

Overview of Copyright and Licensing Concepts required for certain Sections of RSPC

The following is a layman's attempt to clarify the issues of copyright, etc. in the context of a Recommendation incorporating ITU-R created material, incorporation of externally material, and external references. This layman's perspective is not to be considered definitive, but is provided as a starting point to assist all parties in understanding the portions of RSPC requiring discussion with regards to copyright, licensing and other similar aspects. Figure 3 provides a pictorial representation of this section of this document.

The "Complete" RSPC Recommendation Itself:

The ITU has a combination of owned and assigned rights to copy, distribute, and sell to its

members in the usual way. SDOs, etc. will have assigned appropriate rights (not necessarily exclusive) to the ITU-R to copy, distribute and sell. The "complete" RSPC Recommendation (incorporating ITU-R- created material, incorporation of externally developed material, and the content included by use of external referencing) will be made available to ITU members through the ITU itself.

The "ITU-R Created Material" Part (Section 5.X.1)
The document will contain ITU-R created material of which the ITU-R therefore owns the copyright. ITU-R can copy, distribute or sell as it may wish, and can if necessary assign similar rights to other entities.

The "Extract From External Material" Part (Section 5.X.2)
The document will contain directly incorporated externally generated material, for which the source SDO owns the copyright, and has assigned appropriate rights to the ITU-R to copy, distribute and sell.

The "Reference From External Material" Part (Section 5.X.3)

The document will contain some reference from external material for which the source SDO owns the copyright, and has assigned appropriate rights to the ITU-R to copy, distribute and sell; and which the SDO will have agreed to make available to ITU members who are purchasing the Recommendation.

8 Change Authority

It should be noted that the content of RSPC being included in the "extract from external material" part and the "reference from external material" part is essentially "controlled" by the relevant externalorganizations but is an essential part of RSPC which is "controlled" by the ITU-R. A mechanism may be required, whereby through mutual agreement, certain portions of these two parts are edited and/or modified under request of the ITU-R (particularly during the completion and approval portions of process) or by request by the relevant external organizations. Such a mechanism may be appropriate for management of on going change authority for RSPC.

The lack of such a mechanism should not preclude completion and approval of RSPC nor hinder RSPC meeting its current schedule.

Relevant external organizations are requested to comment on change authority and provide guidance to ITU-R TG 8/1 Secretariat on this topic in a timely manner. It is suggested that aspects of change authority be sucessfully concluded between the ITU and the relevant external organizations before the Helsinki meeting of TG 8/1.

9 Publication and Distribution Aspects

Consistent with the outcomes of copyright, ownership, licensing, change authority and the maintenance process, the ITU and relevant external organization should mutually develop processes and mechanisms to ensure that publication and distribution of RSPC, and the related external materials is flexible enough to support a range of purchasing option. This range may include just the purchase of RSPC text or may extend through to a "one stop shopping" concept for purchase of not only RSPC text but also the materials that are incorporated equivalently by reference. Further purchase options may be to obtain either a particular "radio interface section" up to getting all included "radio interface sections".

Investigation of electronic means such as "hyperlinks" may help ensure that references to external material are current and may be useful in the maintenance/update process and should be investigated.

Relevant external organizations are invited to respond in a timely manner to ITU-R TG 8/1 on this topic.

10 Other Aspects

Adherence to Schedule

TG 8/1 does not intend to delay RSPC if information on any specific radio interface is not forthcoming. If the requested materials encompassed by this liaison cannot be provided by the response dates established by TG 8/1, relevant material may be considered within ITU-R after initial publication of RSPC through subsequent updates and releases of RSPC in accordance with procedures which will be established for maintenance of RSPC.

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Figure 1 IMT-2000 Interfaces

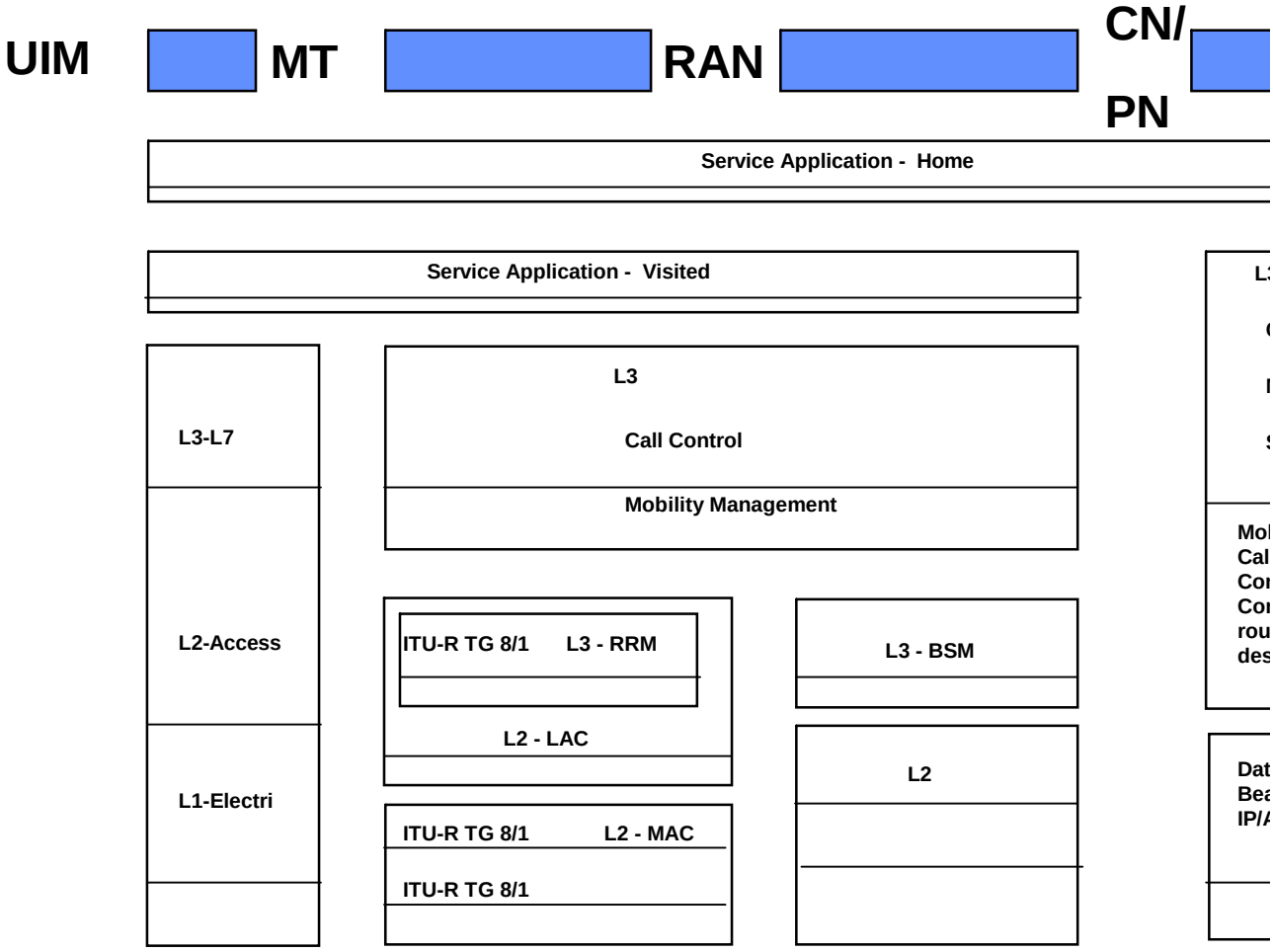


Figure 2 RSPC Development Process

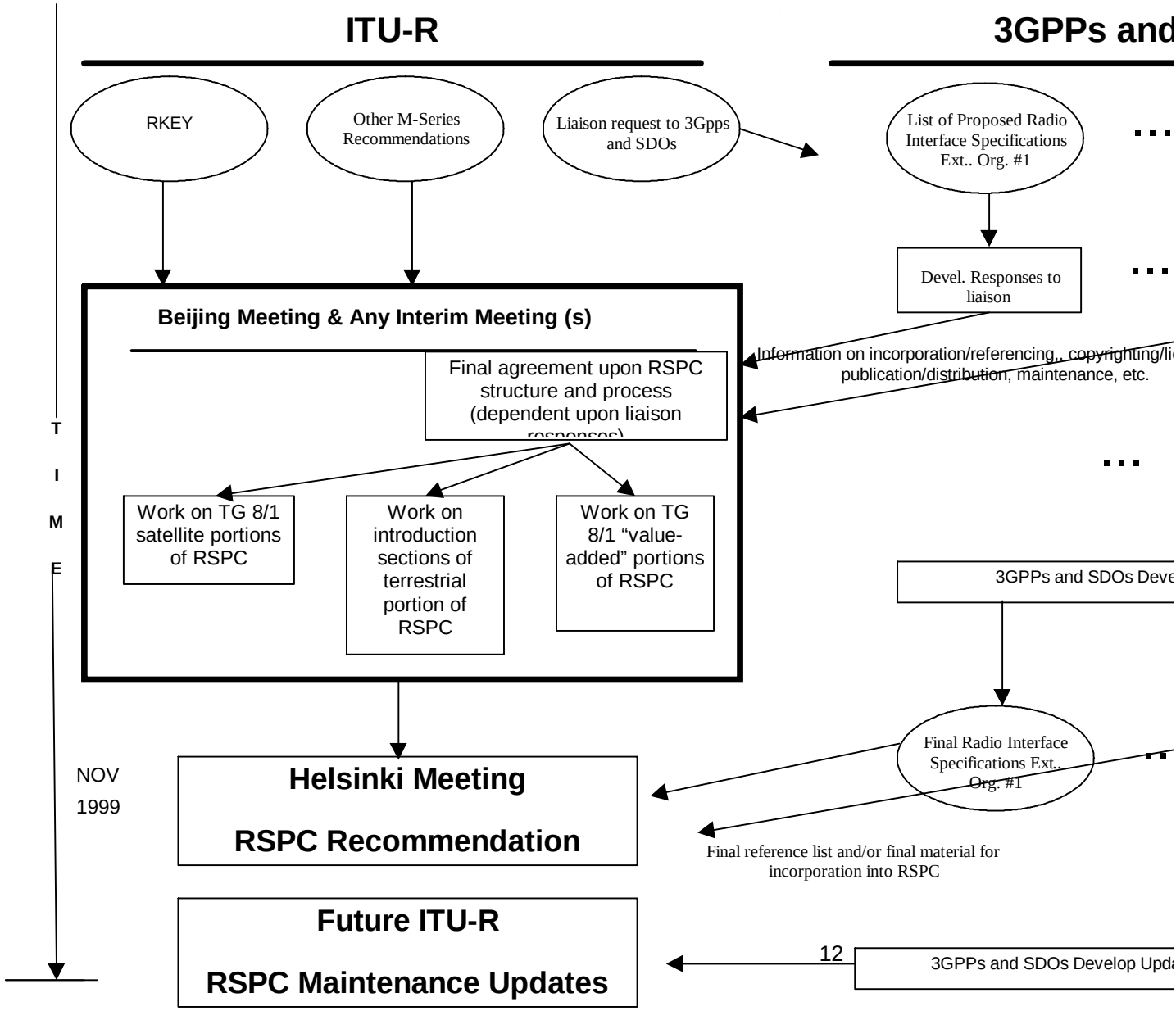
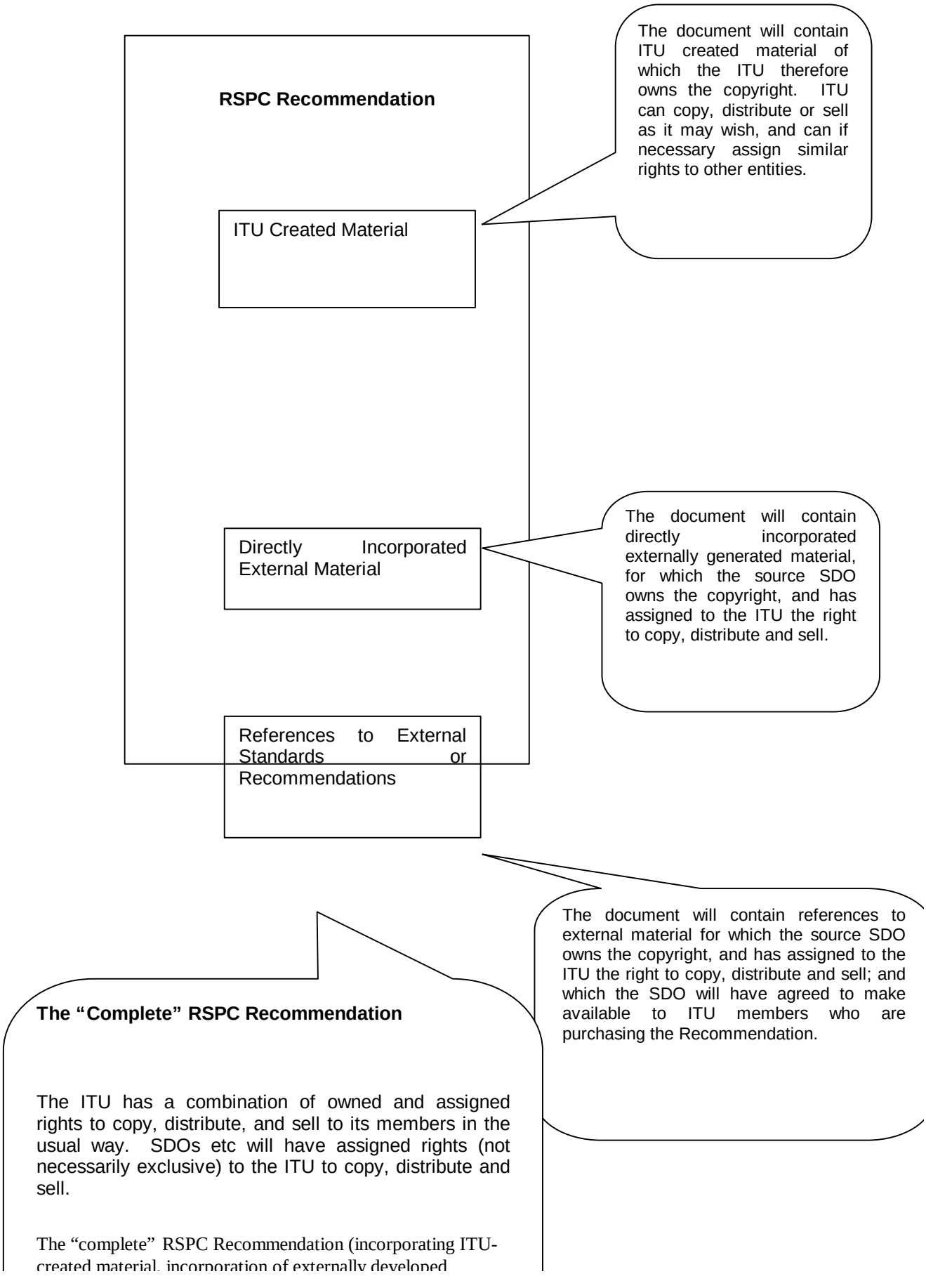


Figure 3 – Copyright and Licensing Concepts for Recommendation ITU-R M.[IMT.RSPC]



ANNEX 1

Guidelines For The Inclusion of "Extract from External Material" in RSPC

For the "Extract from External Material" portion of Sections 5.X, using extracted or incorporated material, TG 8/1 has concluded that specifying the format and structure of this portion is appropriate. The guideline for this material is presented below:

The "Overview of the Radio Interface" Section

The information in this part provides the major technical specifications and should be organized from the bottom up, that is Layer 1 (Physical layer), Layer 2, and Layer 3, with respect to the OSI Reference Model. The information should be only technical, clear and complete, and while mainly focused on the radio-dependent aspects should also include sufficient information on the radio independent aspects to provide a complete technology view. It is suggested that the information be covered in about 5 to 10 pages.

