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Contents

Foreword

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2 presented to TSG for approval;

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y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document shall provide a description of the UTRAN Iur and Iub interfaces user plane protocols for Dedicated Transport Channel data streams as agreed within the TSG-RAN working group 3.

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. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 25.301: "Radio interface protocol architecture".

[2] 3GPP TS 25.401: "UTRAN overall description".

[3] 3GPP TS 25.302: "Services provided by the physical layer".

[4] 3GPP TS 25.433: "UTRAN Iub interface Node B Application Part (NBAP) signalling".

[5] 3GPP TS 25.402: "Synchronisation in UTRAN, Stage 2".

[6] 3GPP TS 25.423: "UTRAN Iur interface Radio Network Subsystem Application Part (RNSAP) signalling".

[7] 3GPP TS 25.133: "Requirements for support of radio resource management (FDD)".

[8] 3GPP TS 25.123: "Requirements for support of radio resource management (TDD)".

[9] 3GPP TS 25.212: "Multiplexing and channel coding (FDD)".

[10] 3GPP TS 25.222: "Multiplexing and channel coding (TDD)".

[11] 3GPP TS 25.224: "Physical layer procedures (TDD)".

[12] 3GPP TS 25.214: "Physical layer procedures (FDD)".

[13] 3GPP TS 25.319: "Enhanced uplink; Overall description; Stage 2"

[14] 3GPP TS 25.101: "User Equipment (UE) radio transmission and reception (FDD)"

[15] 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification"

[16] 3GPP TS 25.321: "Medium Access Control (MAC) protocol specification"

3 Definitions and abbreviations

3.1 Definitions

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

Transport Bearer: service provided by the transport layer and used by frame protocol for the delivery of FP PDU

3.2 Abbreviations

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

BER	Bit Error Rate
CCTrCH	Coded Composite Transport Channel
CFN	Connection Frame Number
CRC	Cyclic Redundancy Checksum
CRCI	CRC Indicator
DCH	Dedicated Transport Channel
DL	Downlink
DPC	Downlink Power Control
DRNC	Drift RNC
DSCH	Downlink Shared Channel
DTX	Discontinuous Transmission
E-DCH	Enhanced DCH
FP	Frame Protocol
FT	Frame Type
HARQ	Hybrid ARQ
LTOA	Latest Time of Arrival
PC	Power Control
PDU	Protocol Data Unit
PO	Power Offset
QE	Quality Estimate
RL	Radio Link
SIR	Signal-to-Interference Ratio
SRNC	Serving RNC
TB	Transport Block
TBS	Transport Block Set
TFI	Transport Format Indicator
TFCI	Transport Format Combination Indicator
ToA	Time of Arrival
ToAWE	Time of Arrival Window Endpoint
ToAWS	Time of Arrival Window Startpoint
TPC	Transmit Power Control
TTI	Transmission Time Interval
UE	User Equipment
UL	Uplink

3.3 Specification Notations

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

[FDD] This tagging of a word indicates that the word preceding the tag "[FDD]" applies only to FDD. This tagging of a heading indicates that the heading preceding the tag "[FDD]" and the section following the heading applies only to FDD.

[TDD] This tagging of a word indicates that the word preceding the tag "[TDD]" applies only to TDD, including 7.68 Mcps TDD, 3.84Mcps TDD and 1.28Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[TDD]" and the section following the heading applies only to TDD, including 7.68Mcps TDD, 3.84Mcps TDD and 1.28Mcps TDD.

[7.68Mcps TDD] This tagging of a word indicates that the word preceding the tag "[7.68Mcps TDD]" applies only to 7.68Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[7.68Mcps TDD]" and the section following the heading applies only to 7.68Mcps TDD.

[3.84Mcps TDD] This tagging of a word indicates that the word preceding the tag "[3.84Mcps TDD]" applies only to 3.84Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[3.84Mcps TDD]" and the section following the heading applies only to 3.84Mcps TDD.

[1.28Mcps TDD] This tagging of a word indicates that the word preceding the tag "[1.28Mcps TDD]" applies only to 1.28Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[1.28Mcps TDD]" and the section following the heading applies only to 1.28Mcps TDD.

[FDD - …] This tagging indicates that the enclosed text following the "[FDD - " applies only to FDD. Multiple sequential paragraphs applying only to FDD are enclosed separately to enable insertion of TDD specific (or common) paragraphs between the FDD specific paragraphs.

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Procedure When referring to a procedure in the specification, the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Timing Adjustment procedure.

Frame When referring to a control or data frame in the specification, the CONTROL/DATA FRAME NAME is written with all letters in upper case characters followed by the words "control/data frame", e.g. DL SYNCHRONISATION control frame.

