

Agenda Item: 8.2, 8.3
Source: Lucent Technologies
Title: Frequency raster for IMT 2000 band
Document for: Approval

1 Introduction

TSG RAN #4 decided that WG4 is responsible for defining the channel raster and numbering scheme for UTRA. It agreed that flexibility should be retained for future enhancements. The following proposal allows maximum flexibility for any enhancement within the IMT 2000 band (including parts of the band which are currently not available in Europe, and the possibility of future options with narrower channel bandwidth).

The overhead of providing this flexibility, in terms of the length of signalling messages, is not significant.

2 Text proposal

It is proposed to add the following text to 25.101:

5.4.3 Channel number

The carrier frequency is designated by the [UTRA absolute radio frequency channel number (UARFCN)]. The value of the [UARFCN] in the IMT 2000 band is defined as follows:

Downlink:

$$N = 5 \cdot \frac{(F_{\text{downlink}} - 1885.2) - 1885.2}{F_{\text{downlink}} - 2024.8}$$

Uplink:

$$N = 5 \cdot \frac{(F_{\text{uplink}} - 2075.2) - 2110.2}{F_{\text{downlink}} - 2169.8}$$

It is proposed to add the following text to 25.102:

5.4.3 Channel number

The carrier frequency is designated by the [UTRA absolute radio frequency channel number (UARFCN)]. The value of the [UARFCN] in the lower IMT 2000 band is defined as follows:

$$N = 5 \cdot \frac{(F - 1885.2) - 1885.2}{F - 2024.8}$$

3 Other comments

The term UARFCN is placed in square brackets because the terminology must be aligned with WG2. The paper attached to this contribution shows why it may be necessary to change the terminology (see the table in section 4; the raster position has the same meaning as UARFCN in 25.101 and 25.102).

Agenda Item: 14.4

Source: Lucent Technologies

Title: *Identification of Parameters to Provide Full Flexibility of Channel Definition to Meet IMT2000 Requirements*

Document for: *Discussion, and approval as a working assumption*

1. Introduction

TSG SA WG1 has documented the requirements for handover in TS 22.129 V3.0.0 and this was approved at TSG SA#3. It contains a number of requirements that should be considered when developing the message formats for handover within RAN WG2.

2. Requirements

2.1 Handover Between IMT-2000 Members

Reviewing the requirements highlighted in the fore mentioned document, section 4 (General Principles Governing Handover requirements) the following is stated,

The handover matrix

handover possible?	to UMTS	to GSM-cs	to GSM-GPRS	to IMT2000 . UMTS
From UMTS	1	1	1	x
From GSM-cs	1	oos	oos	oos
From GSM-GPRS	1	oos	oos	oos
From IMT2000 . UMTS	x	oos	oos	oos

oos = out of scope of UMTS specifications

1= supporting standards required for UMTS release 99.

x= supporting standards required, not necessarily for release 99.

Point of Action 1: Whilst handover between different IMT2000 family members is not required for Release 99, a means shall be provided within Release 99 to facilitate this being introduced in future releases.

2.2 Handover between Environments

To support handover between different environments the fore mentioned document, section 5.3, states the following,

‘UMTS is expected to provide coverage in a number of environments including fixed and mobile. The standard shall enable handover between these environments as described in the table below. The following are indicative of long term requirements and do not necessarily apply to R99. However, technical standardisation should not preclude the possibility of implementing these requirements.’

From \ To	Terrestrial Cellular	Fixed/Cordless	Satellite
Terrestrial Cellular	Yes	Yes	Yes
Fixed/Cordless	Yes	Yes	Yes
Satellite	Yes	Yes	No

Point of Action 2: It should be possible to support handover between these different environments. Signalling should therefore be provided to support handover to terrestrial, satellite, and cordless in future releases. Release 99 standards should facilitate this being introduced.

3. Proposal

In order to not restrict or pre-empt the spectrum regulators in anyway whilst maintaining complete flexibility in the description of RF channel and minimising the over air traffic, it is proposed that some additional parameters be added to the *frequency info* information element.

The frequency information element is used in a number of RRC messages such as the handover command, RAB setup & reconfiguration, RRC connection setup etc. Additionally, there are also other specific messages sent to facilitate intersystem handover which specify cell system characteristics, which may or may not identify the target cell as the same system type as the existing PLMN (or even the same PLMN in the case of cross boarder roaming).