The Summary of Major Technical Parameters Table
The purpose of this table is to provide a clear and concise understanding of the radio interface specifications, shown in a summary format.

Parameter	**"Value"**	**Reference to SDOs/3GPPs Specifications**

Note: The number of parameters chosen for this table should be sufficient to summarize the radio interface. The parameter selected must be from the actual radio interface specification and in addition to providing a "value" for the parameter, the appropriate reference to the specification (section, number, version, etc.) must be shown in the table. These specifications must be referenced in Section 5.X.3 also. SDOs and 3GPPs can use key characteristics listed in Draft New Recommendation ITU-R M.[IMT.RKEY] for guidance on the type of parameters that might be appropriately included in the table.

If there are any differences with the terminology defined in Recommendation ITU-R M.1224, it should be noted and it should be referenced in Section 5.X.3.

Guidelines for the Inclusion of "Reference from External Material" in RSPC

For the "Reference from External Material" portion of Sections 5.X, using material included by referencing, it has been decided within TG 8/1 that ITU-R TG 8/1 should adopt the structure of the detailed specifications coming from external Standards Development Organizations (SDOs) and 3rd Generation Partnership Projects (3GPPs) and should not attempt to unilaterally edit this material. However, in order to ensure uniformity and understanding of what is included in the references some basic guidelines for this information are presented below:

The "Detailed Specification of the Radio Interface" Section

This part consists of a list of reference documents. If necessary, describe the relationship between references and /or numbering scheme.

The following information should be included for each reference

Title of the document

Document number

Version

Issued date

Status

Location (either physical document or electronic link)

Brief introduction, less than 5 lines

Any IPR issue related to this document

Example

25.211 Physical channels and mapping of transport channels onto physical channels (FDD)

Version: xxx.xx; Issued: yyyy-mm-dd; Status: approved by XXX;

Location: http://www.3gpp.org/xxxxxxxxxxx

Synopsis:

This specification describes the characteristics of the Layer1 transport channels and physicals channels in the FDD mode of UTRA. The main objectives of the document are to be a part of the full description of the UTRA Layer 1, and to serve as a basis for the drafting of the actual technical specification (TS).

ATTACHMENT A

Document 8/1 TEMP/218Rev1 ,Working Document Towards Preliminary Draft Recommendation Detailed Specifications of Radio Interfaces of IMT-2000, RSPC

Task Group 8/1
WG 5

DOCUMENT CATEGORY	:	DNR
SOURCE	:	WG 5
APPROVAL STATUS	:	Approved by WG5
DATE	:	8 June 1999
TO	:	TG 8/1 Plenary
ACTION	:	For consideration and approval to attach to the liaison
SCHEDULE	:	9 June 1999

WORKING DOCUMENT TOWARDS
PRELIMINARY DRAFT NEW RECOMMENDATION
DETAILED SPECIFICATIONS OF THE RADIO INTERFACES OF IMT-2000
(IMT.RSPC)[4]

1. Introduction

International Mobile Telecommunications-2000 (IMT-2000) are third generation mobile systems which are scheduled to start service around the year 2000 subject to market considerations. They will provide access, by means of one or more radio links, to a wide range of telecommunications services supported by the fixed telecommunication networks (e.g. PSTN/ISDN/IP), and to other services which are specific to mobile users.

A range of mobile terminal types is encompassed, linking to terrestrial and/or satellite based networks, and the terminals may be designed for mobile or fixed use.

Key features of IMT-2000 are:

– high degree of commonality of design worldwide;

4 Any reference to an external document in this Recommendation means that the external document is considered to be part of this Recommendation. However, such a reference does not give the external document the status, as a stand-alone document, of an ITU Recommendation. Any reference to an external document is accurate at the time of approval of this Recommendation. Since the external document may be revised, users of this Recommendation are advised to contact the source of the external document to determine whether the reference is still current. [However, TG 8/1 will maintain periodic update of the Recommendation and would co-ordinate with the external organisations to this effect.]

– compatibility of services within IMT-2000 and with the fixed networks;

– high quality;

– small terminal for worldwide use;

– worldwide roaming capability;

– capability for multimedia applications, and a wide range of services and terminals.

IMT-2000 are defined by a set of interdependent ITU Recommendations of which this one is a member.

[Draft New Recommendation IMT.RKEY] defines the key characteristics of the IMT-2000 radio interfaces, and represents the results of the evaluation process by the ITU-R on IMT-2000 radio interface proposals submitted to the ITU to a set of defined requirements.

This Recommendation forms the final part of the process of specifying the radio interfaces of IMT-2000, as defined in Recommendation M.1225. It identifies the detailed specifications for the IMT-2000 radio interfaces.

This Recommendation has been developed based on consideration of the evaluation results and consensus building, continuing from the IMT-2000 key characteristics defined in RKEY and recognising the need to minimise the number of different radio interfaces and maximise their commonality, while incorporating the best possible performance capabilities in the various IMT-2000 radio operating environments.

[Editor's Note: For satellite component, some text will be developed if necessary].

2. Scope

This Recommendation identifies the IMT-2000 terrestrial and satellite radio interface specifications, based on the key characteristics identified in Recommendation [IMT.RKEY] and output of activities outside ITU.

These radio interfaces support the features and design parameters of IMT-2000, including the capability to ensure worldwide compatibility and international roaming.

[Editor's Note: For satellite component, some additional text will be developed if necessary].

3. Related Recommendations

The existing IMT-2000 Recommendations that are considered to be of importance in the development of this particular Recommendation are as follows:

ITU-R M.687-2 – International Mobile Telecommunications 2000 (IMT-2000)

ITU-R M.816-1 – Framework for services supported on IMT-2000

ITU-R M.817 – IMT-2000 Network architectures

ITU-R M.818-1 – Satellite operations within IMT-2000

ITU-R M.819-2 – IMT-2000 for developing countries

ITU-R M.1034-1 – Requirements for the radio interface(s) for IMT-2000

ITU-R M.1035 – Framework for the radio interface(s) and radio sub-system functionality for IMT-2000

ITU-R M.1036-1 – Spectrum considerations for implementation of IMT-2000 in the bands 1 885–2 025 MHz and 2 110–2 200 MHz

ITU-R M.1167 – Framework for the satellite component of IMT-2000

ITU-R M.1224 – Vocabulary of Terms for IMT-2000

ITU-R M.1225 – Guidelines for evaluation of radio transmission technologies for IMT-2000

ITU-R M.1308 – Evolution of land mobile systems towards IMT-2000

ITU-R M.1311 – Framework for modularity and radio commonality within IMT-2000

ITU-R M.1343 – Essential Technical Requirements of mobile earth stations for global non-geostationary mobile-satellite service systems in the bands 1-3 GHz.

ITU-R M.[IMT.RKEY] - Key characteristics for the IMT-2000 radio interfaces

ITU-R SM.329 – Spurious emissions

ITU-T Q.1701 – Framework for IMT-2000 Networks

ITU-T Q.1711 – Functional Network Architecture for IMT-2000

ITU-T Q.1721 – Information flows for IMT-2000

ITU-T Q.1731 – Functional Specifications and requirements for IMT-2000 radio interface

Handbook on Principles and Approaches on Evolution to IMT-2000 – Volume 2 of Handbook on Land Mobile (including Wireless Access)

[Editor' Note: Additional recommendations may be added to the exiting list for satellite component if necessary].

4. Considerations

4.1 Radio Interfaces for IMT-2000

4.1.1 Introduction

[Editor's note: This section should contains general introduction to the "Radio Interfaces of IMT-2000", to be developed by TG 8/1].

Recommendation [IMT.RKEY] indicates that the IMT-2000 radio interface development process should comprise a single terrestrial standard encompassing two high level groupings; CDMA, TDMA, or a combination thereof. The CDMA grouping accommodates FDD direct sequence, FDD multi-carrier and TDD. The TDMA grouping accommodates FDD single carrier, FDD multi-carrier and TDD. These groupings satisfy the needs expressed by the global community.

Additionally, consistent with ITU-T Recommendation Q.1701, the IMT-2000 Recommendations should include the capability of operating with both of the major third generation core networks.

In line with this, the terrestrial IMT-2000 radio interfaces comprise two high level groupings, with a small number of discrete variants representing the various combinations thereof:

[Editor's note: the list below is an example at this stage - the final version will reflect any agreed incorporation of other technologies, e.g. TD-SCDMA, and discussions within OHG.]

Radio interface #1 (title of section 5.1)

Radio interface #2 (title of section 5.2)

Radio interface #3 (title of section 5.3)

Radio interface #x (title of section 5.x)

The terrestrial radio interfaces are described in detail in Section 5.

Recommendation ITU-R M.[RKEY] lists the key characteristics of six radio interfaces for the satellite component of IMT-2000. As highlighted in that Recommendation, due to the constraints on satellite system design and deployment, several satellite radio interfaces will be required for IMT-2000 (see Recommendation ITU-R M.1167 for further considerations).

A satellite system is severely resource limited (e.g., power and spectrum limited), its radio interfaces

are therefore specified primarily based on a whole system optimisation process, driven by the market needs and business objectives. It is generally not technically feasible or viable from a business point-of-view to have a radio interface common to satellite and terrestrial IMT-2000 components. Nevertheless, it is desirable to achieve as much commonality as possible with the terrestrial component when designing and developing a satellite system.

The strong dependency between technical design and business objectives of an IMT-2000 satellite system requires a large scope of flexibility in the satellite radio interface specifications. Future modifications and updates of these specifications may nevertheless be needed in order to adapt to changes in market demands, business objectives, technology developments, and operational needs, as well as to maximise the commonality with IMT-2000 terrestrial systems as appropriate.

The satellite radio interfaces are described in detail in Section 6.

4.1.2 Terrestrial component

[Editor's note: this section should contained general introduction to the terrestrial part, to be developed by TG 8/1: considerations related to terrestrial component, RKEY related introduction].

4.1.3 Satellite component

The terrestrial and satellite components are complementary, with the terrestrial component providing coverage over areas of land mass with population density considered to be large enough for economic provision of terrestrially based systems, and the satellite component providing service elsewhere by a virtually global coverage. The ubiquitous coverage of IMT-2000 can only therefore be realised using a combination of satellite and terrestrial radio interfaces. Since a satellite radio interface will provide this global coverage, international use is ensured, subject of course, to various regulatory processes in each country.

To fulfil the scope given in Section 2, this Recommendation describes those elements needed for worldwide compatibility of operation noting that international use is inherently ensured through the global coverage of a satellite system. This description includes consideration of all the satellite component interfaces.

Figure 4.1, which has been developed from Figure 1 of Recommendation ITU-R M.818, shows the various interfaces in the IMT-2000 satellite component here.

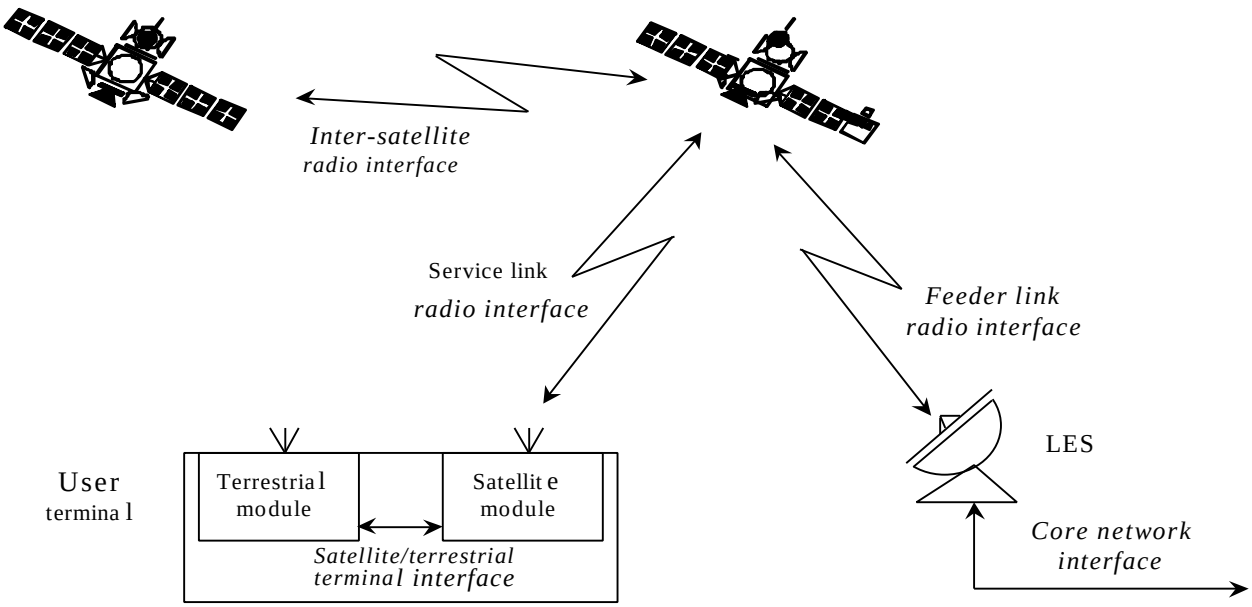


FIGURE 4.1

Interfaces in the satellite component of IMT-2000

N.B. This figure is based on Figure 1 of Recommendation ITU-R M.818

4.1.3.1 Radio Interfaces

4.1.3.1.1Service link interface

The service link interface is the radio interface between mobile earth stations and satellite stations.