IE When referring to an information element (IE) in the specification, the *Information Element Name* is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. *Connection Frame Number* IE.

Value of an IE When referring to the value of an information element (IE) in the specification, the "Value" is written as it is specified in subclause 6.2.4 or 6.3.3 enclosed by quotation marks, e.g. "0" or "255".

4 General aspects

The specification of Iub DCH and E-DCH data streams is also valid for Iur DCH and E-DCH data streams.

The complete configuration of the transport channel is selected by the SRNC and signalled to the Node B via the Iub and Iur control plane protocols.

The parameters of a transport channel are described in TS 25.301 [1]. Transport channels are multiplexed on the downlink by the Node B on radio physical channels, and de-multiplexed on the uplink from radio physical channels to transport channels.

In Iur interface, every set of coordinated transport channels related to one UE context that is communicated over a set of cells that are macro-diversity combined within Node B or DRNC, is carried on one transport bearer. This means that there are as many transport bearers as set of coordinated transport channels and Iur DCH data ports for that communication.

In Iub interface, every set of coordinated transport channels related to one UE context that is communicated over a set of cells that are macro-diversity combined within Node B is carried on one transport bearer. This means that there are as many transport bearers as set of coordinated transport channels and Iub DCH data ports for that communication.

Bi-directional transport bearers are used.

4.1 DCH and E-DCH FP services

DCH frame protocol provides the following services:

- Transport of TBS across Iub and Iur interface.
- Transport of outer loop power control information between the SRNC and the Node B.
- Support of transport channel synchronisation mechanism.
- Support of node synchronization mechanism.
- [3.84 Mcps TDD and 7.68 Mcps - Transfer of Rx timing deviation from the Node B to the SRNC.]
- Transfer of radio interface parameters from the SRNC to the Node B.

[FDD – E-DCH frame protocol provides the following services:

- Transport of MAC-es or MAC-is PDUs across Iub and Iur interface from Node B to SRNC.
- Transport of outer loop power control information between the SRNC and the Node B.
- Transfer of radio interface parameters from the SRNC to the Node B.
- Transport of network congestion indication from SRNC across Iub and Iur interface.
- Transport of hybrid ARQ information between SRNC and Node B.]

[TDD – E-DCH frame protocol provides the following services:

- Transport of MAC-es or MAC-is PDUs across Iub and Iur interface from Node B to SRNC.
- Transport of outer loop power control information between the SRNC and the Node B.
- Transport of network congestion indication from SRNC across Iub and Iur interface.
- Transport of hybrid ARQ information between SRNC and Node B.]

4.2 Services expected from the Data Transport Network layer

Following service is required from the transport layer:

- Delivery of FP PDU.

In sequence delivery is not required. However, frequent out-of-sequence delivery may impact the performance and should be avoided.

4.3 Protocol Version

This revision of the specification specifies version 1 of the protocol.

5 DCH Frame Protocol procedures

5.1 Data Transfer

5.1.0 General

When there is some data to be transmitted, DCH data frames are transferred every transmission time interval from the SRNC to the Node B for downlink transfer, and DCH/E-DCH data frames are transferred every transmission time interval from Node B to the SRNC for uplink transfer. [FDD – For 2 ms Uu TTI and depending on configuration from higher layers, the uplink E-DCH MAC-es or MAC-is PDU's from one or more 2ms Uu TTI's may be bundled into one E-DCH Data Frame before being transferred at an interval of e.g. 10ms from the Node B to the SRNC.]

An optional error detection mechanism may be used to protect the data transfer if needed. At the transport channel setup it shall be specified if the error detection on the user data is used.

5.1.1 Uplink for DCH

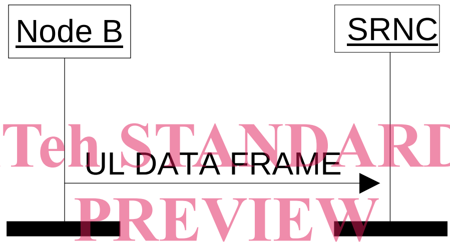

Figure 1: Uplink Data Transfer procedure

Two modes can be used for the UL transmission: *normal mode* and *silent mode*. The mode is selected by the SRNC when the transport bearer is setup and signalled to the Node B with the relevant control plane procedure.

- In normal mode, the Node B shall always send an UL DATA FRAME to the RNC for all the DCHs in a set of coordinated DCHs regardless of the number of Transport Blocks of the DCHs.

- In silent mode and in case only one transport channel is transported on a transport bearer, the Node B shall not send an UL DATA FRAME to the RNC when it has received a TFI indicating "number of TB equal to 0" for the transport channel during a TTI.

