TSG-RAN Meeting #13 ***TSGRP#13(01) 0586***
Beijing, China, 18 - 21, September, 2001

Title: **Agreed CRs to TS 25.427**

Source: **TSG-RAN WG3**

Agenda item: **8.3.3/8.3.4/9.4.3**

RP Tdoc	R3 Tdoc	Spec	CR_Num	Rev	Release	CR_Subject	Cat	Cur_Ver	New_Ver	Workitem
RP-010586	R3-012236	25.427	055		R99	Transport bearer replacement clarification	F	3.7.0	3.8.0	TEI
RP-010586	R3-012237	25.427	056		Rel-4	Transport bearer replacement clarification	A	4.1.0	4.2.0	TEI
RP-010586	R3-012242	25.427	062	1	R99	General Corrections on Iub_Iur UP protocol for DCH data streams	F	3.7.0	3.8.0	TEI
RP-010586	R3-012243	25.427	063	1	Rel-4	General Corrections on Iub_Iur UP protocol for DCH data streams	A	4.1.0	4.2.0	TEI

CR-Form-v3

CHANGE REQUEST

⌘	25.427	CR	055	⌘ rev		⌘ Current version:	3.7.0	⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title: ⌘	Clarifications on Transport bearer replacement			
Source: ⌘	R-WG3			
Work item code: ⌘	TEI		***Date:*** ⌘	July 2001
Category: ⌘	F		***Release:*** ⌘	R99

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘ Currently there are several unclarities regarding the detailed transport bearer replacement over Iub/Iur. This CR attempts to solve this unclarity.

Summary of change: ⌘ It is clarified, at what moment data frame transport shall switch from the old to the new transport bearer. In addition it is clarified which control frames shall be supported on the new transport bearer before the switch takes place.

Changes due to comments received during RAN3#22:

- Step 1: Support for the Node synchronisation procedure is no longer required on the new transport bearer;
- Step 1: One comment received concerning step 1 was that “this will enable the SRNC..” should be replaced by “this would enable the SRNC …”; Based on comments from native English speakers, the sentence is reworded to: “this enables the SRNC….”.
- Step 2: “for which it has received the first DL data frame before LTOA” is replaced by: “at which the new transport bearer is considered synchronised (i.e. it has received a DL data frame before LTOA)”;
- General: Correct procedure names/message names are used

Consequences if not approved: ⌘ Multi-vendor problems might be the result due to unclear specifications.

Backward compatibility:

This CR is backward compatible with the assumed intention of the specification. However, since the current description is not completely clear, other interpretations might lead to incompatible solutions.

Clauses affected: ⌘ 5.10

Other specs ⌘ [X] Other core specifications ⌘ CR056 25.427 v4.1.0

	☐		CR417 25.423 v3.6.0 CR418 25.423 v4.1.0 CR487 25.433 v3.6.0 CR479 25.433 v4.1.0
affected:	☐	Test specifications	
	☐	O&M Specifications	
Other comments: ⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.10 General

5.10.1 Transport bearer replacement

As described in NBAP [4] and RNSAP [6], transport bearer replacement can be achieved by using the Synchronised Radio Link Reconfiguration Preparation procedure in combination with the Synchronised Radio Link Reconfiguration Commit procedure, or by using the Unsynchronised Radio Link Reconfiguration procedure. In both cases the following steps can be discerned:

1) The new transport bearer is established after which 2 transport bearers exist in parallel.

2) The transport channel(s) is/are switched to the new transport bearer.

3) The old transport bearer is released.

In step 1), communication on the old transport bearer continues as normal. In addition, the Node-B shall support the Synchronisation procedure (see section 5.3) on the new bearer. This enables the SRNC to determine the timing on the new transport bearer.

Regarding step 2), the moment of switching is determined differently in the synchronised and unsynchronised case:

- When using the combination of the Synchronised Radio Link Reconfiguration Preparation procedure and the Synchronised Radio Link Reconfiguration Commit procedure, the UL/DL data frames shall be transported on the new transport bearer from the CFN indicated in the RL RECONFIGURATION COMMIT message.

- When using the Unsynchronised Radio Link Reconfiguration procedure, the Node-B shall start using the new transport bearer for the transport of UL data frames from the CFN at which the new transport bearer is considered synchronised (i.e. has received a DL data frame before LTOA [4]).

In both cases, starting from this CFN the Node-B shall support all applicable DCH frame protocol procedures on the new transport bearer and no requirements exist regarding support of DCH frame protocol procedures on the old transport bearer.

Finally in step 3), the old transport bearer is released.