4.1.3.1.2Feeder link interface

The feeder link interface is the radio interface between satellite stations and land earth stations. Feeder links are analogous to the radio interfaces used on “back-haul” fixed links to carry traffic to/from terrestrial base stations. When designing a satellite system, system specific implementations for feeder links result since:

i) Feeder links will operate in a number of frequency bands which are outside the bands identified for IMT-2000;

ii) Each individual feeder link presents its own issues, some of which are related to satellite system parameters, while others are related to frequency bands of operations.

The feeder link radio interface is therefore largely an intra-system specification, and can be viewed as an implementation issue, which has been addressed in Recommendation ITU-R M.1167 stating that “the radio interfaces between the satellites and the LESs (i.e. the feeder links) are not subject to IMT-2000 standardisation”.

4.1.3.1.3Inter-satellite link interface

The inter-satellite link interface is the interface between different satellite stations of the same system, noting that some systems may not implement this interface. The issues discussed above under feeder link interface are also applicable here, and the specification of this interface is therefore outside the scope of this Recommendation.

4.1.3.2 Other Interfaces

It is recognised that the core network and satellite/terrestrial terminal interfaces described below are not radio interfaces. However, it is also recognised that they have a direct impact on the design and specification of satellite radio interfaces and on the worldwide compatibility of operation. Other IMT-2000 Recommendations also make reference to these interfaces.

4.1.3.2.1Core Network Interface

The core network interface is the interface between land earth stations and terrestrial networks. Recommendation ITU-R M.1167 indicates that "the IMT-2000 satellite component interfaces with other networks in the same way as the IMT-2000 terrestrial component".

4.1.3.2.2Satellite/Terrestrial Terminal Interface

The satellite/terrestrial terminal interface is the interface between the satellite and terrestrial modules within a user terminal. For terminals incorporating both the satellite and terrestrial components of IMT-2000, there is a requirement to identify both how the two components operate together and any interfacing necessary between them.

For example, Recommendation ITU-R M.818 highlights "that a protocol be developed to establish whether a terrestrial or satellite component should be used for a given call". Recommendation ITU-R M.1167 also recognises that "an IMT-2000 user should not necessarily need to request the terminal to access the satellite or the terrestrial component" and also that "in order to facilitate roaming, it is important that the user can be reached by dialling a single number, regardless of whether the mobile terminal is accessing the terrestrial or the satellite component at the time".

4.2 Incorporation of Externally Developed Material

[Editor's note: this section contains information on the development process of IMT.RSPC. The inclusion of this section in IMT.RSPC is considered relevant since it will inform the reader on the issues discussed during the development of the Recommendation; therefore it will provide a rationale for the overall IMT.RSPC structure. This section is considered relevant for any reader; also SG8 will benefit from this section. If felt appropriate, this section can be removed from the Recommendation]

[Editor's note: the text in italic in the following may be revisited based on the responses fromSDOs and PPs to the liaison statement from TG8/1 on the issues addressed in this section]

[Editor's note: For satellite component, some text will be developed if necessary].

4.2.1 Description of the approach used for the development of IMT.RSPC

[Editor's note: the content of this section was agreed but the text could be editorially reworded in a form more suitable for a Recommendation]

Use of References

It was decided in ITU-R TG8/1 that neither the extreme of "all references" nor the extreme of "100% new or incorporated text" is an appropriate approach to complete RPSC within the established deadline. TG8/1 has decided that significant use of references of externally developed specifications is the most appropriate solution.

The following conditions apply with respect to the inclusion of references to documents of other

organizations in this Recommendation:

a) the other organization owner of the document:

- is a recognized and qualified body (e.g., accredited standardization organization);
- agreed to the use of the reference and to make the document and its revisions available to ITU membership[5] (a written statement should be obtained by the BR Secretariat in this regard before the Recommendation is formally approved);

b) the document referred to in the Recommendation:

- is a finalized and approved document by the owner organization;
- is clearly identified (type, title, number, version, date, degree of stability, etc.);
- has any IPR issue related to it clearly identified.

Radio Interface Specification Sections of RSPC (Sections 5.X)

TG 8/1 has decided that having the Radio Interface Sections as complete individual sections is the most appropriate presentation of the radio interface specification to ensure completeness.

Relationship of Material Developed by ITU-R TG8/1 and External Organisations

It has been decided by TG8/1 that the information contained in the radio interface section of RSPC (Sections 5.X) will have three parts: "Reference From External Material" part, "Extract From External Material" part and "ITU Created Material" part.

For the "Reference From External Material" portion of Section 5.X, using material included by referencing, it has been decided within TG8/1 that ITU-R TG8/1 should adopt the structure of the detailed specifications coming from external Standards Development Organisations (SDOs) and 3rd Generation Partnership Projects (3GPPs) and should not attempt to unilaterally edit this material.

For the "Extract From External Material" portion of Section 5.X, using extracted or incorporated material, TG8/1 has concluded that specifying the format and structure of this portion is appropriate and does not present a burden on the responding organizations to supply their inputs in accord with the TG8/1 established criteria.

The issues addressed include:

4.2.2 Approval of IMT.RSPC

The RSPC Recommendation is an ITU Recommendation even though the content of RSPC includes material that has been developed external to the ITU and included into RSPC either by direct incorporation or through the use of referencing of content. The approval of the "complete" Recommendation (incorporating ITU-R created material, incorporation of externally developed material, and the content included by use of external references) will follow the usual course of ITU-R Recommendation procedure. Change authority is addressed in section 4.2.5.

4.2.3 Overview of Copyright and Licensing Aspects, including ownership

Copyright and licensing procedures have been established as follows:

- *The "Complete" RSPC Recommendation Itself*

---

5 A full copy of the document and its revisions is to be made available to the ITU-R Secretariat.

The ITU has a combination of owned and assigned rights to copy, distribute, and sell to its members in the usual way. SDOs etc have assigned appropriate rights (not necessarily exclusive) to the ITU-R to copy, distribute and sell. The "complete" RSPC Recommendation (incorporating ITU-R-created material, incorporation of externally developed material, and the content included by use of external referencing) is made available to ITU members through the ITU itself.

- *The "ITU-R Created Material" Part*

The document contains ITU-R created material of which the ITU-R therefore owns the copyright. ITU-R can copy, distribute or sell as it may wish, and can if necessary assign similar rights to other entities.

- *The "Extract From External Material" Part*

The document contains directly incorporated externally generated material, for which the source SDO owns the copyright, and has assigned appropriate rights to the ITU-R to copy, distribute and sell.

- *The "Reference From External Material" Part*

The document contains some reference from external material for which the source SDO owns the copyright, and has assigned appropriate rights to the ITU-R to copy, distribute and sell; and which the SDO have agreed to make available to ITU members who are purchasing the Recommendation.

4.2.4 Maintenance of the RSPC Recommendation, including frequency of updates, ver control and approval procedures;

The ITU-R is responsible for maintenance of its Recommendations including all of RSPC. Relevant external organisations are requested to provide the ITU with periodic updates of their radio interface specifications as they relate to RSPC. The process for maintaining the RSPC after approval by ITU-R is dependent upon communication between the ITU-R and the appropriate 3GPPs and SDOs. It is recommended that the external organisations notify the ITU of updates to their specifications in a timely manner. Conversely the ITU should notify the external organisations of pertinent schedules within the ITU to ensure co-ordination with approval cycles of the ITU-R parties having ongoing responsibility for IMT-2000 Recommendations

Initially, it is believed that annual maintenance update interval should be followed for RSPC. It isrecognised that updates to each radio interface specification will be occurring independently, however updates of RSPC should be done as a single combined update by the ITU-R endeavouring to accommodate as well as possible the varying schedules among the external organisations. It is suggested that co-ordination by the external organisations among themselves on this issue be done to ensure uniformity of updates.

Timing of the first update release of RSPC should be negotiated between the ITU and the external organisations. It is suggested that the first update be released by the ITU-R no later than January 2001. Development of an on-going update schedule and procedure should ideally be worked out prior to final approval of RSPC within ITU-R. The lack of such a process on maintenance in place prior to final approvals of RSPC within the ITU-R should not delay such approval or release of RSPC, however it is urged that the maintenance process negotiations be addressed as a matter of urgency and concluded prior to the final approval timeline within the ITU-R.

4.2.5 Change authority

It should be noted that the content of RSPC being included in the "extract from external material" part and the "reference from external material" part is essentially "controlled" by the relevant externalorganisations but is an essential part of RSPC which is "controlled" by the ITU-R. A mechanism was defined, whereby through mutual agreement, certain portions of these two parts are edited and/or modified under request of the ITU-R (particularly during the completion and approval portion of the process) or by request by the relevant external organisations. Such a mechanism is appropriate for management of on going change authority for RSPC.

4.2.6 Publication and Distribution Aspects

Consistent with the outcomes of copyright, ownership, licensing, change authority and the maintenance process, the ITU and relevant external organization should mutually develop processes and mechanisms to ensure that publication and distribution of RSPC, and the related external materials is flexible enough to support a range of purchasing option. This range may include just the purchase of RSPC text (without the referenced material) or may extend through to a "one stop shopping" concept for purchase of not only RSPC text but also the materials that are incorporated equivalently by reference. Further purchase options may be to obtain either a particular "radio interface section" or getting all included "radio interface sections"

Investigation of electronic means such as "hyperlinks" may help ensure that references to external material are current and may be useful in the maintenance/update process and should be investigated.

4.2.7 Other comments relevant to the development of [IMT.RSPC].

[Editor's note: this section is a place-holder for additional issues to be addressed here]

[Editor's note: in the following, two separate sections are foreseen for the recommendations of the terrestrial and the satellite component respectively; this may be revisited when the material from SWG 5-4 will be available]

5. Recommendations (Terrestrial Component)[6]

The ITU Radio communication Assembly recommends that the radio interfaces given in sections 5.1 to 5.[N] should be those of the terrestrial component of IMT-2000. The description given in sections 5.1.3, 5.2.3, , , , and 5.N.3 is recommended as the complete definition of the radio interfaces of the terrestrial component of IMT-2000.

Unwanted emission limits are identified in section 7. These may be generic or specific to particular technologies. (See Documents 8-1/347, 348.)

[Editor's note: the sections below are examples at this stage - the final version will reflect any agreed incorporation of other technologies.]

5.1. Radio Interface No-1

5.1.1. Introduction

[Editor's note:

- ***This section corresponds to the "Original part (10%)".***
- ***This subsection 5.1 corresponds to materials supplied by CWTS, i.e. Doc. 8-1/407 for TD-SCDMA.***
- ***TG 8/1 will develop this part based on future contributions.***
- ***Terminology : ITU-R M.1224***

]

The TD-SCDMA radio interface is defined by a set of CWTS standards, the following sub-section list only those TD-SCDMA standards, dealing with lower layers of the IMT2000 air interface.

5.1.2. Overview of the Radio Interface

[Editor's note:
This section gives summary information of the radio interface. The complete definition of the radio interface is given in section 5.1.3.

- ***This section corresponds to the "Extracted part (20%)".***

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[6] ***Editor's Note: The current version intends to show the base line structure of this section. Each sub-section for detailed specification shall be revised further.***

- ***This section should have the structure and style defined by Annex-1 of 8-1/TEMP/213.***
- ***This section should include the Summary of Major Technical Parameters Table shown in the format defined by Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to develop this part using the style guide defined above.***
- ***Terminology : SDO's terminology***
- ***Input material : 8-1/407***

]

Based on smart antenna, synchronous CDMA and other new technologies, the TD-SCDMA technology is one of the most advanced Radio Transmission Technology (RTT). This section will describe the main features of TD-SCDMA, and the RTT of TD-SCDMA.

Synchronous CDMA:

The spreading sequences of multiple EUs CDMA signals are synchronized at the Node B. This feature is important in a CDMA system to guarantee the orthogonality property of the spreading codes and to virtually remove the co-channel interference from other code channels.

Smart antenna system:

A smart antenna system is formed by an array of multiple antennas and cohenrate transceivers and advanced digital signal processing algorithms. Instead of having a single fixed beam pattern from a traditional antenna, the smart antenna can effectively generate multiple beam patterns, each of which is pointed toward a particular EU. Such beam patterns can also adapt to follow any mobile EU. On the receive side, such a feature, i.e., spatially selective receive, can greatly increase the receive sensitivity, minimize the co-channel interference from co-channel EUs at different locations leading to higher capacity. It can also effectively incorporate multipath components to combat multipath fading. On the transmit side, intelligent spatial selective beamforming transmit can reduce the interference to other co-channel EUs and leading to higher capacity and dramatically reduce the output power requirement.

Software radio:

Software radio is a technology of realizing radio functions by digital signal processing (DSP) software. In the TD-SCDMA system, many functions traditionally implemented by RF or baseband analog circuits or ASICs are realized by state-of-the-art DSP algorithms. These functions include intelligent RF beamforming, on-board RF calibration, carrier recovery, and timing adjustment. The main advantages of the software radio include but not limited to: (1) it is flexible and programmable instead of hard wired; (2) it is repeatable and precise; (3) it never ages nor is it sensitive to environments; (4) it can implements sophisticated functions without requiring expensive hardware; (5) it can be low cost following the trend of forthcoming inexpensive powerful digital signal processors (DSPs).

Baton handover:

Based on the position information of all active UE, which is obtained by smart antenna and uplink synchronization technology, the handover procedure will be much precise and efficiency. The baton handover may combined with hard- and soft-handover, and operate between the Node B in the same system or between systems.

5.1.2.1. General description of Layer 1

5.1.2.1.1. Multiple Access

The access scheme is Direct-Sequence Code Division Multiple Access (DS-CDMA) with information spread over approximately 1.6 MHz bandwidth in TDD (Time Division Duplex) for operating with unpaired bands respectively. TDD mode is defined as follows:

> *TDD:A duplex method whereby forward link and reverse link transmissions are carried over same radio frequency by using synchronised time intervals. In the TDD, time slots in a physical channel are divided into transmission and reception part. Information on forward link and reverse link are transmitted reciprocally.*

In TD-SCDMA, there is TDMA component in the multiple access in addition to DS-CDMA. Thus the multiple access has been also often denoted as TDMA/CDMA due added TDMA nature.

The carrier separation is 1.6 MHz depending on the deployment scenario with 200 kHz carrier raster. A 10 ms radio frame is divided into 2*10 0.472 ms time slots. A physical channel is therefore defined as a code (or number of codes) and additionally in TDD mode the sequence of 0.472 ms time slots completes the definition of a physical channel. TD-SCDMA uses the 72-frame superframe structure. The resulting longer frame duration is under discussion (hyperframe, etc.)

The information rate of the channel varies with the symbol rate being derived from the 1.3542 Mchips/s chiprate and the spreading factor is from 1 to 16 for TDD uplink and downlink. Thus the respective modulation symbol rates vary from 1.3542 Msymbols/s to 422 symbols/s for TDD.