- In silent mode and in case of coordinated DCHs, when the Node B receives a TFI indicating "number of TB equal to 0" for all the DCHs in a set of coordinated DCHs, the Node B shall not send an UL DATA FRAME to the RNC for this set of coordinated DCHs.

For any TTI in which the Node B Layer 1 generated at least one CPHY-Out-of-Sync-IND primitive, the Node B is not required to send an UL DATA FRAME to the SRNC.

When Node B receives an invalid TFCI, no UL DATA FRAME shall be sent to the SRNC.

5.1.1a Uplink for E-DCH

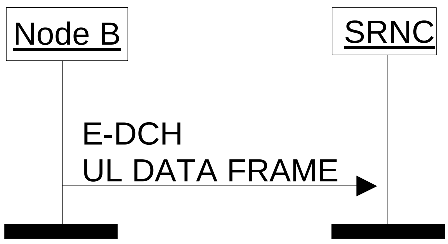

Figure 1a: Uplink Data Transfer procedure

When a MAC-e or MAC-i PDU is received, it is demultiplexed into MAC-d flows which are then each sent on separate transport bearers to the RNC using the E-DCH UL DATA FRAME TYPE 1 (MAC-e) or TYPE 2 (MAC-i).

Only silent mode is used, i.e. E-DCH user-plane payload is transmitted using the E-DCH UL DATA FRAME only when some payload has been successfully received.

[FDD – In case of Multi Cell E-DCH operation two transport bearer modes can be used for the E-DCH payload transmission: *separate Iub transport bearer mode* and *E-DCH UL flow multiplexing mode*. The mode is selected by the SRNC when the RL on secondary UL frequency is setup and signalled to the Node B with the relevant control plane procedure.

- In separate Iub transport bearer mode, the Node B shall send each MAC-d flow received in cells of the different UL frequencies (primary and secondary) on separate transport bearers, one per frequency, to the RNC using the E-DCH UL DATA FRAME TYPE 2 (MAC-i).

- In E-DCH UL flow multiplexing mode, the Node B shall send the MAC-d flows received on all UL frequencies (primary as well as secondary) on one transport bearer to the RNC using the E-DCH UL DATA FRAME TYPE 2 (MAC-i).]

[1.28Mcps TDD – In case of multiple carriers E-DCH operation two transport bearer modes can be used for the E-DCH payload transmission: *separate Iub transport bearer mode* and *E-DCH UL flow multiplexing mode*. The mode is selected by the SRNC when the RL is setup and signalled to the Node B with the relevant control plane procedure.

- In separate Iub transport bearer mode, the Node B shall send each MAC-d flow received in the different frequencies on separate transport bearers, one per frequency, to the RNC using the E-DCH UL DATA FRAME TYPE 2 (MAC-i).

- In E-DCH UL flow multiplexing mode, the Node B shall send one MAC-d flow received on all frequencies on one transport bearer to the RNC using the E-DCH UL DATA FRAME TYPE 2 (MAC-i).]

5.1.2 Downlink

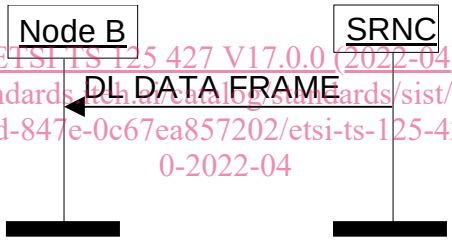

Figure 2: Downlink Data Transfer procedure

The Node B shall only consider a transport bearer synchronised after it has received at least one DL DATA FRAME on this transport bearer before LTOA (TS 25.402 [5]).

The Node B shall consider the DL user plane of a certain RL synchronised once all transport bearers established to carry DCH DL DATA FRAMEs included in the CCTrCH for this RL are considered as synchronised. Once synchronised, the Node B shall assume the DL user plane for this Radio Link stays synchronised as long as the Radio Link exists, even if transport bearers are added (see 5.10.2), replaced (see subclause 5.10.1), or removed. When a RL established through the Radio Link Addition procedure (TS 25.433 [4] TS 25.423 [6]) is combined with a RL whose DL user plane is considered as synchronised, the Node B shall consider the DL user plane of this newly established RL as synchronised.

[FDD - The Node B shall transmit on the DL DPDCH(s) of a certain RL only when the DL user plane of this RL is considered synchronised.]

[TDD – The Node B shall transmit special bursts on the DL DPCH as per TS 25.224 [11], until the DL user plane is considered synchronised].

When the DL user plane is considered synchronised and the Node B does not receive a valid DL DATA FRAME in a TTI, it assumes that there is no data to be transmitted in that TTI for this transport channel, and shall act as one of the following cases: