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Technical Report

**UMTS Terrestrial Radio Access Network (UTRAN);
UTRA Interoperability Description
(UMTS XX.16 version 1.0.0)**

UMTS

Universal Mobile
Telecommunications System



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ETSI

Postal address

F-06921 Sophia Antipolis Cedex - FRANCE

Office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16
Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Internet

secretariat@etsi.fr
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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Special Mobile Group (SMG).

The present document describes the interoperability of UTRA between the TDD and FDD operating modes as well as with GSM. The contents of the present document are subject to continuing work within SMG2 and SMG2 UMTS Layer 1 Expert Group and may change following approval by either of these two groups.

1 Scope

This Technical Report is to describe the interoperability between UTRA and GSM and where appropriate between UTRA and other non-GSM based system. Idle mode cell reselection as well as redirection in call setup to base stations supporting modes other than UTRA will be included. Reference will be made to other documents where appropriate in order to avoid duplications of information.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] UTRA Physical Layer Description, FDD parts, V 0.4, Tdoc SMG2 UMTS L1 221/98
- [2] UTRA Physical Layer Description, TDD parts, V 0.2.1, Tdoc UMTS L1 274/98
- [3] Introduction of FDD to GSM handover scenarios, Tdoc UMTS L1 177/98
- [4] UTRA XX.15: "Handover".
- [5] UTRA XX.07 FDD: "Physical Layer Procedure Description".
- [6] UTRA XX.13 TDD: "Physical Layer Procedure Description".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

[Editor Notes: HIPERLAN/2 is a system proposed within the ETSI Broadband Radio Access Networks (BRAN) Project. The system is intended to provide services in the middle ground between mobile systems and the wired accessnetwork. In particular, HIPERLAN/2 will provide high speed (25 Mbit/s typical data rate) communications between portable computing devices and broadband ATM and IP networks, and is capable of supporting multimediaapplications. The typical environment is indoors. User mobility is supported within the local service area; wide area mobility (e.g. roaming) is supported by standards outside the scope of the BRAN Project.]

3.2 Symbols

For the purposes of the present document, the following symbols apply:

[None specified at present]

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

BRAN	Broadband Radio Access Network
FDD	Frequency Division Duplex
GSM	Global System for Mobile Communications
TDD	Time Division Duplex
UTRA	UMTS Terrestrial Radio Access

4 Status

There is currently no working assumptions apart from that UTRA has to be able to support interoperations with GSM, BRAN/HIPERLAN2, and other non-specified systems on the principle that these interoperations will not impose any restrictions nor implications on the deployment scenarios.

Some scenarios for handover, cell re-selection, redirection and coexistence are included and items for further studies are indicated where appropriate. It should be noted that many issues related to handover, cell re-selection and redirection have implications to higher layer functions and should be addressed collectively.

In addition, while UTRA does not impose any limitations on the interoperability with any systems other than GSM and HIPERLAN 2, as per L1 Meeting #9, this is currently beyond the scope of the L1 Group unless the requirements are explicitly expressed.

5 UTRA/FDD - UTRA/TDD handover

All handovers within UTRA including handover between UTRA /FDD and UTRA/TDD mode are addressed in XX.15.

6 Handover between UTRA and other systems

The handover between UTRA and GSM system offering world-wide coverage has been one of the main design criteria. For details of the monitoring and execution procedures from UTRA to GSM, please refer to XX.15.

6.1 Example scenarios of UTRA to GSM handover

Scenarios listed below are but a few examples of UTRA to GSM handover with no implication on network operation.

6.1.1 Scenario A: Handover due to lack of UTRA coverage

Description

In this scenario, an operator may wish to use the GSM network as a fallback solution when a dual mode mobile station is moving outside UTRA coverage. It can be envisaged that such a scenario might happen at the beginning of rolling out of UTRA. An example of the implementation is shown in Figure 1.

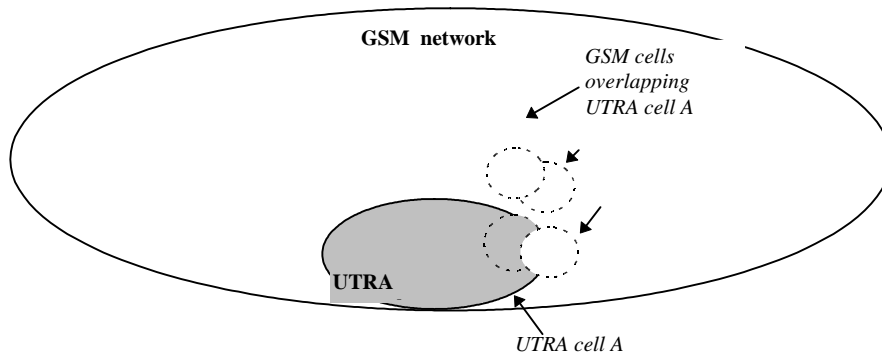


Figure 1: GSM coverage as a fallback solution when out of UTRA coverage

6.1.2 Scenario B: Handover due to bearer services

Description

An operator may wish to dedicate the UTRA network is dedicated to handle high data rate services (for example rates at or above 144 kbits/s) while using its GSM network to cater for lower data rate services such as voice. During each call set-up, a dual mode UTRA/GSM phone is either assigned channels on the UTRA or on a GSM cell depending on the bearer service negotiated. Moreover in this scenario it is assumed that a dual mode MS makes its call set-up attempt on an UTRA cell. An example of the implementation is shown in Figure 2.

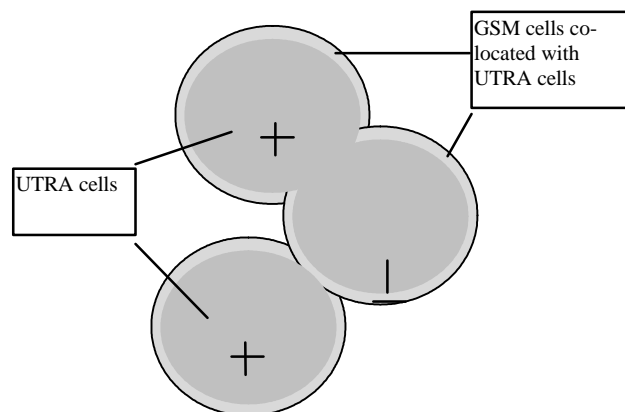


Figure 2

This example shows co-located GSM and UTRA cells with roughly the same coverage for GSM 1800 speech service and W-CDMA UDD 384 services.

6.1.3 Scenario C: Seamless handover

In this scenario GSM & UTRA cells are transparent to the users and handover between the UMTS and GSM cells is seamless.

6.2 GSM to UTRA handover

6.2.1 GSM to UTRA/FDD handover

The GSM system is likewise expected to be able to indicate also the UTRA FDD base station scrambling codes in the area to make the cell identification simpler and after that the existing measurement practices in GSM, between the slots or during idle slots, can be used for measuring the UTRA FDD mode when operating in GSM mode.

As the UTRA FDD does not rely on any superframe structure as with GSM to find out synchronisation, the terminal operating in GSM mode is able to obtain UTRA FDD BS frame synchronisation once the UTRA FDD base station scrambling code timing is acquired. The BS scrambling code has 10 ms period and is synchronised to UTRA FDD common channels in the frame timing.

Scenarios listed below describe the different reasons for performing handover from GSM to UTRA:

6.2.1.1 Scenario A: Handover due to UTRA Coverage

In this scenario, the dual-mode mobile station which was handed-over from UTRA to GSM network due to a lack of UTRA coverage, is moving back to the UTRA coverage. The handover of this mobile station from GSM to UTRA must be possible to provide full UTRA bearer services to the user.

6.2.2 GSM to UTRA/TDD handover

GSM to UTRA/TDD handover shall be supported. The exact deployment scenarios are operator specific.

6.3 UTRA and other systems

UTRA does not preclude the interoperability with other non-GSM based terrestrial or satellite systems, under the IMT-2000 family of standard concept. Handover between UTRA and BRAN/HIPERLAN 2, in case of dual mode terminals, should be supported via the core network. <<Details are ffs. See also minutes of SMG2 UMTS L1 #9 Meeting Minutes. There is currently no expressed requirements - Editor >>

7 UTRA cell re-selection to other systems

Idle mode procedures within UTRA are described in XX.07 and XX.13. This section describes the physical layer issues for the idle mode procedures in relationship to other systems. Similar to active mode, UTRA re-selection to other systems including, but not exclusively, GSM, and BRAN/HIPERLAN2 as well as to other cellular systems in idle mode are ffs.