Furthermore, relaying between nodes can be used by means of Opportunity Driven Multiple Access (ODMA) in TDD mode.

5.1.2.1.2. Coding and interleaving

For the channel coding in TD-SCDMA two options are supported:

Convolutional coding, either 1/2 rate or 1/3 rate for packet data and services requiring quality level 10-3 or lower over the physical layer with forward error correction (FEC).
Turbo coding, for the services requiring higher than 10-3 quality level.
<Editor's note: Turbo coding method is under refinement >

5.1.2.1.3. Modulation and spreading

The modulation scheme is QPSK with root raised cosine pulse shaping with roll-of factor 0.22.

With CDMA nature the spreading (& scrambling) process is closely associated with modulation. In TD-SCDMA, different families of spreading codes are used to spread the signal.

For separating channels from same source, channelisation codes are used.
For separating different base station the following solutions are supported:
Gold codes in downlink Pilot, or
Scrambling codes with the length 16 used as defined in 105.
For separating different mobiles the following code families are defined:
Codes with period of 16 chips and midamble sequences of 144 chips length.
Gold codes in uplink pilot.

5.1.2.1.4. Transmission and reception

The TD-SCDMA frequency bands assumed for operation are:

1) Unpaired spectrum at 1900-1920 MHz and at 2010-2025 MHz for TDD mode operation, and used for both Node B and UE transmission;

(1895-1918.1 MHz band is occupied by PHS in Japan. 1850-1990 MHz band is occupied by PCS 1900 in U.S. 1900-1920MHz band is occupied by PHS and DECT in China.)

2) Another proposed unpaired spectrum at 1785-1805MHz for TDD mode operation.

Several power classes are being defined currently.

5.1.2.1.5. Physical layer procedures

There are several physical layer procedures involved in TD-SCDMA operation. Such a procedures covered by physical layer description are:

1) The power control, with both closed loop and open loop power control;
2) Handover measurements for handover within TD-SCDMA mode;
3) The measurement procedures for preparation for handover to GSM900/GSM1800;
4) The measurement procedures for preparation for handover to other TDD/FDD mode;
5) Random access processing;
6) Dynamic Channel Allocation (DCA) with TDD mode operation;
7) ODMA specific procedures such as probing;
8) Uplink synchronization;
9) Beamforming for both uplink and downlink (Smart antenna).

TABLE 5.1.2-1

Summary of Major Technical Parameters (RF Front-end)

The definition of the parameter is identical to “Description” of the key characteristic listed in the Draft New Recommendation ITU-R M.[IMT.RKEY].

Name of Parameter		List of proposed values	
		Mobile Station Value	**Base Station Value**
	Transmitter characteristics		
	Transmit power		
1.1	Power classes	The maximum power levels are expected to be (1.9GHz Band): Class I: 28dBm <EIRP < 33dBm Class II: 23dBm <EIRP < 30dBm Class III: 18dBm <EIRP < 27dBm Class IV: 13dBm <EIRP < 24dBm Class V: 8dBm <EIRP < 21dBm	The maximum power level is subject to constraints from regulatory agencies and based on the product design.
1.2	Dynamic range	The value depends on terminal power class and may be up to 80 dB.	30 dB
1.3	Power Control Steps	1.0 dB nominal	3.0 dB nominal
1.4	Frequency stability	0.1 ppm (locked to the system)	0.05 ppm
	Output RF spectrum emissions		

1.5	3 dB Bandwidth	1.36MHz	1.36MHz
1.6	Adjacent Channel Leakage power ratio	ACPR=30dBc Next ACPR=40dBc	ACPR=35dBc Next ACPR=45dBc
1.7	Out of band and Spurious emissions	Requirements will be based on applicable tables from ITU-R Recommendations SM.329 and from the ERC Recommendations that are currently under progress. Other regulatory bodies will also have recommendations to this requirement. 30 dBc in adjacent channel 40 dBc in alternate channel 50 dBc in second alternate channel -36 dBm in 30 kHz offset 1.8MHz -36dBm /1kHz (9kHz<f<150kHz) -36dBm /10kHz (150kHz<f<30MHz) -36dBm/100kHz (30MHz<f<1GHz) -30dBm/1MHz (1GHz<f<(fc-20)MHz) -30dBm/1MHz ((fc+20)MHz <f<11GHz) Notes NB: Necessary Bandwidth (1.6MHz) Fc: Center frequency of carrier	Requirements will be based on applicable tables from ITU-R Recommendations SM.329 and from the ERC Recommendations that are currently under progress. Other regulatory bodies will also have recommendations to this requirement. 35 dBc in adjacent channel 45 dBc in alternate channel 55 dBc in second alternate channel -36 dBm in 30 kHz offset 1.8MHz -36dBm /1kHz (9kHz<f<150kHz) -36dBm /10kHz (150kHz<f<30MHz) -36dBm/100kHz (30MHz<f<1GHz) -30dBm/1MHz (1GHz<f<(fc-20)MHz) -30dBm/1MHz ((fc+20)MHz <f<11GHz) Notes NB: Necessary Bandwidth (1.6MHz) Fc: Center frequency of carrier
1.8	Transmit linearity requirements	Linear transmitters required Linearity: 3 dB backoff with QPSK	Linear transmitters required Linearity: 5 dB backoff with QPSK
1.9	Standby RF output power	-47 dBm /1MHz in frequency band (f<1GHz) -40 dBm/1MHz in frequency band (f>1GHz)	-47 dBm /1MHz in frequency band (f<1GHz) -40 dBm/1MHz in frequency band (f>1GHz)
	Receiver characteristics		
2.1	Reference sensitivity	Based on NF ≤ 7dB -105dBm for 9.6kbps measurement channel	Based on NF ≤ 6dB -110dBm for 9.6kbps measurement channel.
2.2	Receiver dynamic range	The maximum value 80 dB	≥30dB
2.3	Intermodulation sensitivity	Linear receivers required; the 3 rd Order intercept point will be specified between -10 dBm and -15 dBm.	Linear receivers required; the 3 rd Order intercept point will be specified between 5 dBm and 10 dBm.
2.4	Spurious response and Blocking	In-band: -44dBm (over 15MHz offset) Out of band:-30dBm (2025-2070MHz and 2210-2225MHz)-15dBm (other frequency)	In-band: -40dBm (over 15MHz offset) Out of band:-30dBm (2025-2070MHz and 2210-2225MHz)-15dBm (other frequency)
2.5	Adjacent channel selectivity	The exact specifications are yet to be defined.	The exact specifications are yet to be defined.
	Other characteristics		

3.1	Diversity techniques	Time diversity: symbol interleaving, error coding and correction and multiple time slots receiver. Space diversity (optional MS antenna diversity) Code diversity Frequency diversity	Time diversity: symbol interleaving, error coding and correction and multiple time slots receiver. Space diversity (smart antenna) Code diversity Frequency diversity (Multi-carrier for 1.36Mcps)
3.2	Smart antennas	Not required, but accommodated	Supported both in the up- and down link beamforming through pilots.
3.3	Minimum operating bandwidth	TDD: 1900-1920, 2010-2025 MHz. Deployment of TDD in the 1920-1980 MHz band is an open item. Operating bandwidth: 1.6 MHz . 5 MHz	TDD: 1900-1920, 2010-2025 MHz. Deployment of TDD in the 1920-1980 MHz band is an open item. Operating bandwidth: 1.6 MHz . 5 MHz

TABLE 5.1.2-2

Summary of Major Technical Parameters (Baseband)

The definition of the parameter is identical to “Description” of the key characteristic listed in the Draft New Recommendation ITU-R M.[IMT.RKEY].

#	Names of the Parameter	Values
1	**Multiple access technique**	TD/CD/SDMA
2	**Chip rate**	1.3542 Mcps
3	**Frame structure**	*Number of time slots in a frame:* 10/ subframe subframe length: 5ms Frame Length:10 ms
4	**Variable length spreading factor**	1-16
5	**Inter base station asynchronous/ synchronous operation**	synchronous
6	**Inter-user synchronization**	used
7	**Handover**	• Hard handover • Inter- and intra-system handover (including between 2G and 3G) • Baton handover
8	**Channel coding and interleaving**	**Coding**: Convolutional code Turbo code **Interleaving**: Intra-frame MIL (10 ms)

		Inter-frame interleaving (20/40/80 ms)
9	**Random access**	• Packet Random Access channel • Preamble + Message
10	**Modulation** **(up-link and down-link)**	**Data modulation** UL and DL - QPSK, **Spreading modulation** UL and DL - QPSK,
11	**Channelization code** **(up-link and down-link)**	• Walsh code • Type of code: Real OVSF Code length: 1-16 chips (1 symbol)
12	**Scrambling code** **(up-link and down-link)**	Tbd
13	**Pilot structure**	• Time-multiplex dedicated pilot time slot
14	**Detection** **(up-link and down-link)**	• Detection: Coherent • Joint detection
15	**Power control** **(up-link and down-link)**	• Closed loop (dedicated channels) • Open loop (random-access channel)
16	**Variable data rate** **(up-link and down-link)**	Supported
17	**Diversity**	• Time diversity • Frequency diversity • Space diversity (smart antenna) • Code diversity • Antenna diversity with MRC • Multi-carrier transmission diversity (optional) • Selective transmit diversity or parallel trasnmit diversity for TDD mode • Handover diversity
18	**Adaptive equalizer**	Used
19	**Dynamic Channel Allocation**	Supported
20	**Duplexing Scheme**	TDD
21	**Multicarrier**	Not required but can be used in BS

5.1.3. Detail Specification of the Radio Interface

[Editor's note:

- ***This section corresponds to the "Reference part (70%)".***
- ***This section should include all references to ensure worldwide compatibility.***
- ***Description style of this section should be based on Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to review and update this part.***
- ***Terminology : SDO's terminology which should also be referenced in this part***
- ***Input material : 8-1/406 (CWTS)***

]

5.1.3.1. Detailed Specifications

The most recent versions of the TD-SCDMA series of draft specifications as developed within the CWTS WG1. Some of them were approved or endorsed during the WG1#2 meeting.

You can find detailed specifications in www.CWTS.org

The specification for a TD-SCDMA mobile system shall be organized as 6 series as follows:

00x series: General description of the radio interface protocol architecture and the functions ;

10x series: Physical layer specifications;

20x series: Layer 2 signaling;

30x series: Layer 3 signaling;

40x series: RF specifications for both BTS and UE;

50x series: Conformance testing.

5.1.3.2 Documentation list

001 Radio Interface Protocol Architecture
The present document shall provide an overview description of the TD-SCDMA radio interface protocol architecture.

002 Services provided by the Physical Layer
The present document is a technical specification of the services provided by the physical layer to upper layers.

003 UE functions and Interlayer Procedures in Connected Mode
This document defines the UE States and the principal tasks undertaken by the UE when in connected mode. It includes informative interlayer procedures for the UE to perform the required tasks.

This document attempts to provide a comprehensive overview of the different states and transitions within the connected mode of a TD-SCDMA terminal. The applicable set of states for a given service may be a subset of the total set of possible states.

In addition to describing the states and related transitions, this document describes all procedures that assign, reconfigure and release radio resources. Included are, e.g., procedures for transitions between different states and substates, handovers and measurement reports. The emphasis is on showing the combined usage of both peer-to-peer messages and interlayer primitives to illustrate the functional split between the layers, as well as the combination of elementary procedures for selected examples.

004 UE procedures in Idle Mode
The present document shall describe the overall idle mode processes for the UE and the functional division between the non-access stratum and access stratum in the UE. The UE is in idle mode when the connection of the UE is closed on all layers, e.g., there is neither a MM connection nor an RRC connection.

This document also presents examples of interlayer procedures related to the idle mode processes, and describes idle mode functionality of a dual mode TD-SCDMA/GSM UE.

101 Physical layer – general description
This specification describes the documents being produced by CWTS and first complete versions expected to be available by end of 1999. This specification gives also general description of the physical layer of the TD-SCDMA air interface.

102 User Equipment physical layer capabilities
This specification describes the physical layer capabilities of the UE.

103 Physical channels and mapping of transport channels onto physical channels

This specification describes the characteristics of the Layer 1 transport channels and physical channels in the TD-SCDMA mode of CWTS. The main objectives of the document are to be a part of the full description of the TD-SCDMA Layer 1, and to serve as a basis for the drafting of the actual technical specification (TS).

104 Multiplexing and channel coding

This specification describes the documents being produced by the CWTS and first complete versions expected to be available by end of 1999. This specification describes the characteristics of the Layer 1 multiplexing and channel coding in the TD-SCDMA mode of CWTS.

105 Spreading and modulation

The present document describes spreading and modulation for the TD-SCDMA mode of CWTS.

106 Physical layer procedures description

This document specifies and establishes the characteristics of the physicals layer procedures in the TD-SCDMA mode of CWTS.

107 Physical layer - Measurements

This document describes the measurements done at the UE and network in order to support operation in idle mode and connected mode.

As far as the measurements in idle mode are concerned, this TS described the following:

- measurements for the cell selection for a UE supporting TD-SCDMA
- measurements for cell reselection for a UE camping on an TD-SCDMA cell

As far as the measurements in connected mode are concerned, this TS describes measurements when the UE is connected to a TDD cell for the cell connected state. This TS provides the minimum requirements for the UE and networks. Some explanatory text is also contained in the TS but it is more of a descriptive nature than normative.

As far as the measurements for the handover preparation, this specification defines the requirements to the UE and network, as well as parametrisation rules for the compressed mode in order to accommodate idle periods.

201 Medium Access Control (MAC) Protocol Specification

The scope of this description is the specification of the MAC protocol.

The following lists the contents for the specification of the MAC protocol:

1. list of procedures
2. logical flow diagrams for normal procedures
3. logical description of message
4. principles for error handling
5. some exceptional procedures which are felt criteria
6. It should, as far as possible, have the same format and outline as the final specification
7. exact message format

8. all scenarios

401 UE Radio transmission and reception
This document establishes the minimum RF characteristics of the TD-SCDMA mode of CWTS for the User Equipment (UE).

402 BTS Radio transmission and reception
This document establishes the minimum RF characteristics of TD-SCDMA mode of CWTS for the BTS.

403 RF parameters in support of Radio Resource Management
This Technical Specification shall describe RF parameters and Requirements for the Radio Resource Management.

404 UE and BTS EMC
This Technical Specification shall describe RF EMC parameters and Requirements for both UE and BTS in TD-SCDMA mode of CWTS.

501 BTS conformance testing

502 UE conformance testing
Both these specifications describe the documents being produced by the CWTS and first complete versions expected to be available by first half of 2000.