3GPP TSG- Working Group 3 Meeting #23 **Tdoc R3-012237**
Helsinki, Finland, 27th – 31st August

CR-Form-v3

CHANGE REQUEST

⌘	**25.427**	**CR 056**	⌘ rev		⌘ Current version:	**4.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title:	⌘	Clarifications on Transport bearer replacement		
Source:	⌘	R-WG3		
Work item code:	⌘	TEI	***Date:*** ⌘	July 2001
Category:	⌘	A	***Release:*** ⌘	REL-4
		Use <u>one</u> of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use <u>one</u> of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	Currently there are several unclarities regarding the detailed transport bearer replacement over Iub/Iur. This CR attempts to solve this unclarity.
Summary of change:	⌘	It is clarified, at what moment data frame transport shall switch from the old to the new transport bearer. In addition it is clarified which control frames shall be supported on the new transport bearer before the switch takes place. Changes due to comments received during RAN3#22: - Step 1: Support for the Node synchronisation procedure is no longer required on the new transport bearer; - Step 1: One comment received concerning step 1 was that “this will enable the SRNC..” should be replaced by “this would enable the SRNC …”; Based on comments from native English speakers, the sentence is reworded to: “this enables the SRNC….”. - Step 2: “for which it has received the first DL data frame before LTOA” is replaced by: “at which the new transport bearer is considered synchronised (i.e. it has received a DL data frame before LTOA)”; - General: Correct procedure names/message names are used
Consequences if not approved:	⌘	Multi-vendor problems might be the result due to unclear specifications. Backward compatibility: This CR is backward compatible with the assumed intention of the specification. However, since the current description is not completely clear, other interpretations might lead to incompatible solutions.

Clauses affected:	⌘	5.10		
Other specs	⌘	[X] Other core specifications	⌘	CR055 25.427 v4.1.0

			CR417 25.423 v3.6.0 CR418 25.423 v4.1.0 CR487 25.433 v3.6.0 CR479 25.433 v4.1.0
affected:		Test specifications	
		O&M Specifications	
Other comments: ⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.10 General

5.10.1 Transport bearer replacement

As described in NBAP [4] and RNSAP [6], transport bearer replacement can be achieved by using the Synchronised Radio Link Reconfiguration Preparation procedure in combination with the Synchronised Radio Link Reconfiguration Commit procedure, or by using the Unsynchronised Radio Link Reconfiguration procedure. In both cases the following steps can be discerned:

1) The new transport bearer is established after which 2 transport bearers exist in parallel.

2) The transport channel(s) is/are switched to the new transport bearer.

3) The old transport bearer is released.

In step 1), communication on the old transport bearer continues as normal. In addition, the Node-B shall support the Synchronisation procedure (see section 5.3) on the new bearer. This enables the SRNC to determine the timing on the new transport bearer.

Regarding step 2), the moment of switching is determined differently in the synchronised and unsynchronised case:

- When using the combination of the Synchronised Radio Link Reconfiguration Preparation procedure and the Synchronised Radio Link Reconfiguration Commit procedure, the UL/DL data frames shall be transported on the new transport bearer from the CFN indicated in the RL RECONFIGURATION COMMIT message.

- When using the Unsynchronised Radio Link Reconfiguration procedure, the Node-B shall start using the new transport bearer for the transport of UL data frames from the CFN at which the new transport bearer is considered synchronised (i.e. has received a DL data frame before LTOA [4]).

In both cases, starting from this CFN the Node-B shall support all applicable DCH frame protocol procedures on the new transport bearer and no requirements exist regarding support of DCH frame protocol procedures on the old transport bearer.

Finally in step 3), the old transport bearer is released.

CR-Form-v3

CHANGE REQUEST

⌘	**25.427**	**CR**	**062**	⌘ rev	**1**	⌘	Current version:	**3.7.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title: ⌘	General Corrections on Iub_Iur UP protocol for DCH data streams		
Source: ⌘	R-WG3		
Work item code: ⌘	TEI	***Date:*** ⌘	August 2001
Category: ⌘	**F**	***Release:*** ⌘	*R99*
	Use <u>one</u> of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use <u>one</u> of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	- There are some editorial errors on the specification. - Some abbreviations used in the text are missed in 3.2. - In 6.3, the representations of granularity of information elements are incoherent. - In 6.3.3.4, the control frame name is inconsistent with the name used in other parts of specification. - In 6.3.3.7, although the control frame is used in only TDD mode, [TDD] is not specified in the text. - In 6.3.3.9, although the control frame is used in only FDD mode, [FDD] is not specified in the text.
Summary of change: ⌘	- Editorial corrections on font, indentation and grammar. - When referring to a control frame name in the specification the CONTROL FRAME NAME is written with all letters in upper case characters, e.g. OUTER LOOP POWER CONTROL control frame. <u>- When referring to a data frame name in the specification the DATA FRAME NAME is written with all letters in upper case characters, e.g. UL DATA FRAME.</u> - In 3.2, LOTA, ToAWE and ToAWS are added. - In 6.3, the mixed usage of step, resolution and granularity is unified to granularity. - In 6.3.3.4, UL Outer loop power control is changed to OUTER LOOP POWER CONTROL. - In 6.3.3.7, [TDD] indication is added. - In 6.3.3.9, [FDD] indication is added.
Consequences if not approved: ⌘	If this CR is not approved this erroneous description will remain in the specification. Backward compatibility: This CR is backward compatible.

