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Technical Specification

Universal Mobile Telecommunications System (UMTS); UTRAN Iub/Iur Interface User Plane Protocol for DCH Data Streams (3GPP TS 25.427 version 3.7.0 Release 1999)

Reference

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Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

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1 Scope

This 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 architecture description".

[3] 3GPP TS 25.302: "Services provided by the Physical Layer, Source WG2".

[4] 3GPP TS 25.433: "UTRAN Iub interface NBAP signalling".

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

[6] 3GPP TS 25.423: "UTRAN Iur interface RNSAP signalling".

[7] 3GPP TS 25.215: "Physical layer – Measurements (FDD)".

[8] 3GPP TS 25.225: "Physical layer – Measurements (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)".

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:

CFN Connection Frame Number
CRC Cyclic Redundancy Checksum
CRCI CRC Indicator
DCH Dedicated Transport Channel

DL	Downlink
DSCH	Downlink Shared Channel
DTX	Discontinuous Transmission
FP	Frame Protocol
FT	Frame Type
PC	Power Control
QE	Quality Estimate
TB	Transport Block
TBS	Transport Block Set
TFI	Transport Format Indicator
TFCI	Transport Format Combination Indicator
ToA	Time of arrival
TTI	Transmission Time Interval
UL	Uplink

4 General aspects

The specification of I_{ub} DCH data streams is also valid for I_{ur} 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 [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 channel 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 User ports for that communication.

In Iub interface, every set of coordinated Transport channel 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 User ports for that communication.

Bi-directional transport bearers are used.

4.1 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 synchronization mechanism.
- Support of Node Synchronization mechanism.
- Transfer of DSCH TFI from SRNC to Node B.
- Transfer of Rx timing deviation (TDD) from the Node B to the SRNC.
- Transfer of radio interface parameters from the SRNC to the Node B.

4.2 Services expected from data transport

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 from Node B to the SRNC for uplink transfer.

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

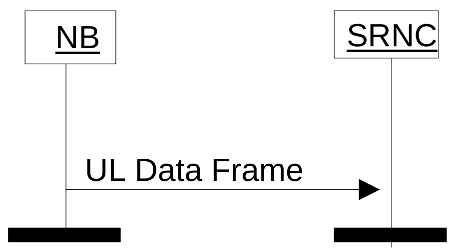

Figure 1: Uplink data transfer

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 Data Frame shall be sent to the SRNC.

5.1.2 Downlink

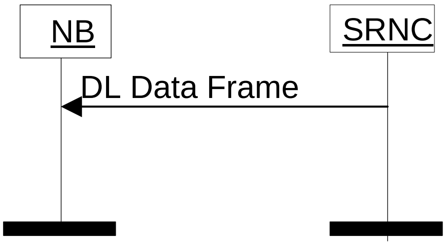

Figure 2: Downlink data transfer

The Node B shall only consider a transport bearer synchronised after it has received at least one data frame on this transport bearer before LTOA [5].

The Node B shall consider the DL user plane for a certain RL synchronised if all transport bearers established for carrying DL DCH data frames for this RL are synchronised.

[FDD - Only when the DL user plane is considered synchronised, the Node B shall transmit on the DL DPDCH.

[TDD – The Node B shall transmit special bursts on the DL DPCH as per [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:

- [TDD – If the Node B receives no valid data frames for any transport channel assigned to a UE it shall assume DTX and transmit special bursts as per [11]].
- If the node B is aware of a TFI value corresponding to zero bits for this transport channel, this TFI is assumed. If the TFS contains both a TFI corresponding to "TB length equal to 0 bits" and a TFI corresponding to "number of TB equal to 0", the node-B shall assume the TFI corresponding to "number of TB equal to 0". When combining the TFI's of the different transport channels, a valid TFCI might result and in this case data shall be transmitted on Uu.
- If the node B is not aware of a TFI value corresponding to zero bits for this transport channel or if combining the TFI corresponding to zero bits with other TFI's, results in an unknown TFI combination, the handling as described in the following paragraph shall be applied.

At each radio frame, the Node B shall build the TFCI value of each CCTrCH, according to the TFI of the DCH data frames multiplexed on this CCTrCH and scheduled for that frame. [FDD - In case the Node B receives an unknown combination of TFIs from the DL Data Frames, it shall transmit only the DPCCH without TFCI bits.] [TDD - In case the Node receives an unknown combination of DCH data frames, it shall apply DTX, i.e. suspend transmission on the corresponding DPCHs.]

5.2 Timing adjustment

The Timing Adjustment procedure is used to keep the synchronization of the DCH data stream in DL direction, i.e to ensure that the Node B receives the DL frames in an appropriate time for the transmission of the data in the air interface.

SRNC always includes the Connection Frame Number (CFN) to all DL DCH FP frames. The same applies to the DSCH TFI Signalling control frame.

If a DL data frame or a DSCH TFCI Signalling control frame arrives outside the arrival window defined in the Node B, the Node B shall send a TIMING ADJUSTMENT control frame, containing the measured ToA and the CFN value of the received DL Data Frame.

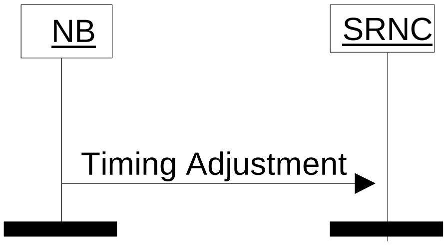

Figure 3: Timing Adjustment

The arrival window and the time of arrival are defined as follows:

Time of Arrival Window Endpoint (ToAWE): ToAWE represents the time point by which the DL data shall arrive to the node B from Iub. The ToAWE is defined as the amount of milliseconds before the last time point from which a timely DL transmission for the identified CFN would still be possible taking into account the node B internal delays. ToAWE is set via control plane. If data does not arrive before ToAWE a Timing Adjustment Control Frame shall be sent by node B.

Time of Arrival Window Startpoint (ToAWS): ToAWS represents the time after which the DL data shall arrive to the node B from Iub. The ToAWS is defined as the amount of milliseconds from the ToAWE. ToAWS is set via control plane. If data arrives before ToAWS a Timing Adjustment Control Frame shall be sent by node B.

Time of Arrival (ToA): ToA is the time difference between the end point of the DL arrival window (ToAWE) and the actual arrival time of DL frame for a specific CFN. A positive ToA means that the frame is received before the ToAWE, a negative ToA means that the frame is received after the ToAWE.

The general overview on the timing adjustment procedure is reported in [2].

5.3 Synchronization

Synchronization procedure is used to achieve or restore the synchronization of the DCH data stream in DL direction, and as a keep alive procedure in order to maintain activity on the Iur/Iub transport bearer.

The procedure is initiated by the SRNC by sending a DL SYNCHRONIZATION control frame towards Node B. This message indicates the target CFN.

Upon reception of the DL SYNCHRONIZATION control frame, Node B shall immediately respond with UL SYNCHRONIZATION control frame indicating the ToA for the DL synchronization frame and the CFN indicated in the received DL SYNCHRONIZATION message.

UL SYNCHRONIZATION control frame shall always be sent, even if the DL SYNCHRONIZATION control frame is received by the Node B within the arrival window.

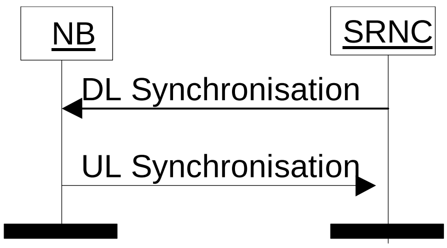

Figure 4: DCH Synchronization procedure

5.4 Outer loop PC information transfer [FDD]

Based, for example, on the CRCI values and on the quality estimate in the UL frames, SRNC modifies the SIR target used by the UL Inner Loop Power Control by including the absolute value of the new SIR target in the OUTER LOOP PC control frame sent to the Node B's.

At the reception of the OUTER LOOP PC control frame, the Node B shall immediately update the SIR target used for the inner loop power control with the specified value.

The OUTER LOOP PC control frame can be sent via any of the transport bearers dedicated to one UE.

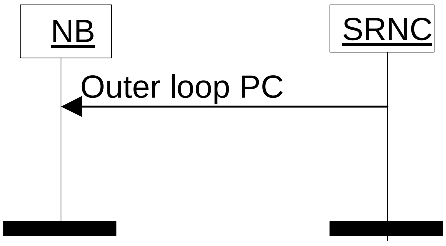

Figure 5: Outer loop power control information transfer

5.5 Node Synchronization

The Node Synchronization procedure is used by the SRNC to acquire information on the Node B timing.

The procedure is initiated by the SRNC by sending a DL NODE SYNCHRONIZATION control frame to Node B containing the parameter T1.

Upon reception of a DL NODE SYNCHRONIZATION control frame, the Node B shall respond with UL NODE SYNCHRONIZATION Control Frame, including the parameters T2 and T3, as well as the T1 which was indicated in the initiating DL NODE SYNCHRONIZATION control frame.

The T1, T2, T3 parameters are defined as:

T1: RNC specific frame number (RFN) that indicates the time when RNC sends the frame through the SAP to the transport layer.

T2: Node B specific frame number (BFN) that indicates the time when Node B receives the correspondent DL synchronization frame through the SAP from the transport layer.

T3: Node B specific frame number (BFN) that indicates the time when Node B sends the frame through the SAP to the transport layer.

The general overview on the Node Synchronization procedure is reported in [2].

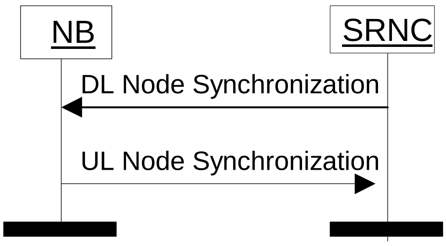

Figure 6: Node Synchronization procedure

5.6 Rx timing deviation measurement [TDD]

In case the *Timing Advance Applied* IE indicates "Yes" (see Ref. [4]) in a cell, the Node B shall, for all UEs using DCHs, monitor the receive timing of the uplink DPCH bursts arriving over the radio interface, and shall calculate the Rx Timing Deviation. If the calculated value, after rounding, is not zero, it shall be reported to the SRNC in a RX TIMING DEVIATION Control Frame belonging to that UE. For limitation of the frequency of this reporting, the Node B shall not send more than one RX TIMING DEVIATION Control Frame per UE within one radio frame.

If the *Timing Advance Applied* IE indicates "No" (see Ref. [4]) in a cell, monitoring of the receive timing of the uplink DPCH bursts is not necessary and no RX TIMING DEVIATION Control Frame shall be sent.

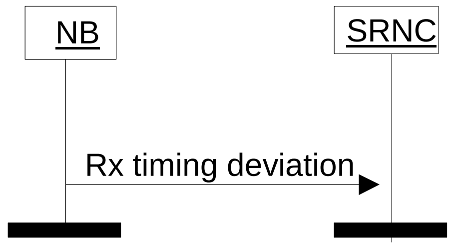

Figure 7: Rx timing deviation

5.7 DSCH TFCI Signalling [FDD]

This procedure is used in order to signal to the node B the TFCI (field 2). This allows the node B to build the TFCI word(s) which have to be transmitted on the DPCCH. A transport bearer of any DCH directed to this same UE may be employed for transport over the Iub/Iur.

The procedure consists in sending the DSCH TFCI signalling control frame from the SRNC to the node B. The frame contains the TFCI (field 2) and the correspondent CFN. The DSCH TFCI signalling frame is sent once every Uu frame interval (10 ms) for as long as there is DSCH data for that UE to be transmitted in the associated PDSCH Uu frame. In the event that the node B does not receive a DSCH TFCI signalling control frame then the node B shall infer that no DSCH data is to be transmitted to the UE on the associated PDSCH Uu frame and will build the TFCI word(s) accordingly.

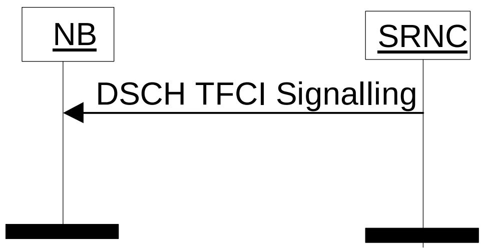

Figure 8: DSCH TFCI Signalling

5.8 Radio Interface Parameter Update [FDD]

This procedure is used to update radio interface parameters which are applicable to all RL's for the concerning UE. Both synchronised and unsynchronised parameter updates are supported.

The procedure consists of a RADIO INTERFACE PARAMETER UPDATE control frame sent by the SRNC to the Node B.

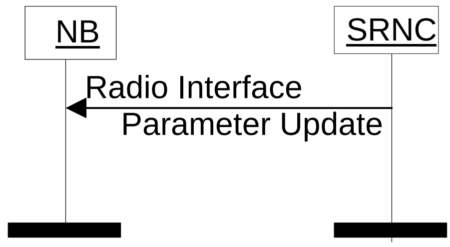

Figure 9: Radio Interface Parameter Update

If the RADIO INTERFACE PARAMETER UPDATE control frame contains a TPC Power Offset value, the Node B shall apply the newly provided TPC PO as soon as possible in case no CFN is included or from the indicated CFN.

5.9 Timing Advance [TDD]

This procedure is used in order to signal to the node B the adjustment to be performed by the UE in the uplink timing.

The Node B shall use the CFN and timing adjustment values to adjust its layer 1 to allow for accurate impulse averaging.

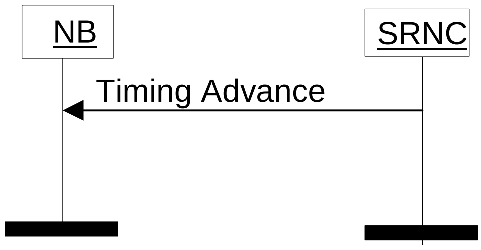

Figure 9A: Timing Advance Signalling

6 Frame structure and coding

6.1 General

The general structure of a DCH FP frame consists of a header and a payload. The structure is depicted in figure 9B below:

Figure 9B: General structure of a frame protocol PDU

The header contains a CRC checksum, the frame type field and information related to the frame type.

There are two types of DCH FP frames (indicated by the Frame type field):

- DCH data frame.
- DCH control frame.

The payload of the data frames contains radio interface user data, quality information for the transport blocks and for the radio interface physical channel during the transmission time interval (for UL only), and an optional CRC field.

The payload of the control frames contains commands and measurement reports related to transport bearer and the radio interface physical channel but not directly related to specific radio interface user data.

6.1.1 General principles for the coding

In this specification the structure of frames will be specified by using pictures similar to figure 10.

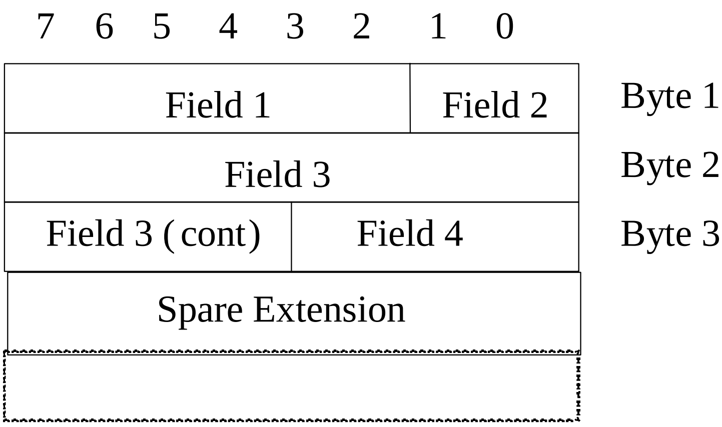

Figure 10: Example of notation used for the definition of the frame structure

Unless otherwise indicated, fields which consist of multiple bits within a byte will have the more significant bit located at the higher bit position (indicated above frame in figure 10). In addition, if a field spans several bytes, more significant bits will be located in lower numbered bytes (right of frame in figure 10).

On the Iub/Iur interface, the frame will be transmitted starting from the lowest numbered byte. Within each byte, the bits are sent according decreasing bit position (bit position 7 first).

The parameters are specified giving the value range and the step (if not 1). The coding is done as follows (unless otherwise specified):

- Unsigned values are binary coded.
- Signed values are coded with the 2's complement notation.

Bits labelled "Spare" shall be set to zero by the transmitter and shall be ignored by the receiver. The Spare Extension indicates the location where new IEs can in the future be added in a backward compatible way. The Spare Extension shall not be used by the transmitter and shall be ignored by the receiver.

6.2 Data frames

6.2.1 Introduction

The purpose of the user data frames is to transparently transport the transport blocks between Node B and Serving RNC.

The protocol allows for multiplexing of coordinated dedicated transport channels, with the same transmission time interval, onto one transport bearer.

The transport blocks of all the coordinated DCHs for one transmission time interval are included in one frame.

SRNC indicates the multiplexing of coordinated dedicated transport channels in the appropriate RNSAP/NBAP message.

6.2.2 Uplink data frame

The structure of the UL data frame is shown below.

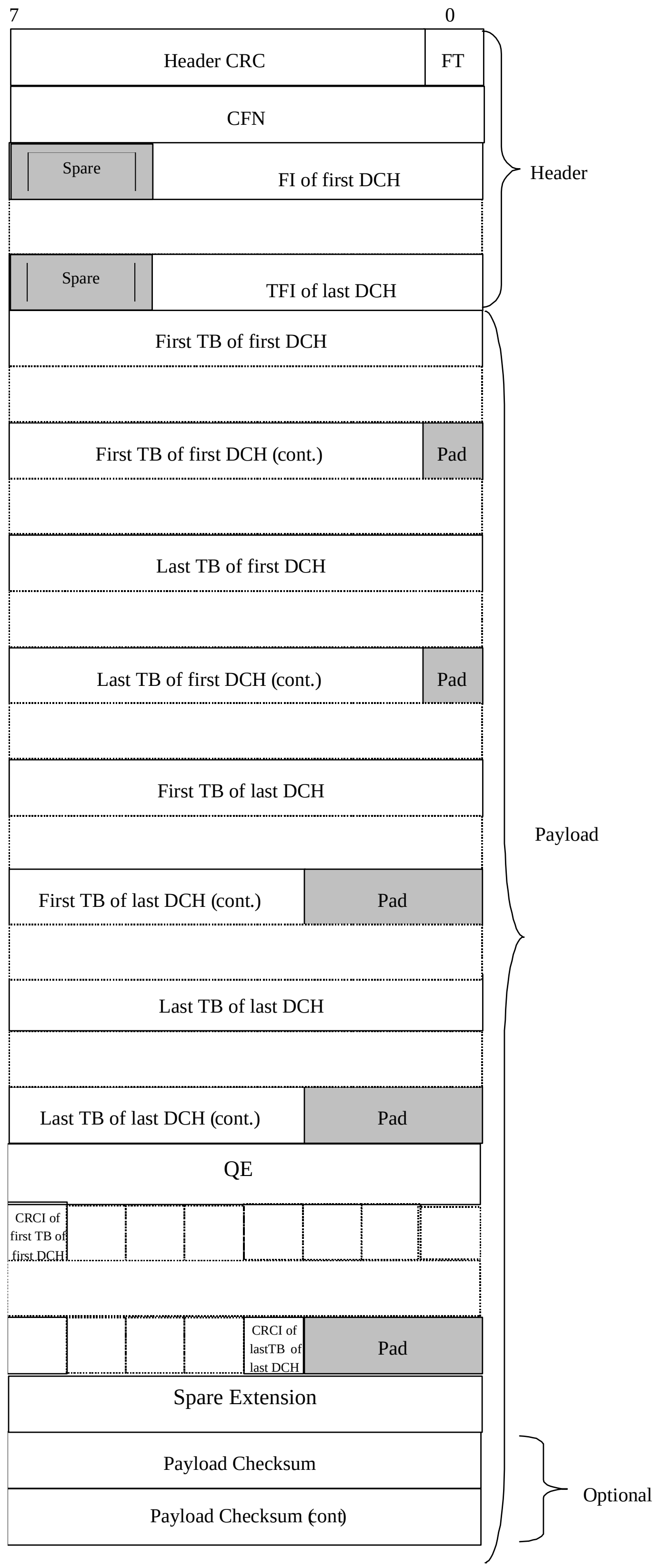

Figure 11: Uplink data frame structure

For the description of the fields see subclause 6.2.4.

There are as many TFI fields as number of DCH multiplexed in the same transport bearer.

The DCHs in the frame structure are ordered from the lower DCH id ('first DCH') to the higher DCH id ('last DCH').

The size and the number of TBs for each DCH is defined by the correspondent TFI.

If the TB does not fill an integer number of bytes, then bit padding is used as shown in the figure in order to have the octet aligned structure (ex: a TB of 21 bits requires 3 bits of padding).

There is a CRCI for each TB included in the frame irrespective of the size of the TB, i.e. the CRCI is included also when the TB length is zero. If the CRC indicators of one data frame do not fill an integer number of bytes, then bit padding is used as shown in the figure in order to have the octet aligned structure (ex. 3 CRCI bits require 5 bits of padding, but there are no CRCI bits and no padding, when number TBs is zero).

The payload CRC is optional, i.e. the whole 2 bytes field may or may not be present in the frame structure (this is defined at the setup of the transport bearer).

6.2.3 Downlink data frame

The structure of the DL data frame is shown below.

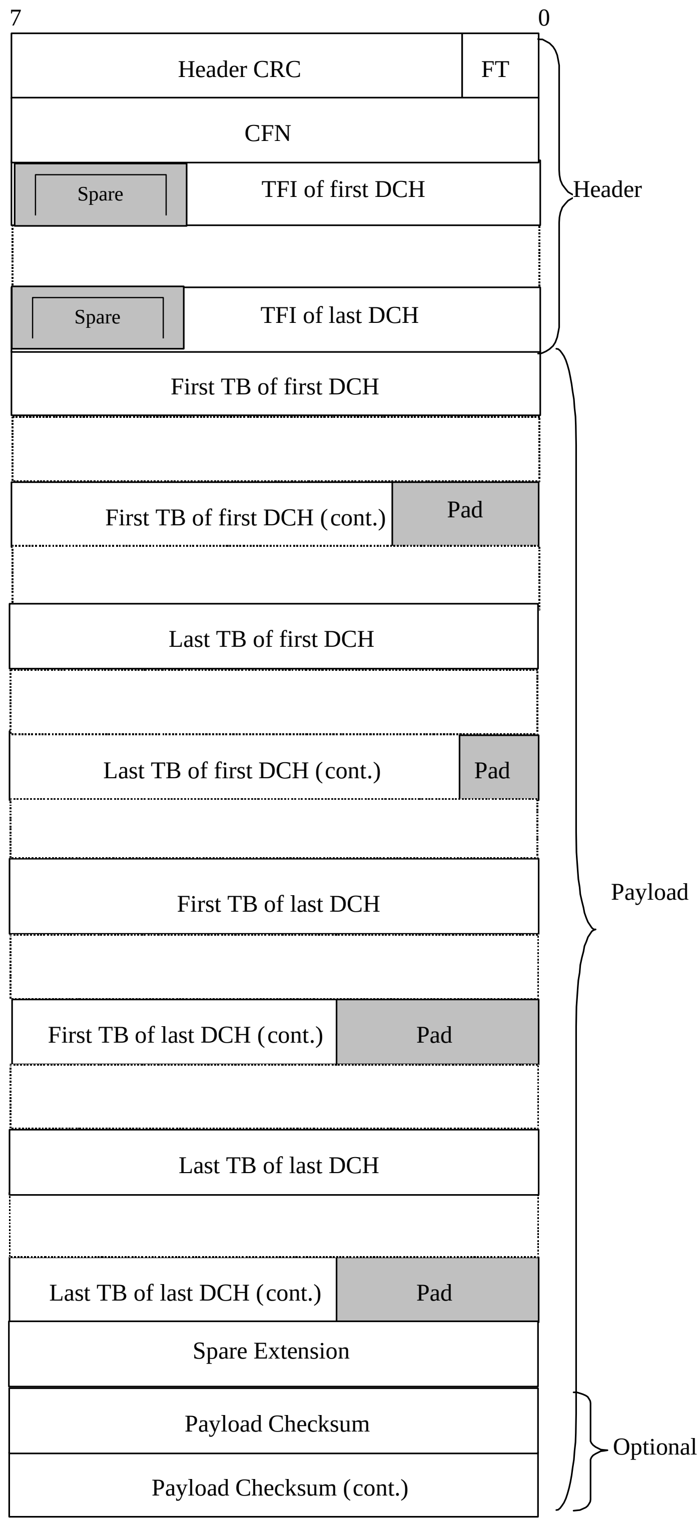

Figure 12: Downlink data frame structure

For the description of the fields see subclause 6.2.4.

There are as many TFI fields as number of DCH multiplexed in the same transport bearer.

The DCHs in the frame structure are ordered from the lower DCH id ('first DCH') to the higher DCH id ('last DCH').

The size and the number of TBs for each DCH is defined by the correspondent TFI.

If the TB does not fill an integer number of bytes, then bit padding is used as shown in the figure in order to have the octet aligned structure (ex: a TB of 21 bits requires 3 bits of padding).

The payload CRC is optional, i.e. the whole 2 bytes field may or may not be present in the frame structure (this is defined at the setup of the transport bearer).

6.2.4 Coding of information elements in data frames

6.2.4.1 Header CRC

Description: Result of the CRC applied to the remaining part of the header, i.e. from bit 0 of the first byte, (the FT field) to the bit 0 (included) of the last byte of the header) with the corresponding generator polynomial: $G(D) = D^7+D^6+D^2+1$. See subclause 7.2.

Field Length: 7 bits.

6.2.4.2 Frame Type (FT)

Description: describes if it is a control frame or a data frame.

Value range: {0=data, 1=control}.

Field Length: 1 bit.

6.2.4.3 Connection Frame Number (CFN)

Description: indicator as to which radio frame the first data was received on uplink or shall be transmitted on downlink. See reference [2].

Value range: {0-255}.

Field length: 8 bits.

6.2.4.4 Transport Format Indicator (TFI)

Description: TFI is the local number of the transport format used for the transmission time interval. For information about what the transport format includes see 3GPP TS 25.302 reference [3].

Value range: {0-31}.

Field length: 5 bits.

6.2.4.5 Quality Estimate (QE)

Description: The quality estimate is derived from the Transport channel BER [FDD - or Physical channel BER.]

[FDD - If the DCH FP frame includes TB's for the DCH which was indicated as "selected" with the QE-selector IE in the control plane [4][6], then the QE is the Transport channel BER for the selected DCH. If no Transport channel BER is available the QE is the Physical channel BER.]

[FDD - If the IE QE-Selector equals “non-selected” for all DCHs in the DCH FP frame, then the QE is the Physical channel BER.]

[TDD - If no Transport channel BER is available, then the QE shall be set to 0. This is in particular the case when no Transport Blocks have been received. The value of QE will be ignored by the RNC in this case.]

The quality estimate shall be set to the Transport channel BER [FDD - or Physical channel BER] and be measured in the units TrCh_BER_LOG [FDD - and PhCh_BER_LOG respectively] (see Ref [7] and [8]). The quality estimate is needed in order to select a transport block when all CRC indications are showing bad (or good) frame. The UL Outer Loop Power Control may also use the quality estimate.

Value range: {0-255}, granularity 1.

Field length: 8 bits.

6.2.4.6 Transport Block (TB)

Description: A block of data to be transmitted or received over the air interface. The transport format indicated by the TFI describes the transport block length and transport block set size. See 3GPP TS 25.302 reference [3].

Field length: the length of the TB is specified by the TFI.

6.2.4.7 CRC indicator (CRCI)

Description: Indicates the correctness/incorrectness of the TB CRC received on the Uu interface. For every transport block included in the data frame a CRCI bit will be present, irrespective of the presence of a TB CRC on the Uu interface. If no CRC was present on the Uu for a certain TB, the corresponding CRCI bit shall be set to "0".

Value range: {0=Correct, 1=Not Correct}.

Field length: 1 bit.

6.2.4.8 Payload CRC

Description: CRC for the payload. This field is optional. It is the result of the CRC applied to the remaining part of the payload, i.e. from the bit 7 of the first byte of the payload to the bit 0 of the byte of the payload before the CRC field, with the corresponding generator polynomial:
$G(D) = D^{16}+D^{15}+D^{2}+1$. See subclause 7.2.

Field length: 16 bits.

6.2.4.9 Spare Extension

Description: Indicates the location where new IEs can in the future be added in a backward compatible way.

Field length: 0-2 octets.

6.3 Control frames

6.3.1 Introduction

Control Frames are used to transport control information between SRNC and Node B.

On the uplink, these frames are not combined – all frames are passed transparently from Node B to SRNC. On the downlink, the same control frame is copied and sent transparently to all the Node Bs from the SRNC.

The structure of the control frames is shown in the figure below:

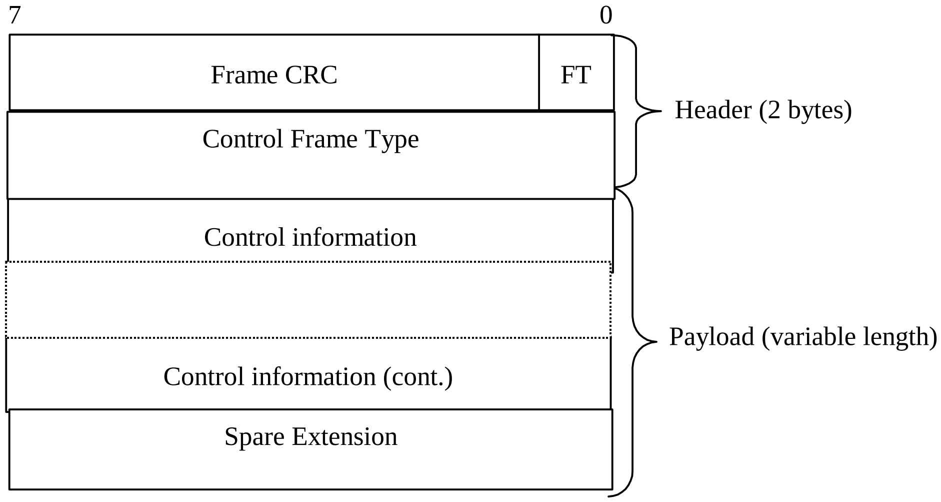

Figure 13: General structure of the control frames

Control Frame Type defines the type of the control frame.

The structure of the header and the payload of the control frames is defined in the following subclauses.

6.3.2 Header structure of the control frames

6.3.2.1 Frame CRC

Description: It is the result of the CRC applied to the remaining part of the frame, i.e. from bit 0 of the first byte of the header (the FT field) to bit 0 of the last byte of the payload, with the corresponding generator polynomial: $G(D) = D^7+D^6+D^2+1$. See subclause 7.2.

Field Length: 7 bits.

6.3.2.2 Frame Type (FT)

Description: describes if it is a control frame or a data frame.

Value range: {0=data, 1=control}.

Field Length: 1 bit.

6.3.2.3 Control Frame Type

Description: Indicates the type of the control information (information elements and length) contained in the payload.

Value The values are defined in the following table:

Control frame type	Coding
Outer loop power control	0000 0001
Timing adjustment	0000 0010
DL synchronization	0000 0011
UL synchronization	0000 0100
DL signalling for DSCH	0000 0101
DL Node synchronization	0000 0110
UL Node synchronization	0000 0111
Rx Timing Deviation	0000 1000
Radio Interface Parameter Update	0000 1001
Timing Advance	0000 1010

Field length: 8 bits.

6.3.3 Payload structure and information elements

6.3.3.1 Timing Adjustment

6.3.3.1.1 Payload structure

Figure below shows the structure of the payload when control frame is used for the timing adjustment.

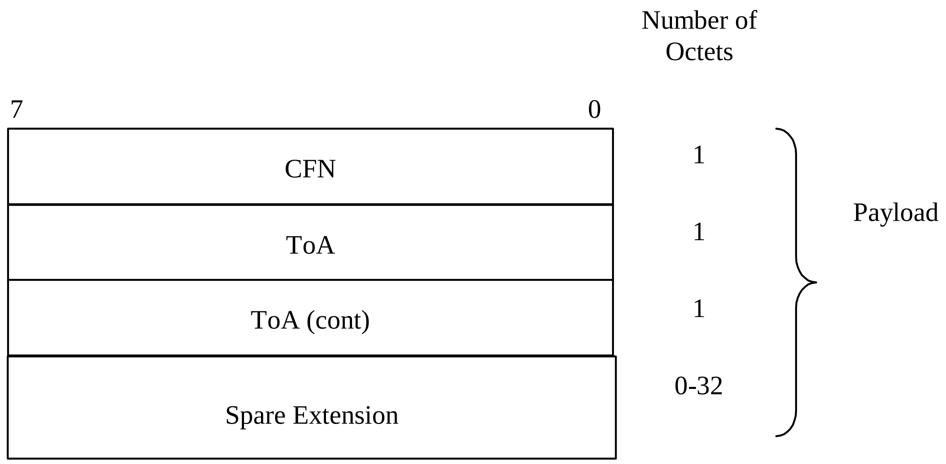

Figure 14: Structure of the payload for the Timing Adjustment control frame

6.3.3.1.2 CFN

The CFN value in the control frame is coded as in subclause 6.2.4.3.

6.3.3.1.3 Time of arrival (ToA)

Description: time difference between the arrival of the DL frame with respect to TOAWE (based on the CFN value in the frame).

Value range: {-1280, +1279.875 msec}.

Granularity: 125 µs.

Field length: 16 bits.

6.3.3.1.4 Spare Extension

Description: Indicates the location where new IEs can in the future be added in a backward compatible way.

Field length: 0-32 octets.

6.3.3.2 DL synchronization

6.3.3.2.1 Payload structure

Figure below shows the structure of the payload when control frame is used for the user plane synchronization.

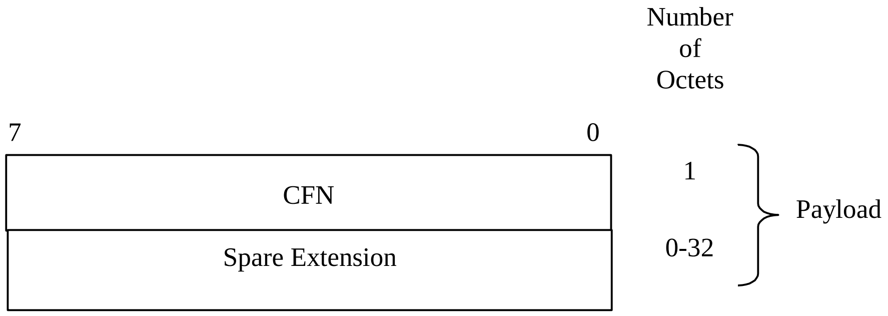

Figure 15: Structure of the payload for the DL synchronization control frame

6.3.3.2.2 CFN

The CFN value in the control frame is coded as in subclause 6.2.4.3.

6.3.3.2.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.3 UL synchronization

6.3.3.3.1 Payload structure

Figure below shows the structure of the payload when the control frame is used for the user plane synchronization (UL).

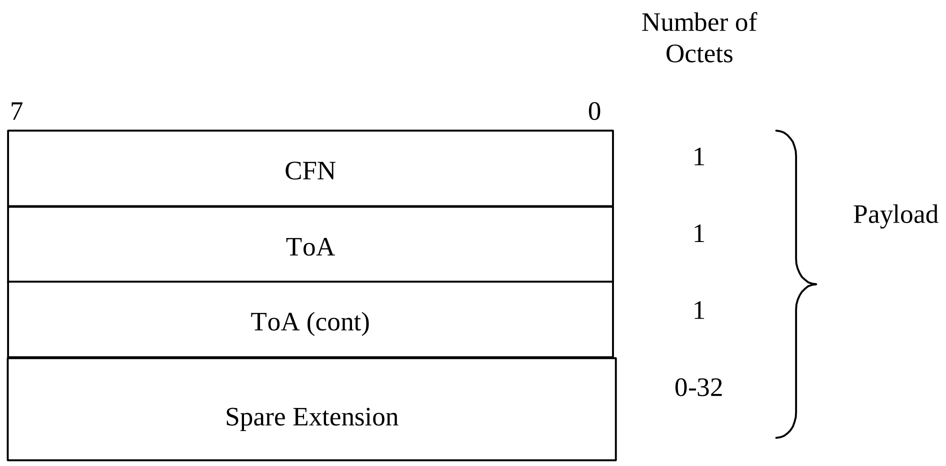

Figure 16: Structure of the UL Synchronization control frame

6.3.3.3.2 CFN

The CFN value in the control frame is coded as in subclause 6.2.4.3.

6.3.3.3.3 Time of arrival (ToA)

See subclause 6.3.3.1.3.

6.3.3.3.4 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.4 UL Outer loop power control [FDD]

6.3.3.4.1 Payload structure

Figure below shows the structure of the payload when control frame is used for the UL outer loop power control.

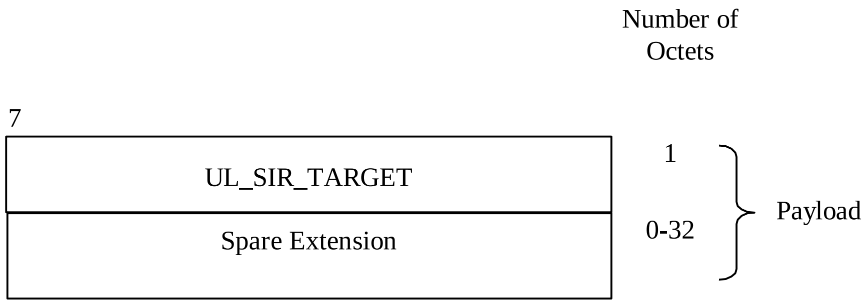

Figure 17: Structure of the payload for outer loop PC control frame

6.3.3.4.2 SIR Target

Description: Value (in dB) of the SIR target to be used by the UL inner loop power control.

SIR Target is given in the unit UL_SIR_TARGET where:

UL_SIR_TARGET = 000 SIR Target = -8.2 dB
UL_SIR_TARGET = 001 SIR Target = -8.1 dB
UL_SIR_TARGET = 002 SIR Target = -8.0 dB
...
UL_SIR_TARGET = 254 SIR Target = 17.2 dB
UL_SIR_TARGET = 255 SIR Target = 17.3 dB

Value range: {-8.2…17.3 dB}, step 0.1 dB.

Field length: 8 bits.

6.3.3.4.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.5 DL Node Synchronization

6.3.3.5.1 Payload structure

Figure below shows the structure of the payload for the DL Node Synchronization control frame.

7 ... 0	Number of Octets	
T1	1	Payload
T1 (cont)	1	
T1 (cont)	1	
Spare Extension	0-32	

Figure 18: Structure of the payload for the DL Node Synchronization control frame

6.3.3.5.2 T1

Description: RNC specific frame number (RFN) that indicates the time when RNC sends the frame through the SAP to the transport layer.

Value range: as defined in subclause 6.3.3.6.2.

Field length: 24 bits.

6.3.3.5.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.6 UL Node Synchronization

6.3.3.6.1 Payload structure

The payload of the UL Node synch control frames is shown in the figure below.

7 … 0	Number of Octets	
T1	1	Payload
T1 (cont)	1	
T1 (cont)	1	
T2	1	
T2 (cont)	1	
T2 (cont)	1	
T3	1	
T3 (cont)	1	
T3 (cont)	1	
Spare Extension	0-32	

Figure 19: Structure of the payload for UL Node Synchronization control frame

6.3.3.6.2 T1

Description: T1 timer is extracted from the correspondent DL synchronization control frame.

Value range: 0-40959.875 ms, and the resolution is 0.125 ms.

Field length: 24 bits.

6.3.3.6.3 T2

Description: Node B specific frame number (BFN) that indicates the time when Node B received the correspondent DL synchronization frame through the SAP from the transport layer.

Value range: 0-40959.875 ms, and the resolution is 0.125 ms.

Field length: 24 bits.

6.3.3.6.4 T3

Description: Node B specific frame number (BFN) that indicates the time when Node B sends the frame through the SAP to the transport layer.

Value range: 0-40959.875 ms, and the resolution is 0.125 ms.

Field length: 24 bits.

6.3.3.6.5 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.7 Rx Timing Deviation

6.3.3.7.1 Payload structure

Figure below shows the structure of the payload when the control frame is used for the Rx timing deviation.

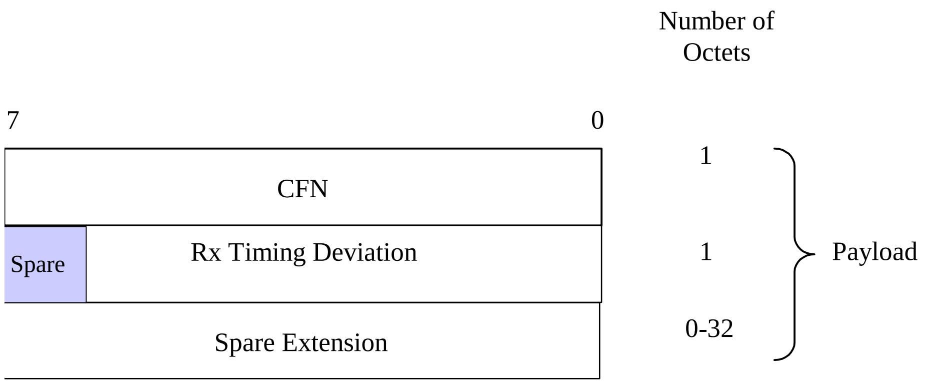

Figure 20: Structure of the payload for Rx timing deviation control frame

6.3.3.7.2 Rx Timing Deviation

Description: Measured Rx Timing deviation as a basis for timing advance.

Value range: {-256, ..,+256 }chips.

{N*4 –256}chips ≤ RxTiming Deviation < {(N+1)*4 –256} chips

With N = 0,1, .. , 127

Granularity: 4 chips.

Field length: 7 bits.

6.3.3.7.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.7.4 CFN

The CFN value in the control frame is the CFN when the RX timing deviation was measured. It is coded as in subclause 6.2.4.3.

6.3.3.8 [FDD - DSCH TFCI signalling]

6.3.3.8.1 Payload structure

The figure below shows the structure of the payload when the control frame is used for signalling TFCI (field 2) bits.

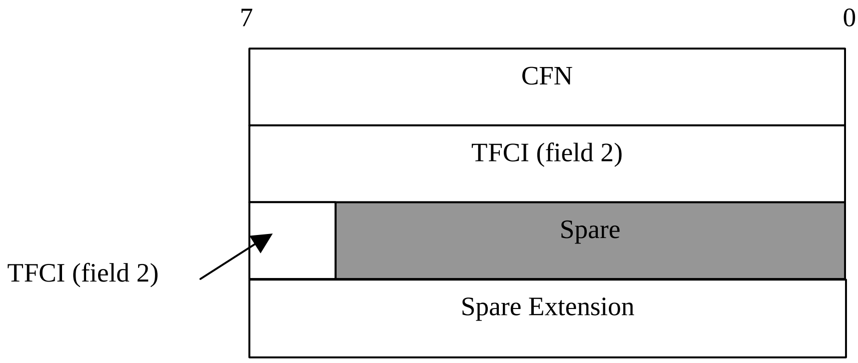

Figure 21: [FDD - Structure of the payload for the DSCH DL signalling control frame

6.3.3.8.2 TFCI (field 2)

Description: TFCI (field 2) is as described in [4], it takes the same values as the TFCI(field 2) which is transmitted over the Uu interface.

Value range: {0 - 1023}

Field length: 10 bits

6.3.3.8.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.9 Radio Interface Parameter Update

6.3.3.9.1 Payload structure

The figure below shows the structure of the payload when the control frame is used for signalling radio interface parameter updates.

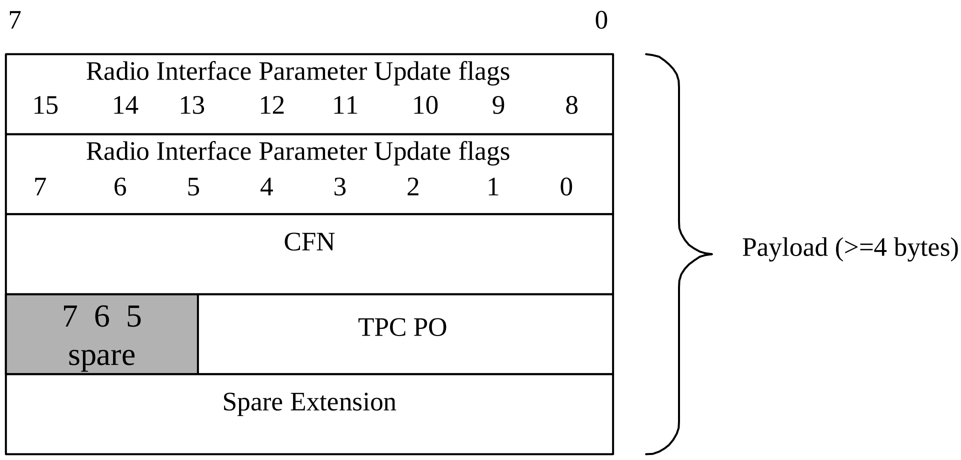

Figure 22: Structure of the payload for the Radio Interface Parameter Update control frame

6.3.3.9.2 Radio Interface Parameter Update flags

Description: Contains flags indicating which information is present in this control frame.

Value range:

Bit 0: Indicates if the 3rd byte of the control frame payload contains a CFN (1) or not (0);

Bit 1: Indicates if the 4th byte (bits 0-4) of the control frame payload contains a TPC PO (1) or not (0);

Bit 2-15: Set to (0): reserved in this user plane revision. Any indicated flags shall be ignored by the receiver.

Field length: 16 bits.

6.3.3.9.3 TPC power offset

Description: Power offset to be applied in the DL between the DPDCH information and the TPC bits on the DPCCH.

Value range: 0-7.75, resolution in 0.25 dB.

Field length: 5 bits.

6.3.3.9.4 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.10 [TDD - Timing Advance]

6.3.3.10.1 Payload structure

Figure below shows the structure of the payload when the control frame is used for timing advance.

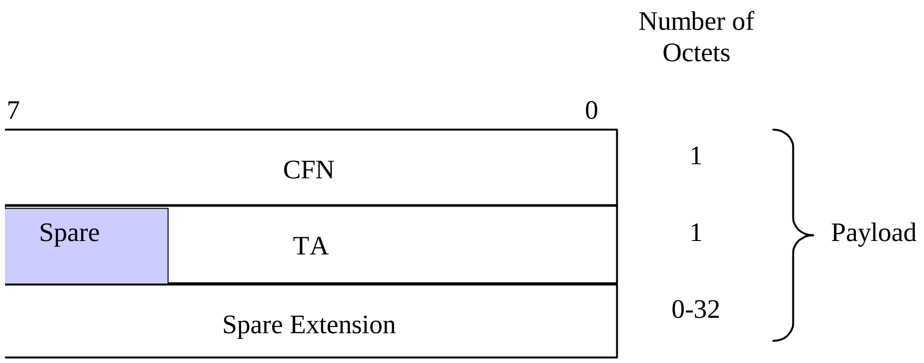

Figure 23: Structure of the Timing Advance control frame

6.3.3.10.2 CFN

The CFN value in the control frame is the frame that the timing advance will occur and is coded as in subclause 6.2.4.3.

6.3.3.10.3 TA

Description: UE applied UL timing advance adjustment.

Value range: : 0-252 chips, and the resolution is 4 chips.

Field length: 6 bits.

6.3.3.10.4 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

7 Handling of Unknown, Unforeseen and Erroneous Protocol Data

7.1 General

A Frame Protocol frame with illegal or not comprehended parameter value shall be ignored. Frame protocol frames sent with a CFN in which the radio resources assigned to the associated Iub data port are not available, shall be ignored.

Frame protocol data frames with CFN value that does not fulfil the requirement set in chapter [FDD - 4.2.14 of Ref [9]] [TDD - 4.2.12 of Ref. [10]], shall be ignored

7.2 Error detection

Error detection is provided on frames through a Cyclic Redundancy Check. The length of the CRC for the payload is 16 bits and for the frame header and control frames it is 7 bits.

7.2.1 CRC Calculation

The parity bits are generated by one of the following cyclic generator polynomials:

$g_{CRC16}(D) = D^{16} + D^{15} + D^2 + 1$

$g_{CRC7}(D) = D^7 + D^6 + D^2 + 1$

Denote the bits in a frame by $a_1, a_2, a_3, \ldots, a_{A_i}$, and the parity bits by $p_1, p_2, p_3, \ldots, p_{L_i}$. A_i is the length of a protected data and L_i is 16 or 7 depending on the CRC length.

The encoding is performed in a systematic form, which means that in GF(2), the polynomial for the payload

$$a_1 D^{A_i+15} + a_2 D^{A_i+14} + \ldots + a_{A_i} D^{16} + p_1 D^{15} + p_2 D^{14} + \ldots + p_{15} D^1 + p_{16}$$

yields a remainder equal to 0 when divided by $g_{CRC16}(D)$ and the polynomial for the header and control frame

$$a_1 D^{A_i+6} + a_2 D^{A_i+5} + \ldots + a_{A_i} D^7 + p_1 D^6 + p_2 D^5 + \ldots + p_6 D^1 + p_7$$

yields a remainder equal to 0 when divided by $g_{CRC7}(D)$. If $A_i = 0$, $p_1 = p_2 = p_3 = \cdots = p_{L_i} = 0$.

7.2.1.1 Relation between input and output of the Cyclic Redundancy Check

The bits after CRC attachment are denoted by $b_1, b_2, b_3, \ldots, b_{B_i}$, where $B_i = A_i + L_i$.

The parity bits for the payload are attached at the end of the frame:

$b_k = a_k$ $\quad k = 1, 2, 3, \ldots, A_i$

$b_k = p_{(k-A_i)}$ $\quad k = A_i + 1, A_i + 2, A_i + 3, \ldots, A_i + L_I$

The parity bits for the frame header and the control frames are attached at the beginning of the frame:

$b_k = p_k$ $\quad k = 1, 2, 3, \ldots, L_i$

$b_k = a_{(k-Li)}$ $\quad k = L_i + 1, L_i + 2, L_i + 3, \ldots, L_I + A_i$

Annex A (informative): Change History

Change history					
TSG RAN#	Version	CR	Tdoc RAN	New Version	Subject/Comment
RAN_05	-	-	-	3.0.0	Approved at TSG RAN #5 and placed under Change Control
RAN_06	3.0.0	-	RP-99758	3.1.0	Approved at TSG RAN #6
RAN_06	3.0.0	-	RP-99759	3.1.0	Approved at TSG RAN #6
RAN_06	3.0.0	005	RP-99760	3.1.0	Approved at TSG RAN #6
RAN_07	3.1.0	-	-	3.2.0	Approved at TSG RAN #7
RAN_08	3.2.0	-	RP-000248	3.3.0	Approved at TSG RAN #8
RAN_09	3.3.0	026 028 029 031 032 033 034 035	RP-000384	3.4.0	Approved at TSG RAN #9
RAN_10	3.4.0	036 037 038	RP-000625	3.5.0	Approved at TSG RAN #10
RAN_11	3.5.0	039 040 043	RP-010122	3.6.0	Approved at TSG RAN #11
RAN_12	3.6.0	049, 053	RP-010381	3.7.0	Approved at TSG RAN #12

History

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V3.1.0	January 2000	Publication
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V3.7.0	June 2001	Publication