5.2. Radio Interface No-2

5.2.1. Introduction

[Editor's note:
- ***This section corresponds to the "Original part (10%)".***
- ***This subsection 5.2 corresponds to materials supplied by ETSI, i.e. Doc. 8-1/341, 8-1/342, and 8-1/343 for EP DECT.***
- ***TG 8/1 will develop this part based on future contributions.***
- ***Terminology : ITU-R M.1224***

]

[NOTE - General introduction to the DECT radio interface and its characteristics, to be developed by TG 8/1. Subsequent sub-sections to be developed by external SDOs and ETSI EP DECT.]

The Digital Enhanced Cordless Telecommunications (DECT) Radio Interface is defined by a set of ETSI standards. A high level description of the DECT features and how the ETSI standards for DECT interrelate to the different applications can be found in the ETSI Technical Report TR 101 178 'A high level guide to the DECT standardization'.

The following sub-sections list only those DECT standards, which are relevant for this ITU-R recommendation, dealing with the lower layers of the IMT-2000 air interface.

5.2.2. Overview of the Radio Interface

[Editor's note:
This section gives summary information of the radio interface. The complete definition of the radio interface is given in section 5.2.3.
- ***This section corresponds to the "Extracted part (20%)".***
- ***This section should have the structure and style defined by Annex-1 of 8-1/TEMP/213.***

- ***This section should include the Summary of Major Technical Parameters Table shown in the format defined by Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to develop this part using the style guide defined above.***
- ***Terminology : SDO's terminology***

]

DECT is a general radio access technology for wireless telecommunications. It is a high capacity digital technology, for wide cell radii ranging from a few meters to several kilometres, depending on application and environment. It provides telephony quality voice services, and a broad range of data services, including Integrated Services Digital Network (ISDN) and packet data. It can be effectively implemented in a range from simple residential cordless telephones up to large systems providing a wide range of telecommunications services, including Fixed Wireless Access (FWA).

5.2.2.1. General access technology

DECT provides a comprehensive set of protocols which provide the flexibility to interwork between numerous different applications and networks. Thus a local and/or public network is not part of the DECT specification. Figure 5.2.4-1 illustrates this.

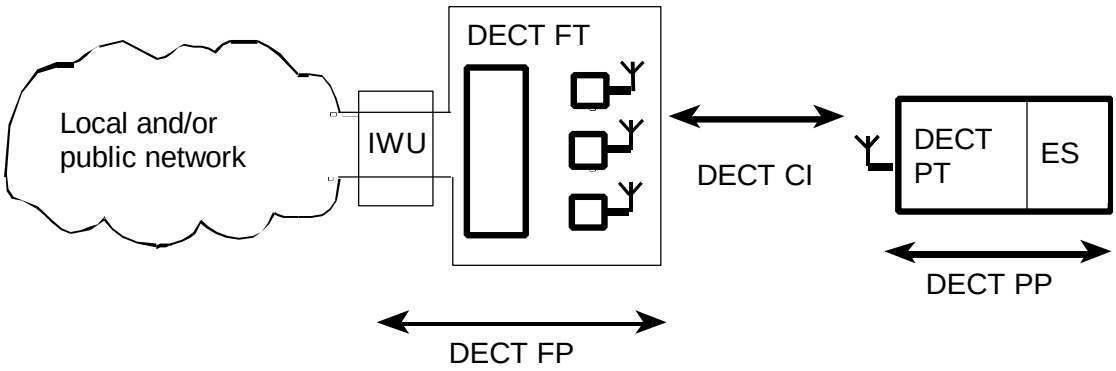


FIGURE 5.2.2-1 THE DECT COMMON INTERFACE (CI)

DECT covers, in principle, only the air interface between the DECT Fixed Part (FP) and Portable Part (PP). The Interworking Unit (IWU) between a network and the DECT Fixed radio Termination (FT) is network specific and is not part of the DECT CI specification. Similarly, the End System (ES), the application(s) in a DECT PP is also excluded. The IWU and end system are only specified as regards general end-to-end compatibility requirements e.g. on speech transmission. The IWU and ES are also subject to general attachment requirements for the relevant public network, e.g. the PSTN/ISDN.

NOTE: An ES depends on the application supported in a PP. For a speech telephony application the ES may be a microphone, speaker, keyboard and display. The ES could equally well be a serial computer port, a fax machine or whatever the application requires.

For each specific network, local or global, the specific services and features of that network are made available via the DECT air interface to the users of DECT PPs/handsets. Except for cordless capability and mobility, DECT does not offer a specific service; it is transparent to the services provided by the connected network.

Thus the DECT CI standard is, and has to be, a tool box with protocols and messages from which a selection is made to access any specific network, and to provide means for market success for simple residential systems as well as for much more complex systems e.g. office ISDN services.

The detailed requirements that have governed the DECT standardisation efforts are provided by the ETR 043, "DECT Common Interface Services and Facilities Requirements Specification", where one requirement is flexibility for additions and evolutionary applications.

The DECT CI standard has a layered structure and is contained in EN 300 175, Parts 1 to 8. It contains a complete set of requirements, procedures and messages. The messages also contain codes that are reserved for evolutionary applications and proprietary extensions.

The DECT authentication algorithm and the DECT encryption algorithm are not part of the CI standard, but are obtained from ETSI through a special legal procedure.

The administration of global unique DECT identity codes for manufacturing, installation and public operation are also handled by ETSI.

5.2.2.2. Coexistence of uncoordinated installations on a common frequency band

The mandatory Instant Dynamic Channel Selection messages and procedures provide effective coexistence of uncoordinated private and public systems on the common designated DECT frequency band and avoids any need for traditional frequency planning. Each device has access to all channels (time/frequency combinations). When a connection is needed, the channel is selected, that at that instant and at that locality, is least interfered of all the common access channels. This avoids any need for traditional frequency planning, and greatly simplifies the installations. This procedure also provides higher and higher capacity by closer and closer base station installation, while maintaining a high radio link quality. Not needing to split the frequency resource between different services or users gives a very efficient use of the allocated spectrum. There is a large spectrum efficiency gain in sharing spectrum between applications and between operators.

Much unique knowledge and experience is available in the DECT community on the subject of sharing spectrum between uncoordinated installations. Information on this subject has been collected in an ETSI Technical Report, TR 101 310, which describes configurations for typical DECT applications and relevant mixes of these, including residential, office, public and RLL applications, and the traffic capacity is analysed, mainly by advanced simulations.

5.2.2.3. Access to different systems by the same PP

Each DECT system, FP, has a broadcasted globally unique Access Rights Identity, ARI. To each ARI are linked the available services, the related protocols and when required e.g. a cipher-key and/or authentication-key. For each service suitable protocols have been selected from the CI tool box to efficiently provide these services.

Similarly each DECT PP (handset) has one or more Portable Access Rights Keys, PARKs. One PARK relates to one FP or a group of FPs belonging to the same operator. To each PARK are linked the corresponding FP ARIs, related services and protocols, and when required e.g. a ciphering-key and/or authentication-key.

Thus the same PP will have access several different types of systems, if equipped with the relevant PARKs and associated protocols. Thus, it is basically not a common protocol for all systems that provide inter system roaming, but it is that the PP is equipped with access rights and related protocols to the wanted systems. A detailed description of the flexible and powerful DECT identity provisions are found in part 6 of the DECT CI standard.

5.2.2.4. Access to several applications through the same base station

DECT also provides the means for sharing base stations or systems between different operators or applications, e.g. hosting private user groups in a large public system, Providing public access through a privately owned system, or hosting public access to several service providers in one system owned by one of the service providers.

5.2.2.5. The Summary of Major Technical Parameters

The following table lists some of major technical parameters.

TABLE 5.2.2-1

Summary of Major Technical Parameters

3 dB Bandwidth	1 MHz
Multiple access technique	TDMA
Duplexing Scheme	TDD
Modulation	GFSK, DBPSK, DQPS, D8PSK
Frame Length	10 ms
Number of time slots in a frame	12, 24, 48
Random access	Instant dynamic channel selection for every set-up using the least interfered channel measured at the mobile
Dynamic Channel Allocation	Supported

5.2.3. Detail Specification of the Radio Interface

[Editor's note:

- ***This section corresponds to the "Reference part (70%)".***
- ***This section should include all references to ensure worldwide compatibility.***
- ***Description style of this section should be based on Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to review and update this part.***
- ***Terminology : SDO's terminology which should also be referenced in this part***
- ***Input material : 341, 342, 343 (DECT)***

]

The following sub-sections list only those DECT standards, which are relevant for this ITU-R recommendation, dealing with the lower layers of the IMT-2000 air interface.

5.2.3.1. Physical Layer

The ETSI standard EN 300 175 - 2 'DECT Common Interface Part 2: Physical Layer' specifies the physical channel arrangements. DECT physical channels are radio communication paths between two radio end points. A radio end point is either part of the fixed infrastructure or a Portable Part (PP), typically a handset. The assignment of one or more particular physical channels to a call is the task of higher layers.

The Physical Layer (PHL) interfaces with the Medium Access Control (MAC) layer, and with the Lower Layer Management Entity (LLME). On the other side of the PHL is the radio transmission medium which has to be shared extensively with other DECT users and a wide variety of other radio services. The tasks of the PHL can be grouped into five categories:

a) to modulate and demodulate radio carriers with a bit stream of a defined rate to create a radio frequency channel;
b) to acquire and maintain bit and slot synchronization between transmitters and receivers;
c) to transmit or receive a defined number of bits at a requested time and on a particular frequency;
d) to add and remove the synchronization field and the Z-field used for rear end collision detection;

e) to observe the radio environment to report signal strengths.

5.2.3.2. MAC Layer

The ETSI standard EN 300 175 - 3 'DECT Common Interface Part 3: Medium Access Control Layer' specifies the layer 2a of the DECT protocol stack.

It specifies three groups of MAC services:

the broadcast message control service,
the connectionless message control service and
the multi-bearer control service.
It also specifies the logical channels that are used by the above mentioned services, and how they are multiplexed and mapped into the Service Data Units (SDUs) that are exchanged with the Physical Layer (PHL).

5.2.3.3. Conformance Requirements

The ETSI standard EN 300 176 - 1 'DECT Approval test specification, Part1: Radio' specifies radio tests for DECT equipment. It covers testing of radio frequency parameters, security elements and those DECT protocols that facilitate the radio frequency tests and efficient use of frequency spectrum. The aims of this document are to ensure efficient use of frequency spectrum, that no harm done to other radio networks and services and that no harm done to other DECT equipment or its services.

5.3. Radio interface No. 3

5.3.1. Introduction

[Editor's note:

- ***This section corresponds to the "Original part (10%)".***
- ***This subsection 5-3 corresponds to materials supplied by TIA TR45.3, i.e. Doc. 8-1/376, and 8-1/414.***
- ***TG 8/1 will develop this part based on future contributions.***
- ***Terminology : ITU-R M.1224***

]

A complete set of specifications is being developed for the UWC-136 radio interface. This standards specification is to be contained in TIA/EIA-136.

TIA TR-45.3 believes that the complete radio interface from L3 Radio Resource and Mobility Management to physical layer should be handled in TG8/1.

5.3.2. Overview of the Radio Interface

[Editor's note:
This section gives summary information of the radio interface. The complete definition of the radio interface is given in section 5.3.3.

- ***This section corresponds to the "Extracted part (20%)".***
- ***This section should have the structure and style defined by Annex-1 of 8-1/TEMP/213.***
- ***This section should include the Summary of Major Technical Parameters Table shown in the format defined by Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to develop this part using the style guide defined above.***
- ***Terminology : SDO's terminology***

]

The "Universal Wireless Communications 136" (UWC-136) Radio Interface was designed to provide a 136 based Radio Transmission Technology that meets ITU-R's requirements for IMT-2000. UWC-136 maintains the TDMA community's philosophy of evolution from 1st to 3rd generation systems while addressing the specific desires and goals of the TDMA community for a 3rd generation system.

UWC-136 is an attractive and powerful evolutionary step for 136. The technology presented provides for future IMTS services to existing operators, as well as providing new operators competitive

features, services and technology. Additionally, the technology provides these same features and services in other bands around the world where regulatory approval has been granted to offer such services, primarily in the 450, 800 and 1900 MHz bands.

UWC-136 meets IMT-2000 objectives via modulation enhancement to the existing 30 kHz 136 channel (136+) and defines complementary Wider band TDMA carriers (136 HS) to address those services which are not possible on the 30 kHz carrier. Together, the existing deployed system (136), the enhanced 30 kHz 136 carrier (136+) and the complementary Wider band TDMA carriers (200kHz and 1.6MHz) to address the High Speed (136 HS) aspect of IMT-2000 are referred to as UWC-136.