Clauses affected:	⌘	3.1, 3.2, 4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2.2, 6.2.4.2, 6.2.4.3, 6.2.4.5, 6.2.4.6, 6.3.1, 6.3.2.2, 6.3.2.3, 6.3.3.1, 6.3.3.2, 6.3.3.3, 6.3.3.4, 6.3.3.5, 6.3.3.6, 6.3.3.7, 6.3.3.8, 6.3.3.9, 6.3.3.10		
Other specs affected:	⌘	X Other core specifications	⌘	25.427 v4.1.0 CR 063
		Test specifications		
		O&M Specifications		
Other comments:	⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3 Definitions and abbreviations

3.1 Definitions

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

Transport Bearer: sService 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
LTOA	Latest Time of Arrival
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 aArrival
ToAWE	Time of Arrival Window Endpoint
ToAWS	Time of Arrival Window Startpoint
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 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 User 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 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 the ~~d~~Data ~~t~~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 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

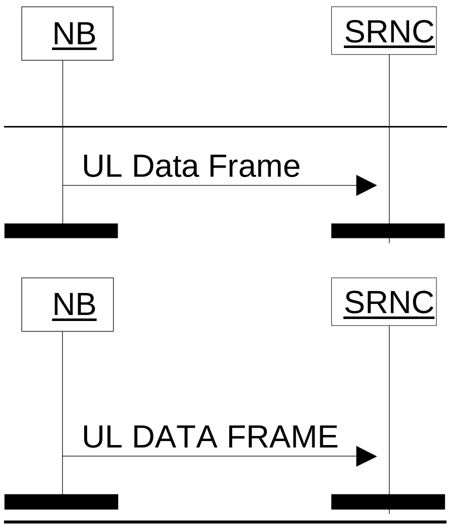


Figure 1: Uplink ~~d~~Data ~~t~~Transfer procedure

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 D~~ata~~ATA F~~rame~~RAME 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 D~~ata~~ATA F~~rame~~RAME 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~~DATA ~~frame~~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~~DATA ~~frame~~FRAME to the SRNC.

When Node B receives an invalid TFCI, no Data Frame shall be sent to the SRNC.

5.1.2 Downlink

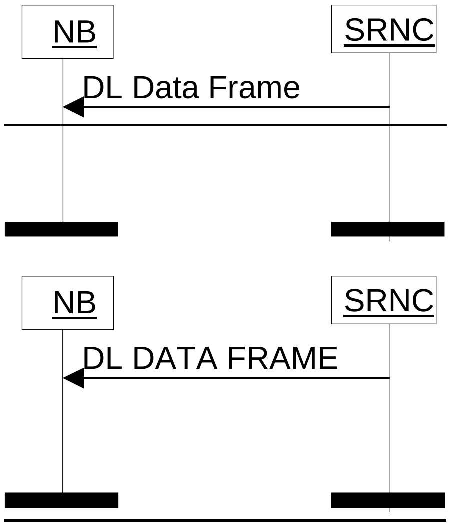


Figure 2: Downlink ~~d~~Data ~~t~~Transfer procedure

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 D~~ata~~ATA F~~rame~~RAME 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 D~~ata~~ATA F~~rame~~RAMEs, 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 ~~a~~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~~ SIGNALLING control frame.

If a DL ~~data~~DATA ~~frame~~FRAME or a DSCH TFCI ~~Signalling~~ 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 D~~ata~~ATA F~~rame~~RAME.

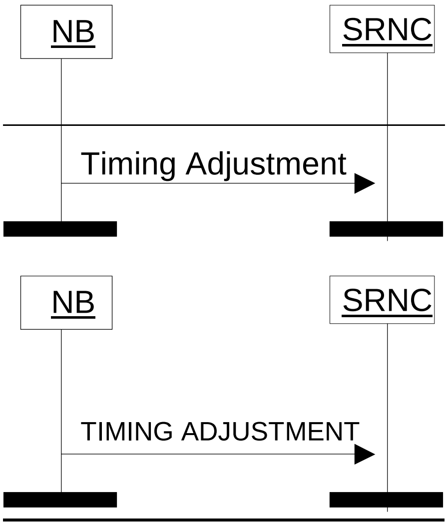


Figure 3: Timing Adjustment procedure

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~~ TIMING ADJUSTMENT ~~C~~control ~~F~~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~~ TIMING ADJUSTMENT ~~C~~control ~~F~~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 ~~t~~Timing ~~a~~Adjustment procedure is reported in [2].

5.3 DCH 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~~ control frame 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~~SYNCHRONIZATION control frame and the CFN indicated in the received DL SYNCHRONIZATION ~~message~~ control frame.

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.

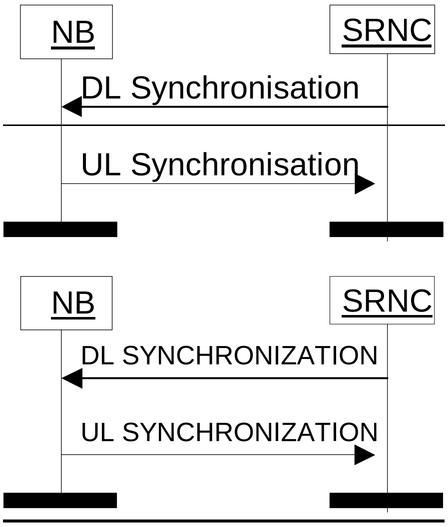


Figure 4: DCH Synchronization procedure

5.4 Outer ~~l~~Loop PC ~~i~~Information ~~t~~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.

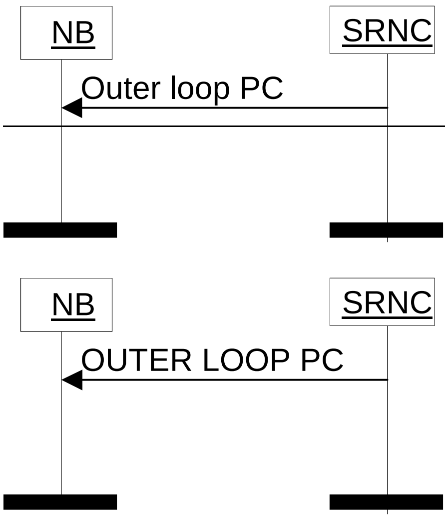


Figure 5: Outer ~~l~~Loop ~~p~~Power ~~c~~Control ~~i~~Information ~~t~~Transfer procedure

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 ~~C~~control ~~F~~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~~SYNCHRONIZATION control 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].

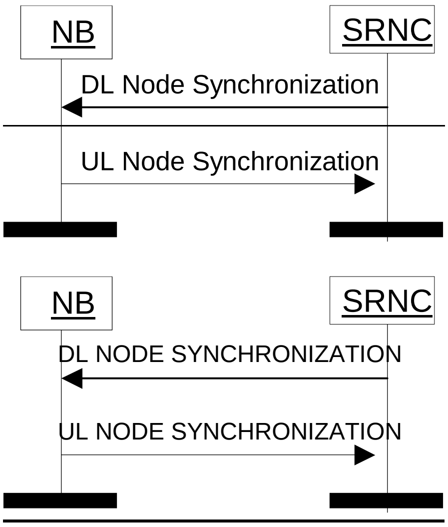


Figure 6: Node Synchronization procedure

5.6 Rx ~~t~~Timing ~~d~~Deviation ~~m~~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 ~~C~~control ~~F~~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 ~~C~~control ~~F~~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 ~~C~~control ~~F~~frame shall be sent.

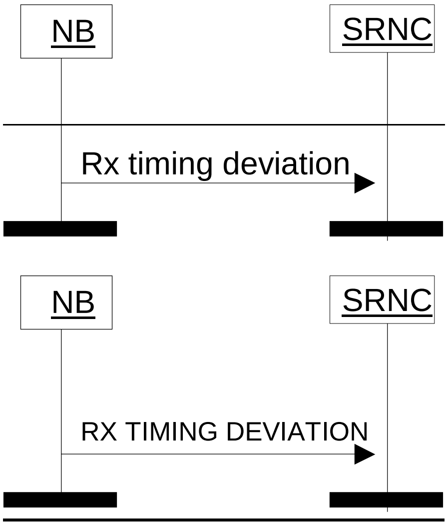


Figure 7: Rx ~~t~~Timing ~~d~~Deviation Measurement procedure

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~~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~~SIGNALLING control 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~~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.

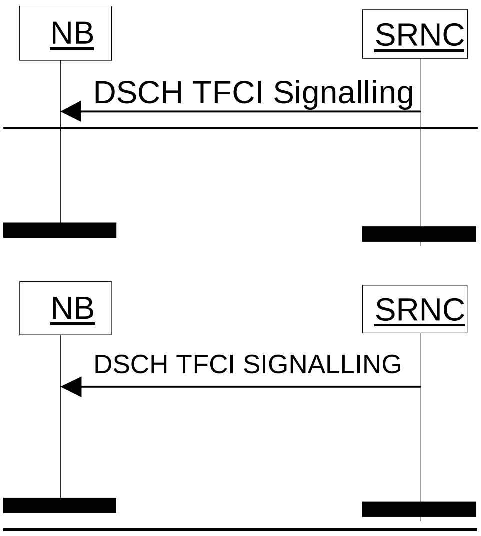


Figure 8: DSCH TFCI Signalling procedure

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.

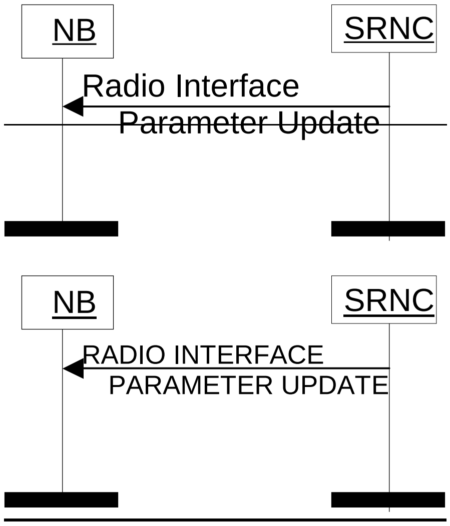


Figure 9: Radio Interface Parameter Update procedure

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.

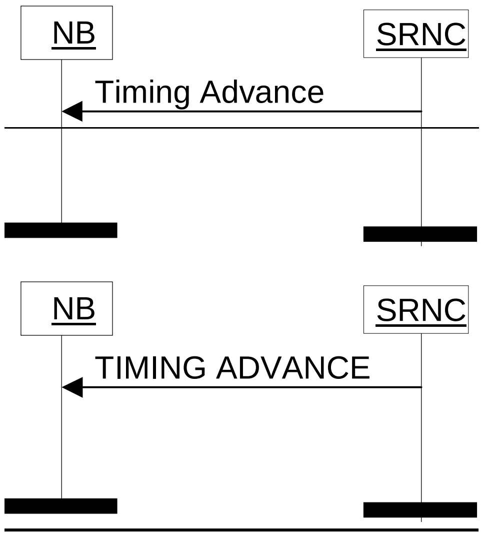


Figure 9A: Timing Advance ~~Signalling~~procedure

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 ~~t~~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.

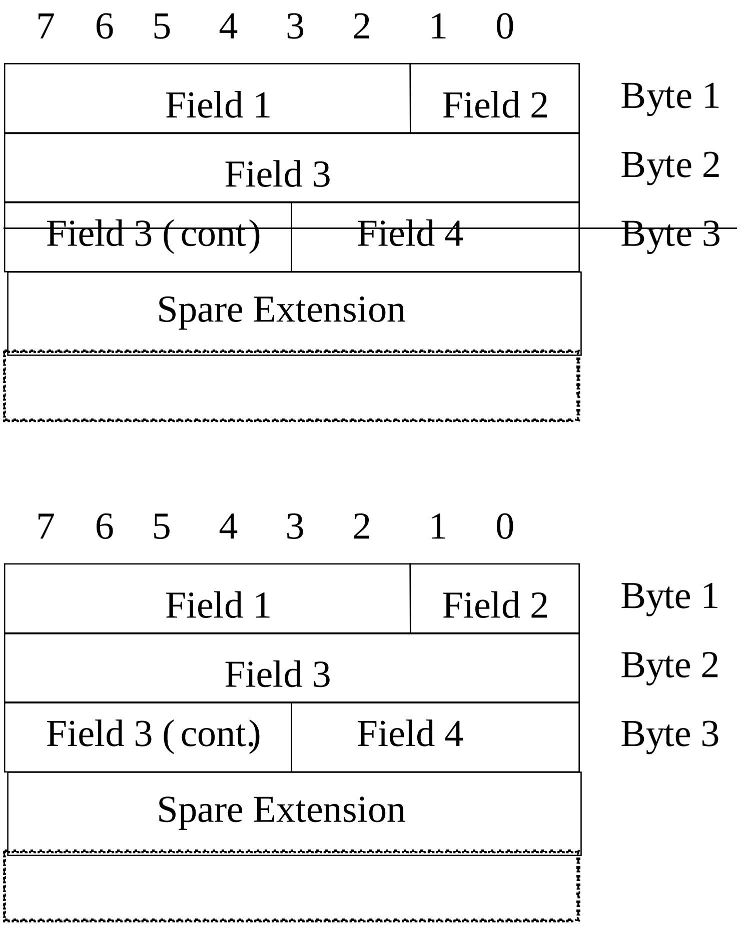


Figure 10: Example of notation used for the definition of the frame structure

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 UplinkPLINK dataDATA frameFRAME

The structure of the UL dataDATA frameFRAME is shown below.

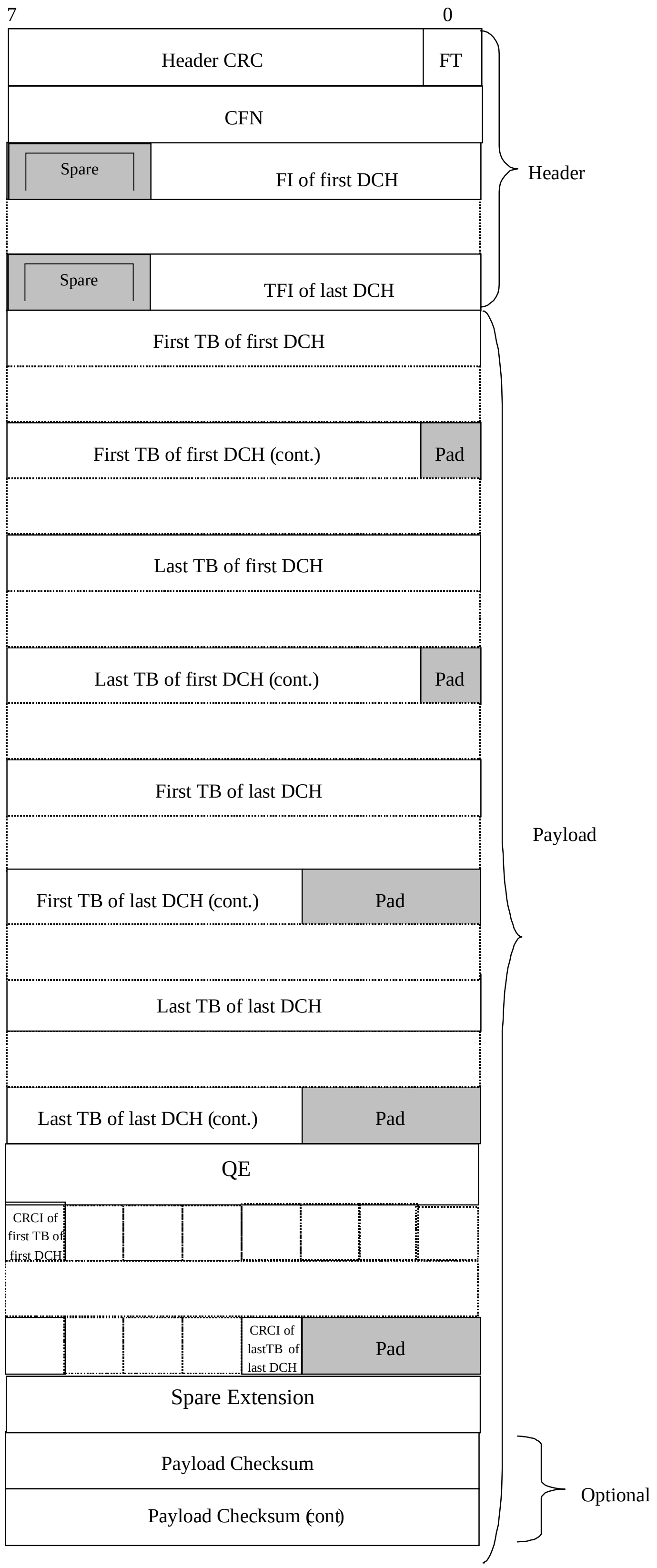


Figure 11: U~~plink~~PLINK ~~data~~DATA ~~frame~~FRAME structure

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~~are 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 D~~ownlink~~OWNLINK ~~data~~DATA ~~frame~~FRAME

The structure of the DL ~~data~~DATA ~~frame~~FRAME is shown below.

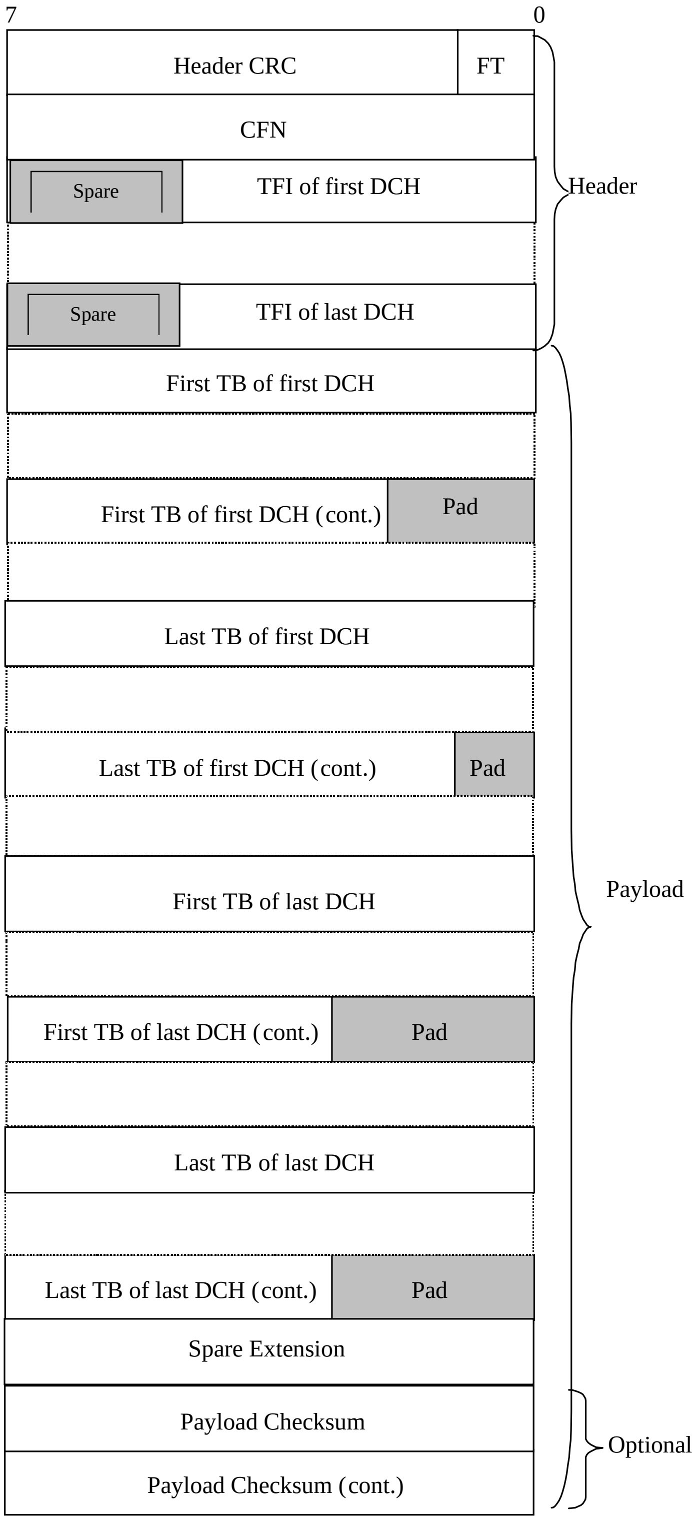


Figure 12: D~~ownlink~~OWNLINK ~~data~~DATA ~~frame~~FRAME structure

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: ~~d~~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: ~~i~~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~~.

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: ~~t~~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 ~~F~~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:

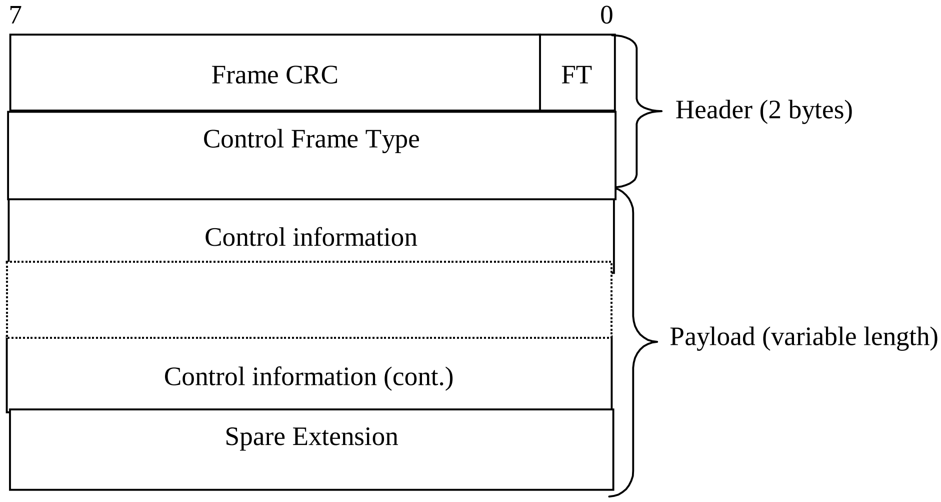


Figure 13: General structure of the control frames

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: dDescribes 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 controlUTER LOOP POWER CONTROL	0000 0001
Timing adjustmentIMING ADJUSTMENT	0000 0010
DL synchronizationSYNCHRONIZATION	0000 0011
UL synchronizationSYNCHRONIZATION	0000 0100
DL signalling for DSCH TFCI SIGNALLING	0000 0101
DL Node synchronizationODE SYNCHRONIZATION	0000 0110
UL Node synchronizationODE SYNCHRONIZATION	0000 0111
RxX TimingIMING DeviationEVIATION	0000 1000
RadioADIO InterfaceNTERFACE ParameterARAMETER UpdatePDATE	0000 1001
TimingIMING AdvanceDVANCE	0000 1010

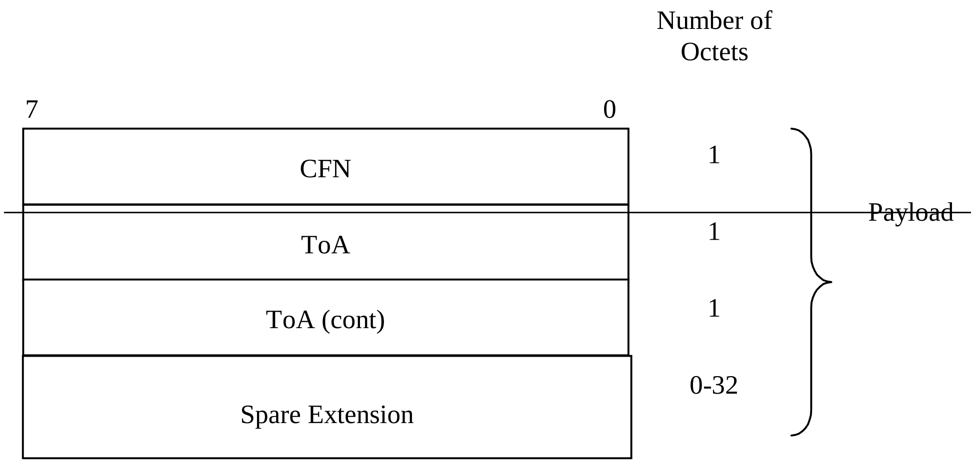
Field length: 8 bits.

6.3.3 Payload structure and information elements

6.3.3.1 TimingIMING AdjustmentADJUSTMENT

6.3.3.1.1 Payload structure

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



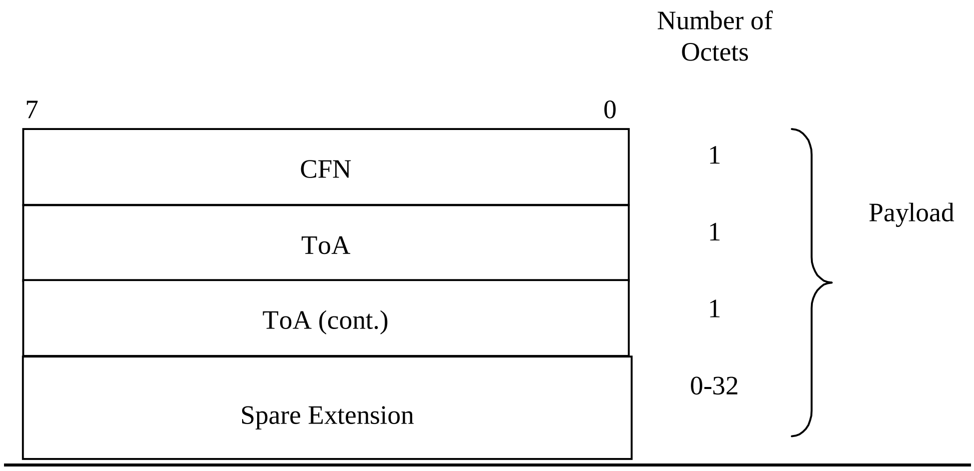


Figure 14: Structure of the payload for the T~~iming~~IMING A~~djustment~~DJUSTMENT control frame