7.1 UTRA cell re-selection to GSM

Cell re-selection from UTRA to GSM shall be supported and transparent to the end-users. The exact deployment scenario is an operator issue.

7.2 UTRA cell re-selection to BRAN/HIPERLAN 2

[Details are ffs.]

7.3 UTRA cell re-selection to other systems

UTRA cell re-selection to other systems is ffs. <<See also minutes of SMG2 UMTS L1 #9 Meeting Minutes. There is currently no expressed requirements for this - Editor >>

8 UTRA redirection to other systems

Redirection is a procedure which allows a system to direct a mobile to setup a call to a different base station under certain defined conditions. These defined conditions may be resulted from congestion in the original base station, etc. This section describes the physical layer issues for the redirection procedures in relationship to other systems. The algorithm for redirection is for further study.

8.1 UTRA redirection to GSM

Under predefined conditions, it may be possible for a terminal within a UTRA coverage area to be redirected at a call set-up to a cell in an overlaying or neighbouring GSM network as instructed by the network. It is evident that, if UTRA coverage and GSM coverage are mutually exclusive, redirection may not normally be possible.

8.2 UTRA redirection to BRAN/HIPERLAN 2

[Details are ffs.]

8.3 UTRA redirection to other systems

UTRA redirection to other systems is ffs. <<See SMG2 UMTS L1 #9 Meeting Minutes. There is currently no expressed requirements for this at present - Editor >>

9 Coexistence

Guidelines for coexistence between UTRA and other systems is important to assist both operators and regulators in the assignment of guard bands.

9.1 UTRA coexistence with GSM

UTRA and GSM will have to coexist in areas where GSM are deployed. Coexistence scenarios are described in more details in XX.17.

9.2 UTRA coexistence with BRAN/HIPERLAN 2

The typical BRAN/HIPERLAN2 deployment scenarios will be in campus environments, customer premises and public hot spots such as airports and convention centres. When UTRA is deployed in the same vicinity, coexistence of the two systems will occur.

HIPERLAN2 systems will primarily be deployed in the 5 GHz band. Thus the separation in frequency will at least 2 GHz. Therefore the issue of specific guard bands is not relevant and UTRA and HIPERLAN2 receivers may be operated in parallel, this applies to both the UTRA FDD and TDD mode.

9.3 UTRA coexistence with other systems

UTRA coexistence with other systems is ffs. <<See also SMG2 UMTS L1 #9 Meeting Minutes. There is currently no expressed requirements for this at present - Editor >>

9.4 UTRA coexistence with other IMT-2000 systems

Depending on the harmonization process and the technology mandate of a specific country, UTRA may have to coexist with other IMT-2000 systems which are deployed in the same locality.

History

Document history		
Date	Version	Comment
15-8-1998	0.0.1	Proposed first draft with text adopted from UTRA Physical Layer Description, FDD parts, expected revised version of Tdoc SMG2 UMTS L1 221/98
9-9-1998	0.0.2	Withdrawn
11-9-1998	0.0.3	Revised after harmonisation with XX.15
15-9-1998	0.0.4	Revision marks for V 0.0.3 approved with text of L1 387/98 added.
15-10-1998	0.1.0	Revision after L1 Group Meeting in Stockholm with the addition of text proposal in L1 418/98 on cell selection and redirection to BRAN / HIPERLAN 2. A section on STATUS is added with an editorial note explaining what is BRAN/HIPERLAN 2 added in Subclause 3.1 "Definitions". Approved at the Sophia Antipolis L1 meeting and submitted to Dresden SMG2 plenary.
21-12-1998	0.2.0	Revision after L1 Group Meeting in Espoo with the approved text as presented in L1 751/98. The STATUS section is updated.
Editor for UMTS XX.16 is: Stanley Chia AirTouch Communications Tel: +1.925.210.3470; Fax: +1.925.210.3485; Email: stanley.chia@airtouch.com		
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