Table 5.3.2-1 Summary of Major Technical Parameters

Parameter	"Value"	Reference to SDOs/3GPPs Specifications

5.3.3. Detail Specification of the Radio Interface

[Editor's note:

- ***This section corresponds to the "Reference part (70%)".***
- ***This section should include all references to ensure worldwide compatibility.***
- ***Description style of this section should be based on Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to review and update this part.***
- ***Terminology : SDO's terminology which should also be referenced in this part***
- ***Input material : 8-1/376, 414***

]

List of Parts of TIA/EIA-136 from 136-000

Part TIA/EIA-136-000 contains a list of all the parts that make up the complete TIA/EIA-136 specification. The current list of those parts is:

11.3 TIA/EIA-136-000	**List of Parts**
11.4 TIA/EIA-136-0XX	**Miscellaneous Information**
11.3 TIA/EIA-136-005	Introduction, Identification and Semi-permanent Memory
11.4 TIA/EIA-136-010	Optional Mobile Station Facilities
11.5 TIA/EIA-136-020	SOC, BSMC, and Other Code Assignments
11.5 TIA/EIA-136-1XX	**Channels**
11.6 TIA/EIA-136-100	Introduction to Channels
11.7 TIA/EIA-136-110	RF Channel Assignments
11.8 TIA/EIA-136-121	Digital Control Channel Layer 1
11.9 TIA/EIA-136-122	Digital Control Channel Layer 2
11.10 TIA/EIA-136-123	Digital Control Channel Layer 3
11.11 TIA/EIA-136-131	Digital Traffic Channel Layer 1
11.12 TIA/EIA-136-132	Digital Traffic Channel Layer 2
11.13 TIA/EIA-136-133	Digital Traffic Channel Layer 3
11.14 TIA/EIA-136-140	Analog Control Channel
11.15 TIA/EIA-136-150	Analog Voice Channel

11.6 TIA/EIA-136-2XX	**Minimum Performance**
11.16 TIA/EIA-136-210	ACELP Minimu m Performance
11.17 TIA/EIA-136-220	VSELP Minimum Performance
11.18 TIA/EIA-136-230	US1 Minimum Performance
11.19 TIA/EIA-136-270	Mobile Stations Minimum Performance
11.20 TIA/EIA-136-280	Base Stations Minimum Performance
11.7 TIA/EIA-136-3XX	**Data Services**
11.21 TIA/EIA-136-310	Radio Link Protocol-1
11.22 TIA/EIA-136-320	Radio Link Protocol-2
11.23 TIA/EIA-136-330	Packet-Data Service - Overview
11.24 TIA/EIA-136-331	Packet-Data Service - Physical Layer
11.25 TIA/EIA-136-332	Packet-Data Service - Medium Access Control
11.26 TIA/EIA-136-333	Packet-Data Service - Logical-Link Control
11.27 TIA/EIA-136-334	Packet-Data Service - Subnetwork-Dependent Convergence Protocol
11.28 TIA/EIA-136-335	Packet-Data Service - Radio -Resource Management
11.29 TIA/EIA-136-336	Packet-Data Service - Mobility Management
11.30 TIA/EIA-136-337	Packet-Data Service - Tunneling of Signaling Messages
11.31 TIA/EIA-136-340	Packet-Data Service - 136HS Outdoor Overview
11.32 TIA/EIA-136-341	Packet-Data Service - 136HS Outdoor Physical Layer
11.33 TIA/EIA-136-342	Packet-Data Service - 136HS Outdoor MAC Layer
11.34 TIA/EIA-136-360	Packet-Data Service - 136HS Indoor Overview
11.35 TIA/EIA-136-361	Packet-Data Service - 136HS Indoor Physical Layer
11.36 TIA/EIA-136-362	Packet-Data Service - 136HS Indoor MAC Layer
11.37 TIA/EIA-136-350	Data-Service Control
11.8 TIA/EIA-136-4XX	**Voice Coders**
11.38 TIA/EIA-136-410	ACELP
11.39 TIA/EIA-136-420	VSELP
11.40 TIA/EIA-136-430	US1
11.9 TIA/EIA-136-5XX	**Security**
11.41 TIA/EIA-136-510	Authentication, Encryptio n of Signaling Information/ User Data, and Privacy
11.42 TIA/EIA-136-511	Messages Subject to Encryption
11.10 TIA/EIA-136-6XX	**Teleservice Transport**
11.43 TIA/EIA-136-610	R-DATA/SMDPP Transport
11.44 TIA/EIA-136-620	Teleservice Segmentation and Reassembly (TSAR)
11.45 TIA/EIA-136-630	Broadcast Teleservice Transport - Broadcast Air-Interface Transport Service (BATS)
11.11 TIA/EIA-136-7XX	**Teleservices**
11.46 TIA/EIA-136-700	Introduction to Teleservices
11.47 TIA/EIA-136-710	Short Message Service Cellular Messaging Teleservice
11.48 TIA/EIA-136-720	Over-the-Air Activation Teleservice (OATS)
11.49 TIA/EIA-136-730	Over-the-Air Programming Teleservice (OPTS)
11.50 TIA/EIA-136-750	General UDP Transport Service (GUTS)
11.12 TIA/EIA-136-9XX	**Annexes/Appendices**
11.51 TIA/EIA-136-900	Introduction
11.52 TIA/EIA-136-905	Normative Information
11.53 TIA/EIA-136-910	Informative Information
11.54 TIA/EIA-136-932	Packet Data Service - Stage 2 Description
11.55 TIA/EIA-136-933	Packet Data Service - Fixed Coding MAC Textual Description

TIA/EIA-136-340, 136 HS Outdoor Overview

This part provides an overview of the 200 KHz 136HS Outdoor packet data service. An overview of the network reference model, base station and mobile station protocols, channel types, and options is provided.

TIA/EIA-136-341, 136 HS Outdoor Physical Layer

This part provides the 200 KHz 136HS physical layer specification including slot formats, frame structure, modulation, and channel coding.

TIA/EIA-136-342, 136 HS Outdoor MAC Layer

This part provides the 200 KHz 136HS packet data MAC layer specification including MAC PDUs, transaction management, error recovery, and random access control.

TIA/EIA-136-360, 136 HS Indoor Overview

This part provides an overview of the 1.6 MHz 136HS Indoor packet data service. An overview of the network reference model, base station and mobile station protocols, channel types, and options is provided.

TIA/EIA-136-361, 136 HS Indoor Physical Layer

This part provides the 1.6 MHz 136HS physical layer specification including slot formats, frame structure, modulation, and channel coding.

TIA/EIA-136-362, 136 HS Indoor MAC Layer

This part provides the 1.6 MHz 136HS packet data MAC layer specification including MAC PDUs, transaction management, error recovery, and random access control.

5.4. Radio interface No.4

5.4.1. Introduction

[Editor's note:

- ***This section corresponds to the "Original part (10%)".***
- ***This subsection 5-4 corresponds to materials supplied by SDOs related to 3GPP, i.e. Doc. 8-1/372 (Annex).***
- ***TG 8/1 will develop this part based on input contributions.***
- ***Terminology : ITU-R M.1224***

]

Within the 3GPP partnership project 3GPP TSG RAN is developing the Universal Terrestrial Radio Access Network (UTRAN), with a complete set of Specifications for the Radio Access Network. This set of specification includes signalling protocols between nodes located at the network side as well as signalling over the radio interface. The sets of specifications should be relevant for TG 8/1 since they describe the physical layers up to the radio resource management layer which are seen as radio technology dependent parts.

This description of the 3GPP radio interface includes parts of the "physical layer - general description" and "Radio interface protocol architecture". It is recognised that not all specifications listed in this document may be relevant to ITU-R TG 8/1, some may be more relevant to the work of ITU-T SG 11.

5.4.2. Overview of the Radio Interface

[Editor's note:
This section gives summary information of the radio interface. The complete definition of the radio interface is given in section 5.4.3.

- ***This section corresponds to the "Extracted part (20%)".***
- ***This section should have the structure and style defined by Annex-1 of 8-1/TEMP/213.***
- ***This section should include the Summary of Major Technical Parameters Table shown in the format defined by Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to develop this part using the style guide defined above.***
- ***Terminology : SDO's terminology***

]

Table 5.4.2-1

Summary of Major Technical Parameters

Parameter	"Value"	Reference to SDOs/3GPPs Specifications

5.4.3. Detail Specification of the Radio Interface

[Editor's note:

- ***This section corresponds to the "Reference part (70%)".***
- ***This section should include all references to ensure worldwide compatibility.***
- ***Description style of this section should be based on Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to review and update this part.***
- ***Terminology : SDO's terminology which should also be referenced in this part***
- ***Input material : 8-1/372 (Annex)***

]

5.4.3.1. Detailed Specifications

The most recent versions of the 25.200, 25.300, and 25.100 series of draft specifications as developed within the 3GPP RAN TSG. Some of them were approved or endorsed during the RAN TSG#3 meeting.

[www.3gpp.org/Documents/TSG_RAN/TSG_RAN/TSGR_03/Docs/pdfs

25.200 series: 233, 234 , 289, 236, 237, 238, 290, 240, 241, 242

25.300 series: 259, 260, 261, 262, 263, 264, 265

25.100 series: 276, 277, 278, 279, 280, 281]

5.4.3.2. 25.200 Series

The 25.200 series specifies Um point for the 3G mobile system. This series defines the minimum

level of specifications required for basic connections in terms of mutual connectivity and compatibility.

25.201 Physical layer - General description
This specification describes the documents being produced by the 3GPP TSG RAN WG 1and first complete versions expected to be available by end of 1999. This specification gives also general description of the physical layer of the UTRA air interface.

25.211 Physical channels and mapping of transport channels onto physical channels (FDD)
This specification describes the characteristics of the Layer 1 transport channels and physicals channels in the FDD mode of UTRA. The main objectives of the document are to be a part of the full description of the UTRA Layer 1, and to serve as a basis for the drafting of the actual technical specification (TS).

25.212 Multiplexing and channel coding (FDD)
This specification describes the documents being produced by the 3GPP TSG RAN WG 1 and first complete versions expected to be available by end of 1999. This specification describes the characteristics of the Layer 1 multiplexing and channel coding in the FDD mode of UTRA.

The 25.200 series specifies Um point for the 3G mobile system. This series defines the minimum level of specifications required for basic connections in terms of mutual connectivity and compatibility.

25.213 Spreading and modulation (FDD)
The present document describes spreading and modulation for UTRA Physical Layer FDD mode.

25.214 Physical layer procedures (FDD)
This document specifies and establishes the characteristics of the physicals layer procedures in the FDD mode of UTRA.

25.221 Physical channels and mapping of transport channels onto physical channels (TDD)

25.222 Multiplexing and channel coding (TDD)
This 3GPP Report describes multiplexing, channel coding and interleaving for UTRA Physical Layer TDD mode.

Text without revision marks has been approved in the previous TSG-RAN WG 1 meetings, while text with revision marks is subject to approval.

25.223 Spreading and modulation (TDD)
This document establishes the characteristics of the spreading and modulation in the TDD mode. The main objectives of the document are to be a part of the full description of the Layer 1, and to serve as a basis for the drafting of the actual technical specification (TS).

25.224 Physical layer procedures description (TDD)

25.231 Physical layer - Measurements
This 3GPP Telecommunication Specification TS contains the description of the measurements done at the UE and network in order to support operation in idle mode and connected mode.

As far as the measurements in idle mode are concerned, this TS described the following:

- measurements for the cell selection for a UE supporting FDD and/or TDD;
- measurements for cell reselection for a UE camping on an FDD or TDD cell.

As far as the measurements in connected mode are concerned, this TS describes measurements when the UE is connected to an FDD cell or cells (in Soft handover) or a TDD cell for the cell connected state (see reference [8]), or camping on an FDD cell for the UTRA connected state. This TS provides the minimum requirements for the UE and networks. Some explanatory text is also contained in the TS but it is more of a descriptive nature than normative.

As far as the measurements for the handover preparation, this specification defines the requirements to the UE and UTRAN, as well as parametrisation rules for the compressed mode in order to accommodate idle periods. This latter aspects may need to be moved to some other specifications. The description of the compressed mode (different type of compressed frames define by the compressed mode A/B, the number if idle slots and the position of such transmission gap) is outside the scope of this specification and is covered in 25.211 and 25.212.

5.4.3.3. 25.300 Series

25.301 Radio Interface Protocol Architecture
The present document shall provide an overview and overall description of the UE-UTRAN radio interface protocol architecture as agreed within the 3GPP TSG RAN working group 2. Details of the radio protocols will be specified in companion documents.

25.302 Services provided by the Physical Layer
The present document is a technical specification of the services provided by the physical layer of UTRA to upper layers.

25.303 UE functions and Interlayer Procedures in Connected Mode
This document defines the UE States and the principal tasks undertaken by the UE when in Connected Mode. It includes informative interlayer procedures for the UE to perform the required tasks.

This document attempts to provide a comprehensive overview of the different states and transitions within the connected mode of a UMTS terminal. The applicable set of states for a given service may be a subset of the total set of possible states.

In addition to describing the states and related transitions, this document describes all procedures that assign, reconfigure and release radio resources. Included are e.g. procedures for transitions between different states and substates, handovers and measurement reports. The emphasis is on showing the combined usage of both peer-to-peer messages and interlayer primitives to illustrate the functional split between the layers, as well as the combination of elementary procedures for selected examples. The peer-to-peer elementary procedure descriptions are described in the related protocol descriptions /1, 2, 3/ and they are thus not within the scope of this document.

25.304 UE procedures in Idle Mode
The present document shall describe the overall idle mode process for the UE and the functional division between the non-access stratum and access stratum in the UE. The UE is in idle mode when the connection of the UE is closed on all layers, e.g. there is neither an MM connection nor an RRC connection.

This document presents also examples of inter-layer procedures related to the idle mode processes and describes idle mode functionality of a dual mode UMTS/GSM UE.

25.321 Medium Access Control (MAC) Protocol Specification
The scope of this description is the specification of the MAC protocol.

The following lists the contents for the specification of the MAC protocol:

1) list of procedures;
2) logical flow diagrams for normal procedures;
3) logical description of message;
4) principles for error handling;
5) some exceptional procedures which are felt criteria;
6) it should, as far as possible, have the same format and outline as the final specification;
7) exact message format;
8) all scenarios.

25.322 Radio Link Control (RLC) Protocol Specification
The scope of this description is to describe the RLC protocol. A description document is intermediate between a stage 2 document and a protocol specification. Once completed, it should be sufficient for manufacturers to start some "high level design" activities. It should allow as well to assess the complexity of the associated protocol. After the completion of a description document, the drafting of the protocol specification should not have to face difficulties which would impact the other protocols i.e. the radio interface protocol architecture should be stable. This means that some procedures which are felt critical in terms of complexity will need to be studied in more details in the description document so that no problem is faced in the writing of the final protocol.

The following lists typical contents for a description document:

1) list of procedures;
2) logical flow diagrams for normal procedures;
3) logical description of message (where it should be possible to guess roughly the size of the various information elements);
4) principles for error handling;
5) some exceptional procedures which are felt critical;
6) it should, as far as possible, have the same format and outline as the final specification.

The following is not covered:

1) exact message format;
2) all scenarios.

25.331 Radio Resource Control (RRC) Protocol Specification
The scope of this specification is to describe the Radio Resource Control protocol for the 3GPP radio system.

5.4.3.4. 25.400 Series

25.401 UTRAN Overall Description
This document describes the overall architecture of the UTRAN, including internal interfaces and assumptions on the radio and Iu interfaces.

25.410 UTRAN Iu Interface: General Aspects and Principles

25.411 UTRAN Iu interface Layer 1

25.412 UTRAN Iu interface signalling transport
The present document specifies the standards for user data transport protocols and related signalling protocols to establish user plane transport bearers.

25.413 RANAP Specification

25.414 UTRAN Iu interface data transport & transport signalling
The present document specifies the standards for user data transport protocols and related signalling protocols to establish user plane transport bearers.

25.415 Iu interface CN-UTRAN user plane protocols
This Technical Specification defines the protocols being used to transport and control over the Iu interface, the Iu User Data Streams.

25.420 UTRAN Iur Interface: General Aspects and Principles

25.421 UTRAN Iur interface Layer 1

25.422 UTRAN Iur interface signalling transport
The present document specifies the standards for user data transport protocols and related signalling protocols to establish user plane transport bearers.

25.423 RNSAP Specification

25.424 Iur interface data transport & transport signalling for Common Transport Channel data streams
This document shall provide a description of the UTRAN RNS-RNS (Iur) interface Data Transport and Transport Signalling for Common Transport Channel data streams as agreed within the TSG-RAN Working Group 3.

25.425 UTRAN Iur interface user plane protocols for Common Transport Channel data streams
This document shall provide a description of the UTRAN RNS-RNS (Iur) interface user plane protocols for Common Transport Channel data streams as agreed within the TSG-RAN Working Group 3.

25.426 Iur & Iub interface data transport & transport signalling for DCH data streams

25.427 Iur & Iub interface user plane protocol for DCH data streams

25.430 UTRAN Iub Interface: General Aspects and Principles

25.431 Iub interface Layer 1

25.432 UTRAN Iub interface signalling transport

25.433 NBAP Specification

25.434 UTRAN Iub interface data transport & transport signalling for Common Transport Channel data streams
This document shall provide a description of the UTRAN RNC-Node B (Iub) interface Data Transport and Transport Signalling for CCH data streams as agreed within the TSG-RAN Working Group 3.

25.435 Iub interface user plane protocols for Common Transport Channel data streams
This document shall provide a description of the UTRAN RNC-Node B(Iub) interface user plane

protocols for Common Transport Channel data streams as agreed within the TSG-RAN Working Group 3.

5.4.3.5. 25.100 Series

25.101 UE Radio transmission and reception (FDD)
This document establishes the minimum RF characteristics of the FDD mode of UTRA.

25.104 BTS Radio transmission and reception (FDD)
This document establishes the Base Station minimum RF characteristics of the FDD mode of UTRA.

25.102 UE Radio transmission and reception (TDD)
This document establishes the minimum RF characteristics of the TDD mode of UTRA for the User Equipment (UE).

25.105 BTS Radio transmission and reception (TDD)
This document establishes the minimum RF characteristics of the TDD mode of UTRA.

25.103 RF parameters in support of Radio Resource Management
This Technical Specification shall describe RF parameters and Requirements for the Radio Resource Management.

25.141 Basestation conformance testing (FDD)
This specification describes the documents being produced by the 3GPP TSG RAN WG 4 and first complete versions expected to be available by end of 1999. This specification gives also general description of the physical layer of the UTRA air interface.

The 25.100 series specifies.

For each test, two conformance requirements are specified:

- essential conformance requirements;
- complete conformance requirements.

Essential conformance requirements are those which are required:

a) to ensure compatibility between the radio channels in the same cell;

b) to ensure compatibility between cells, both coordinated and uncoordinated;

c) to ensure compatibility with existing systems in the same or adjacent frequency bands;

d) to verify the important aspects of the transmission quality of the system.

Essential conformance requirements are sufficient to verify the performance of the equipment for radio type approval purposes, in countries where this is applicable.

Complete conformance requirements may be tested to verify all aspects of the performance of a BSS. These requirements are intended to be used by manufacturers and operators to allow conformance and acceptance testing to be performed in a consistent manner; the tests to be performed should be agreed between the parties.

In some tests there are separate requirements for micro-BTS and BTS. If there is no separate

requirement for a micro-BTS, the requirements for the BTS apply to a micro-BTS.

In the present document, the reference point for RF connections (except for the measurement of mean transmitted RF carrier power) is the antenna connector, as defined by the manufacturer. This EN does not apply to repeaters or RF devices which may be connected to an antenna connector of a BSS, except as specified in subclause 4.10.

25.142 Basestation conformance testing (TDD)

25.113 Basestation EMC[7]

5.5. Radio Interface No-5

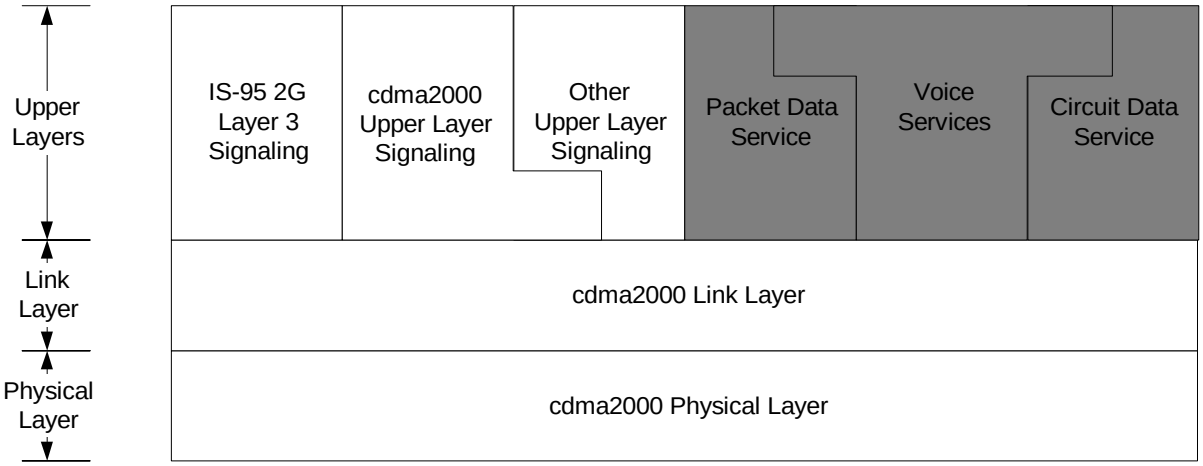
5.5.1. Introduction

[Editor's note:

- ***This section corresponds to the "Original part (10%)".***
- ***This subsection 5-5 corresponds to materials supplied by SDOs related to 3GPP2, i.e. Doc. 8-1/371(Annexes).***
- ***TG 8/1 will develop this part based on input contributions.***
- ***Terminology : ITU-R M.1224***

]

The cdma2000 standard specifies a spread spectrum radio interface that uses Code Division Multiple Access (CDMA) technology to meet the needs for the next generation of wireless communication systems. Figure 1 shows the general architecture of cdma2000. Development of the cdma2000 standard has, to the greatest extent possible, adhered to the architecture by specifying different layers in different volumes of the standard. For example, in Phase I development of cdma2000 specification in TIA, the physical layer is specified in IS-2000-2, the MAC in IS-2000-3, the LAC in IS-2000-4, and upper layer signaling in IS-2000-5. This architecture will be carried over into future development of so called Release A of cdma2000. The shaded services shown in the Upper Layers row in Figure 5.5.1-1. are associated with, but are not part of, IS-2000.



[7] This Specification does not include the antenna port immunity and emissions.

FIGURE 5.5.1-1

General Architecture of cdma2000

5.5.2. Overview of the Radio Interface

[Editor's note:
This section gives summary information of the radio interface. The complete definition of the radio interface is given in section 5.5.3.

- ***This section corresponds to the "Extracted part (20%)".***
- ***This section should have the structure and style defined by Annex-1 of 8-1/TEMP/213.***
- ***This section should include the Summary of Major Technical Parameters Table shown in the format defined by Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to develop this part using the style guide defined above.***
- ***Terminology : SDO's terminology***

]

5.5.2.1. Introduction

The cdma2000 RTT is a wideband, spread spectrum radio interface that uses Code Division Multiple Access (CDMA) technology to meet the needs for the next generation of wireless communication systems. This RTT meets or exceeds all requirements specified in the ITU Circular Letter and corresponding documents. The requirements are satisfied for the Indoor Office, Indoor to Outdoor/Pedestrian, and Vehicular environments. In addition, the RTT meets all of the requirements for the next generation evolution of the current TIA/EIA-95-B family of standards, including support for the following:

- a wide range of operating environments (indoor, low mobility, full mobility, and fixed wireless);
- a wide performance range (from voice and low speed data to very high speed packet and circuit data services);
- a wide range of advanced services (including voice only, simultaneous voice and data, data only, and location services);
- an advanced Multimedia QoS Control capability supporting multiple concurrent voice, high speed packet data, and high speed circuit data services along with sophisticated Quality of Service (QoS) management capabilities;
- a modular structure to support existing Upper Layer Signaling protocols as well as a wide range of future third generation Upper Layer Signaling protocols;
- seamless interoperability and handoff with existing TIA/EIA-95-B systems;
- smooth evolution from existing TIA/EIA-95-B based systems (including support for overlay configurations within the same physical channel as existing TIA/EIA-95-B systems);
- highly optimized and efficient deployments in clear spectrum (in cellular, PCS, and IMT-2000 spectrum); and
- support for existing TIA/EIA-95-B services, including speech coders, packet data services, circuit data services, fax services, Short Messaging Services (SMS), and Over the Air Activation and Provisioning.

5.5.2.2. cdma2000 Key Design Characteristics

The key design characteristics of the cdma2000 RTT are:

Wideband CDMA radio interface offering significant advances to increase performance and capacity:

- coherent pilot based Reverse radio interface;
- continuous reverse radio interface waveform;
- fast forward and reverse radio interface power control; and
- Auxiliary Pilot to support beam forming applications and to increase capacity.

data rates from 1.2 Kbps to greater than 2 Mbps;

support for a wide range of RF channel bandwidths:

- 1.25 MHz;
- 3.75 MHz;
- 7.5 MHz;
- 11.25 MHz; and
- 15 MHz.

advanced Medium Access Control (MAC) for highly efficient High Speed Packet Data Services;

Physical Layer optimized for MAC operation:

- Dedicated Control Channel (DCCH);
- variable frame size packet data control channel operation (5 and 20 ms); and
- enhanced paging and access channels for fast Packet Data Service access control (Common Control Channel - CCCH).

ability to overlay TIA/EIA-95-B 1.25 MHz channels;

Turbo codes for higher transmission rates and increased capacity;

flexible signaling structure designed to support a wide range of radio interface signaling alternatives:

- backward compatible TIA/EIA-95-B Layer 3 Signaling;
- native cdma2000 Upper Layer Signaling; and
- other existing or future Upper Layer Signaling entities (e.g., ITU-T defined signaling services).

advanced Multimedia QoS Control capabilities:

- support for multiple Link Access Control (LAC) and MAC entities with varying QoS requirements;
- sophisticated Multiplexing and QoS Sublayer that controls scheduling and prioritization among competing services to implement negotiated QoS commitments; and
- support for multiple Supplemental Channels with varying QoS attributes so that multiple services with differing QoS requirements can be operated concurrently with optimal radio interface efficiency.

flexible voice, voice/data, and data only modes of operation optimized according to application and environment:

- support for distributed and centralized Packet Data control functions;
- support for operation of data bearing channels in soft handoff or in reduced soft handoff configuration; and
- optional ability to separate packet control and signaling information from the physical channel that carries voice (for enhanced voice quality and/or higher performance Packet Data Service operation).

support for forward radio interface transmit diversity:

- for Multi-Carrier (MC) configurations - assignment of each carrier to independent transmit antennas; and
- for Direct-Spread (DS) configurations - Orthogonal Transmit Diversity (OTD).

support for both Frequency Division Duplex (FDD) as well as Time Division Duplex (TDD) configurations; and

support for handoff between cdma2000 systems and enhanced TIA/EIA-95-B systems.

- Two additional features are under investigation for potential future enhancements to the cdma2000 RTT as described in this document:

Forward Link Direct Spread Orthogonal Overlay; and

1-chip Multipath Resistant Spreading.

5.5.2.3. cdma2000 Operational Modes

cdma2000 supports all three IMT-2000 CDMA operational modes, which are FDD Direct Spread Mode, FDD Multi-carrier Mode, and TDD mode.

The difference between FDD DS mode and MC mode is on the forward link, where the multi-carrier approach de-multiplexes modulation symbols onto N separate 1.25 MHz carriers (N = 3, 6, 9, 12). Each carrier is spread with a 1.2288 Mcps chip rate. The N > 1 direct spread approach transmits modulation symbols on a single carrier which is spread with a chip rate of N X 1.2288 Mcps (N = 3, 6, 9, 12).

Multi-carrier systems can be deployed as an overlay on up to N X 1.25 MHz TIA/EIA-95-B carriers. In this configuration, the resulting system can provide TIA/EIA-95-B and cdma2000 services to TIA/EIA-95-B and cdma2000 MSs concurrently. In an overlay configuration, the TIA/EIA-95-B and cdma2000 systems share common pilot channels, and can optionally share common paging channels. The cdma2000 system can also be deployed in another set of channels within the same or in a different frequency band. Direct Spread systems can be deployed in any frequency band with sufficient bandwidth available. While Multi-carrier Transmit Diversity can be used to provide transmit diversity for MC mode, Orthogonal Transmit Diversity (OTD) may be used to provide transmit diversity for DS mode.

TDD mode is applicable in the environments where a paired frequency band is not available. The cdma2000 TDD mode shares the same common coding schemes, modulation method, PN sequence and processing gain with the cdma2000 FDD DS mode or MC mode. The TDD mode can provide:

Flexible and effective usage of the allocated frequency bands
Base station transmission space diversity and reverse link open-loop power control
Asymmetric traffic of services
Less complexity of TDD terminals

5.5.2.4. Summary of Major Technical Parameters

cdma2000 Key Characteristics Values Used in Developing the cdma2000 Specifications

[Note: The values shown in the following tables reflect the status of the ballot version of IS-2000. They are subject to update in the future development of cdma2000 specification.]

TABLE 5.5.2-1

SUMMARY OF MAJOR TECHNICAL PARAMETERS (RF)

The definition of the parameter is identical to "Description" of the key characteristic listed in the Draft New Recommendation ITU-R M.[IMT.RKEY].