It is intended that this proposal shall identify the parameters necessary to enable a detailed description an RF channel to be made. This shall enable a network to efficiently and accurately inform a UE of all the necessary channel parameters to enable it to perform channel identification and other associated procedures.

These parameters will enable the UTRA to,

- . Define a message format for information, both for UTRA channels and also for channels of any other system, including GSM and CDMA2000. This will support handover and roaming between networks.
- . Support all proposed deployments of UTRA, including TDD in the paired bands and variable duplex spacing, thereby not pre-empting regulatory bodies and providing full flexibility in frequency allocation throughout the whole of the IMT2000 spectrum and any foreseen allocations.
- . Enable the concept of the logical pilot channel as proposed by the ITU-R TG8/1, to be implemented within UTRA.
- . Enable definition of a subset of available frequencies to be defined within a network, thus speeding up the process of channel, and subsequently network acquisition.
- . Enable a priority association to be assigned to the channel also speeding up the process of channel, and subsequently network acquisition.

4. Parameter Definition

Proposed new definition for Frequency Info element to replace current definition in TS 25.331 section 10.2.6.1

Parameters	REFERENCE	TYPE	NOTE
Same/ different system		M	Identifies relevance of message to UMTS or other system
Identification of system		C	If identified as a message for non UMTS system then this is used to specify the system type i.e. CDMA2000, GSM, etc
UTRA RF Channel Number		M	A unique identifier for the channel raster and its associated parameters (as described by the other parameters within this info element)

Raster Position		<input type="radio"/>	Provided to enable the definition of permitted carrier frequency associated to the specific UTRA RF Channel Number parameter
Priority		<input type="radio"/>	Enable the setting of priority of the UTRA RF Channel Number parameter, to facilitate efficient system/ cell/ channel identification and selection processes
Chip rate		<input type="radio"/>	
RF Channel Type		<input type="radio"/>	Identifies whether the UTRA RF Channel Number parameter is FDD/ TDD/ uplink/ downlink only

Details of the new parameters proposed are as follows,

Same/different system – this simple identifier enables the receiving UE to determine whether the associated information (i.e. that contained in the remainder of the information element) is specific to the UMTS system or another type of system. This shall enable the UTRAN to forward other information within this information element specific to another system type such as GSM ARFCN (Absolute Radio Frequency Channel Number).

Identification of system – If the message has been identified as relating to a different system other than UMTS, then this element enables the identification of that system. Each particular system i.e. GSM900, GSM1800, CDMA2000 etc., will have a unique identity.

UTRA channel number – By using this single reference parameter, the over air signalling shall enable the UE to determine all the associated pre-defined parameters of that channel. These pre-defined parameters include the system type (e.g. UMTS, CDMA2000 or GSM), detailed raster position of the channel, mode of the channel (i.e. TDD/ FDD/ uplink/ downlink only), a relative priority for selection, and any other optional fields not currently identified.

Raster position – this details explicitly the radio frequency of the channel. This may be adapted to enable definition of new frequency ranges currently unidentified in the IMT2000 frequency plan with the use of the previously identified system identification parameter.

Priority – enables the definition of the priority of the associated channel, to enable enhancement of the cell selection, system selection and handover selection processes.

RF channel type – this is to enable the identification of the required mode of operation associated to the channel, this would include TDD/ FDD/ uplink/ downlink. (This would enhance the already defined parameter *Mode* that is currently defined as TDD/FDD).

5. Summary

These parameters will enable sufficient flexibility in the definition of an RF channel for the UTRAN to cover all foreseen and unforeseen regulatory spectrum requirements. This will also enhance cell/ network identification and selection processes and provide a process for inter-system operation as required for harmonisation between all IMT2000 systems utilising the priority parameter. The use of the single reference parameter, UTRA channel number enables efficient signalling of all the channel parameters whilst maintaining full flexibility for system / channel identification.

To support the full flexibility required to meet IMT2000 requirements, it is proposed that the information element *Frequency Info* in chapter 10.2.6.1 of TS 25.331 [1] is updated with the parameters outlined in section 4 of this paper.

6. References

- [1] 3GPP TS 25.331, v 1.1.0 : RRC Protocol Specification
Source: Editor