Name of Parameter	**List of proposed values**	
	Mobile Station Value	**Base Station Value**
Transmitter characteristics		
Transmit power		
Power classes	The maximum power levels are expected to be similar to TIA/EIA-95-B EIRPs per class (1.9GHz Band): Class I: 28dBm <EIRP < 33dBm Class II: 23dBm <EIRP < 30dBm Class III: 18dBm <EIRP < 27dBm	N/A

	Class IV: 13dBm <EIRP < 24dBm Class V: 8dBm <EIRP < 21dBm The maximum power level is subject to constraints from regulatory agencies.	
Dynamic range	Open loop: ± 40 dB Closed loop: ± 24 dB (around open loop estimate)	Open loop: +/- 40dB Close loop: +/- 24dB (around open loop estimate)
Power Control Steps	1.0 dB nominal 0.5 dB and 0.25 dB are available as options.	1.0 dB nominal 0.5 dB and 0.25 dB are available as options.
Frequency stability	0.08 ppm (assuming approx. ± 150 Hz MS transmit accuracy) The mobile station obtains its frequency for the BS. The mobile station's transmit frequency is required to be within 150 Hz of the ideal transmit frequency.	0.05 ppm
Output RF spectrum emissions		
3 dB Bandwidth	FDD: 1X: 2 x 1.23 = 2.46MHz 3X: 2 x 3.69 = 7.38MHz 6X: 2 x 7.37 = 14.74MHz 9X: 2 x 11.1 = 22.2MHz 12X: 2 x 14.74 = 29.48MHz TDD: 1X: 1 x 1.23 = 1.23MHz 3X: 1 x 3.69 = 3.69MHz 6X: 1 x 7.37 = 7.37MHz 9X: 1 x 11.1 = 11.1MHz 12X: 1 x 14.74 = 14.74MHz	FDD: 1X: 2 x 1.23 = 2.46MHz 3X: 2 x 3.69 = 7.38MHz 6X: 2 x 7.37 = 14.74MHz 9X: 2 x 11.1 = 22.2MHz 12X: 2 x 14.74 = 29.48MHz TDD: 1X: 1 x 1.23 = 1.23MHz 3X: 1 x 3.69 = 3.69MHz 6X: 1 x 7.37 = 7.37MHz 9X: 1 x 11.1 = 11.1MHz 12X: 1 x 14.74 = 14.74MHz
Adjacent Channel Leakage power ratio	At 3.75MHz, it is estimated to have adjacent channel power at +12dBc for equal in and out of band energy (processing gain provides an additional protection). At 5MHz, adjacent channel powers can be in the order of +50dBc for mobile and base station due to full protection of baseband filters.	At 3.75MHz, it is estimated to have adjacent channel power at +12dBc for equal in and out of band energy (processing gain provides an additional protection). At 5MHz, adjacent channel powers can be in the order of +50dBc for mobile and base station due to full protection of baseband filters.
Out of band and Spurious emissions	Emission limits established by local radio regulatory agencies generally apply (e.g. FCC in the U.S.) The limits given below are representative for a chip rate of 3.6864 Mcps. Freq. Offset (MHz) Power 2.5 < |Δf| < 3.5 -13dBm/37kHz |Δf| > 3.5 -13dBm/1MHz where Δf= center frequency of the CDMA signal - closer measurement edge frequency.	Emission limits established by local radio regulatory agencies generally apply (e.g. FCC in the U.S.) The limits given below are representative for a chip rate of 3.6864 Mcps. Freq. Offset (MHz) Power 2.5 < |Δf| < 3.5 -13dBm/37kHz |Δf| > 3.5 -13dBm/1MHz where Δf= center frequency of the CDMA signal - closer measurement edge frequency.
Transmit linearity requirements		
Standby RF output power	-61 dBm/MHz measured at the mobile station antenna connector for the frequency	N/A

	bands of 850 MHz and 1.9 GHz.	
Receiver characteristics		
Receiver sensitivity	-104 dBm for 9.6 kbps measurement channel	-119dBm
Receiver dynamic range	79 dB	52 dB
Intermodulation sensitivity	IIP3 = -12 dBm The exact specifications are yet to be defined.	[??]
Spurious response and Blocking	Similar to IS-98-C Band Class 1 single tone desensitization requirements: 71 dB The exact specifications are yet to be defined.	Similar to IS-97-C Band Class 1 single tone desensitization requirements: 90 dB The exact specifications are yet to be defined.
Adjacent channel selectivity	The FER of a 9600bps call with Ic/Ior=-15.6dB, Îor= -101 dBm /1.23MHz, and a tone offset by ±1.02×NB Hz from the carrier's center frequency should not exceed 1% FER. NB = Necessary Bandwidth of the system, as defined in Rec. ITU-R SM.329.	Similar to IS-97-C Band Class 1 single tone desensitization requirements: 90 dB The exact specifications are yet to be defined.
Other characteristics		
Diversity techniques	Diversity techniques are used. Time diversity: symbol interleaving and error coding and correction. Path Diversity: RAKE receiver Space diversity: MS antenna diversity is optional Frequency Diversity: 1.2288, 3.686, 7.3728, 11.0592, or 14.7456 MHz spreading Delay transmit diversity: may be employed for both MC and DS Diversity combining: either maximal-ratio or equal gain combining may be used with multiple RAKE fingers. Minimum number of demodulators/receivers: 1 per MS minimum number of antennas: 1 per MS (antenna diversity is optional)	Diversity techniques are used. Time diversity: symbol interleaving and error coding and correction. Path Diversity: RAKE receiver Space diversity: BS uses 2 antennas. Orthogonal Transmit Diversity can be used on the forward link Frequency Diversity: 1.2288, 3.686, 7.3728, 11.0592, or 14.7456 MHz spreading Delay transmit diversity: may be employed for both MC and DS Diversity combining: either maximal-ratio or equal gain combining may be used with multiple RAKE fingers. Minimum number of demodulators/receivers: 2 per BS minimum number of antennas: 2 per BS
Smart antennas	N/A	Smart antennas can be used to reduce interference from other mobiles and to direct beams to specific mobiles.
Minimum operating bandwidth	Minimum operating bandwidth: FDD 2x1.25 MHz for Vehicular 2x3.75 MHz for Pedestrian 2x7.5 MHz for Indoor TDD 1x1.25 MHz for Vehicular 1x3.75 MHz for Pedestrian 1x7.5 MHz for Indoor Minimum channel spacing: 1.25MHz	Minimum operating bandwidth: FDD 2x1.25 MHz for Vehicular 2x3.75 MHz for Pedestrian 2x7.5 MHz for Indoor TDD 1x1.25 MHz for Vehicular 1x3.75 MHz for Pedestrian 1x7.5 MHz for Indoor Minimum channel spacing: 1.25MHz

TABLE 5.5.2-2

SUMMARY OF MAJOR TECHNICAL PARAMETERS

The definition of the parameter is identical to "Description" of the key characteristic listed in the Draft New Recommendation ITU-R M.[IMT.RKEY]

Names of the Parameter	Values
Multiple access technique	DS-CDMA MC-CDMA
Multi-carrier	Required for MC mode Not Used for DS mode Optional for TDD mode
Duplexing Scheme	FDD TDD
Modulation (up-link and down-link)	Data modulation: UL – BPSK DL – QPSK Spreading modulation: UL – HPSK DL – QPSK
Channelization code (up-link and down-link)	Walsh code
Scrambling code (up-link and down-link)	DL & UL: QPSK time shifted Pseudo Noise code.
Pilot structure	Code divided continuous common pilot/auxiliary pilot Code divided dedicated pilot
Detection (up-link and down-link)	Coherent Multi-user detection: optional.
Channel coding and interleaving	**Coding:** ***Convolutional code with k=9, R=1/2, 1/3, or 1/4*** Turbo code with K=4, R=1/2, 1/3or ¼ **Interleaving:** User data: 20, 40 and 80 ms channel interleaving Signaling: 5, 10, 20 ms channel interleaving
Variable data rate (up-link and down-link)	Variable data rates supported with: Variable spreading factor Multi-code Code puncturing Repetition DTX Link adaptation depending on channel condition
Chip rate	1.2288 Mcps 3.6864 Mcps 7.3728 Mcps 11.0592 Mcps 14.7456 Mcps

Frame structure	Number of time slots in a frame: DS mode: 1 MC mode: 1 TDD mode: 4 for 5 ms frame structure 16 for 20 ms frame structure Frame Length: 5, 10, 20 ms
Variable length spreading factor	4, 8, 16, 32, 64, 128, 256, 512, 1024
Random access	RsMA – Flexible Random Access Scheme allowing three modes of access: – Pure Aloha – Power controlled Aloha – Reserved Access
Inter base station asynchronous/ synchronous operation	Synchronous operation is required.
Absolute up-link chip code synchronization	Not used.
Handover	Intra-system/intra-frequency handover: Soft handover Softer handover Hard handover Intra-system/inter-frequency handover: Hard handover Inter-system handover: Hard handover
Power control (up-link and down-link)	Closed loop (dedicated channels) Open loop (random-access channel)
Diversity	Time diversity Frequency diversity Antenna receive diversity Multi-carrier transmission diversity for MC mode Time domain transmit diversity for DS mode Soft handover diversity: Inter-sector - MRC Inter-cell - MRC (DL) Inter-cell - Selection combining (UL)
Adaptive equalizer	Not used.
Dynamic Channel Allocation	Not used.

5.1.3. Detail Specification of the Radio Interface

[Editor's note:

- ***This section corresponds to the "Reference part (70%)".***
- ***This section should include all references to ensure worldwide compatibility.***
- ***Description style of this section should be based on Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to review and update this part.***
- ***Terminology : SDO's terminology which should also be referenced in this part***
- ***Input material : 371 (Annex B, 3GPP2)***

]

5.1.3.1. References

The six volumes in the TIA ballot version of IS-2000 are:

IS-2000-1 Introduction to cdma2000 Standards for Spread Spectrum Systems

IS-2000-2 Physical Layer Standard for cdma2000 Spread Spectrum Systems

IS-2000-3 Medium Access Control (MAC) Standard for cdma2000 Spread Spectrum Systems

IS-2000-4 Signaling Layer 2 Standard for cdma2000 Spread Spectrum Systems

IS-2000-5 Upper Layer (Layer 3) Signaling Standard for cdma2000 Spread Spectrum Systems

In addition, IS-2000 includes the standard that specifies analog operation, to support dual-mode mobile stations and base stations:

IS-2000-6 Analog Standard for cdma2000 Spread Spectrum Systems

5.1.3.2. IS-2000 Layer One (Physical) Table of Content (See the ballot version of IS-2000-2 for details)

1 GENERAL

2 REQUIREMENTS FOR MOBILE STATION CDMA OPERATION

3 REQUIREMENTS FOR BASE STATION CDMA OPERATION

5.1.3.3. IS-2000 Layer Two MAC Table of Content (See the ballot version of IS-2000-3 for details)

1 Introduction
2 Definition of MAC Components
3 Interface Primitives
4 Informative Text

5.1.3.4. Base Station Performance Table of Content (See the to-be-published IS-97D for details)

1 INTRODUCTION
2 STANDARD EMISSIONS MEASUREMENT PROCEDURES
3 CDMA RECEIVER MINIMUM STANDARDS
4 CDMA TRANSMITTER MINIMUM STANDARDS
5 CDMA GENERAL REQUIREMENTS
6 CDMA STANDARD TEST CONDITIONS

5.1.3.5. Mobile Station Performance Table of Content (See the to-be-published IS-98D for details)

1 INTRODUCTION
2 ANALOG RECEIVER MINIMUM STANDARDS
3 ANALOG TRANSMITTER MINIMUM STANDARDS
4 ANALOG ENVIRONMENTAL REQUIREMENTS
5 STANDARD RADIATED SIGNAL MEASUREMENT PROCEDURE
6 ANALOG STANDARD TEST CONDITIONS
7 ANALOG PROTOCOL CONFORMANCE TESTING
8 ANALOG OPTIONS
9 CDMA RECEIVER MINIMUM STANDARDS
10 CDMA TRANSMITTER MINIMUM STANDARDS
11 CDMA ENVIRONMENTAL REQUIREMENTS
12 CDMA STANDARD TEST CONDITIONS
13 CDMA PROTOCOL CONFORMANCE TESTING
14 CDMA OPTIONS
15 SUBSCRIBER INTERFACE REQUIREMENTS

5.1.3.6. Other Specifications

IS-126
Voice Services (see IS-127 for details)
High Speed Data Services (see IS-707 for details)
Core Network (see ANSI-41 evolved specifications for details)

5.6. Radio Interface No.-N

5.6.1. Introduction

[Editor's note:
- ***This section corresponds to the "Original part (10%)".***
- ***This subsection 5-X corresponds to materials supplied by [SDO], i.e. Doc. 8-1/xxx, 8-1/yyy, and 8-1/zzzz.***
- ***TG 8/1 will develop this part based on input contributions.***
- ***Terminology : ITU-R M.1224***

]

5.6.2. Overview of the Radio Interface

[Editor's note:
This section gives summary information of the radio interface. The complete definition of the radio interface is given in section 5.6.3.
- ***This section corresponds to the "Extracted part (20%)".***
- ***This section should have the structure and style defined by Annex-1 of 8-1/TEMP/213.***
- ***This section should include the Summary of Major Technical Parameters Table shown in the format defined by Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to develop this part using the style guide defined above.***
- ***Terminology : SDO's terminology***

]

5.6.3. Detail Specification of the Radio Interface

[Editor's note:
- ***This section corresponds to the "Reference part (70%)".***
- ***This section should include all references to ensure worldwide compatibility.***
- ***Description style of this section should be based on Annex-1 of 8-1/TEMP/213.***
- ***TG 8/1 requests SDOs to review and update this part.***
- ***Terminology : SDO's terminology which should also be referenced in this part***

]

6. Recommendations (Satellite Component)

[Editor's note: This section is for Recommend 2 on Satellite Component Radio interfaces.]

6.1 Introduction

[Editor's Note: Text will be developed if necessary].

6.2 Core Network Interface

[Editors's Note: Elements for consideration include:
- ***Common signalling for seamless roaming with terrestrial networks***
- ***Database management and registration requirements***
- ***Satellite/terrestrial interoperability]***

6.3 Satellite/Terrestrial Terminal Interface

[Editor's NOTE: Since satellite systems are inherently global in nature, it is not necessary to define roaming and interoperability between different satellite networks. Thus, this section focuses on the roaming and interoperability between satellite and terrestrial networks.

- ***Multi-mode terminals interworking with terrestrial networks***
- ***Use of numbering***
- ***Component choice and use***
- ***User Identity Module]***

6.4 Radio Interface Specifications

The specification of each satellite radio interface is given in the following sub-sections. These include only elements related to the service link interface; the feeder link and inter-satellite link interfaces are not specified in this recommendation.

Because of the strong dependency between the radio interface design and overall satellite system optimisation, this section includes the architectural and system descriptions as well as the RF and baseband specifications of radio interfaces.

6.4.1 Satellite Radio Interface A Specifications

6.4.1.1 Architectural description

6.4.1.1.1 Constellation

6.4.1.1.2 Satellites

6.4.1.2 System description

6.4.1.2.1 Service features

6.4.1.2.2 System features

6.4.1.2.3 Terminal features

6.4.1.3 RF specifications

6.4.1.4 Baseband specifications

6.4.2 Satellite Radio Interface B Specifications

6.4.3 Satellite Radio Interface C Specifications

_ …

6.5 Coexistence with Other Systems and Services

[NOTE - Recommendation RSPC should describe at a high level those elements needed for worldwide compatibility of operation. For separate systems and services to coexist, one of the important criteria is that the interference between these systems should be kept to a minimum. Reference should be made to Recommendation ITU-R M.1343 and Recommendation ITU-R M.xxx (currently being developed in WP 8D) as the appropriate Recommendations containing unwanted emission limits for IMT-2000 satellite terminals.]

[Editor' Note: This section may be merged to Section 7 on the generic unwanted emission limit for IMT-2000 terminals.]

7. Recommendations (Generic Unwanted Emission Limits)

[Editor's note: This section is for Recommend 3 on Unwanted Emission Limits.]

[See Documents 8-1/TEMP/203.]