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 ~~a~~Arrival (ToA)

Description: ~~t~~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~~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.

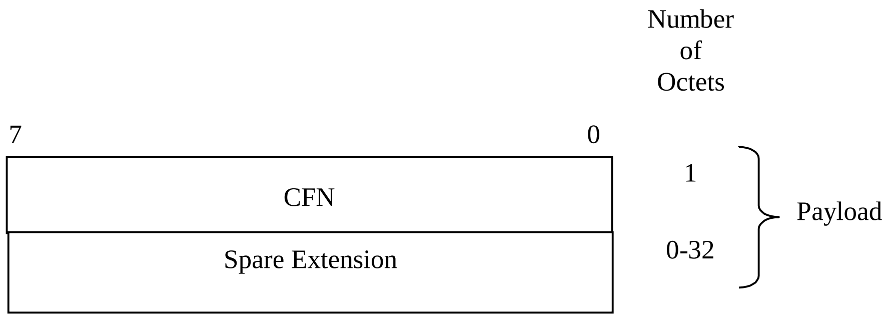


Figure 15: Structure of the payload for the DL ~~synchronization~~SYNCHRONIZATION control frame

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~~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).

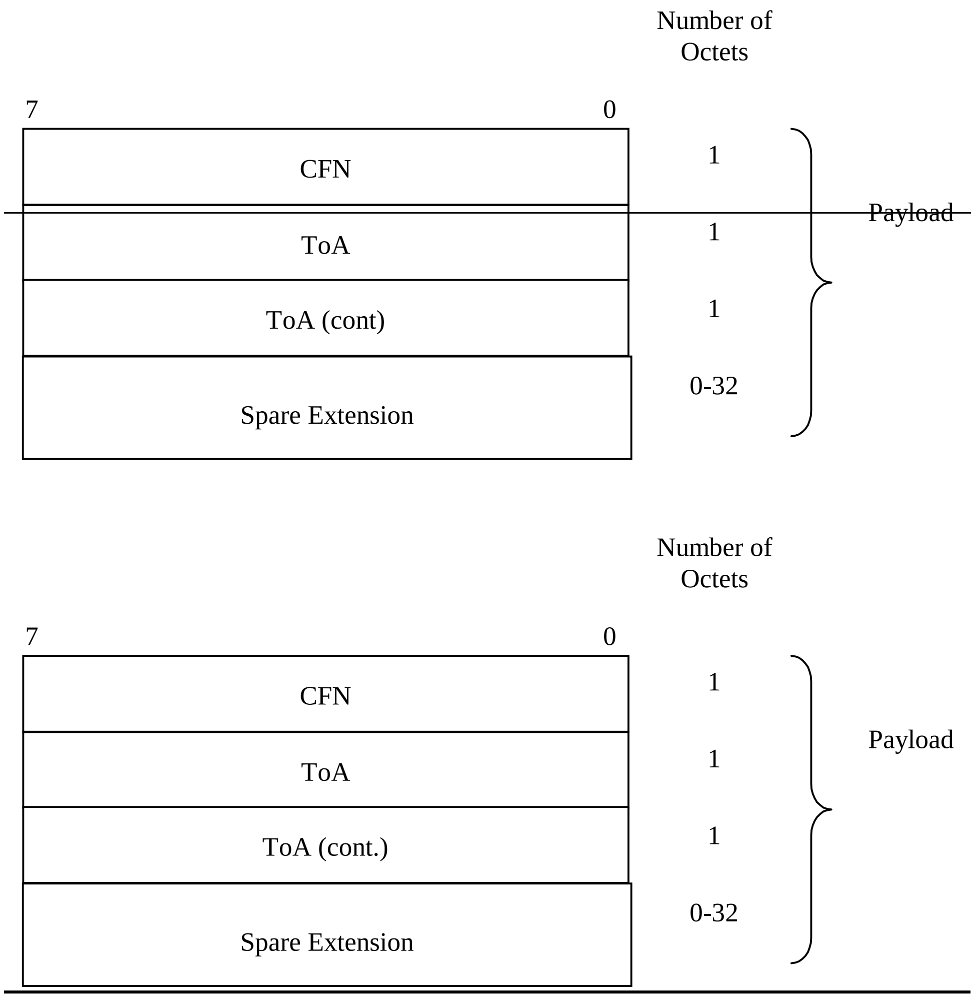


Figure 16: Structure of the UL S~~ynchronization~~YNCHRONIZATION control frame

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 ~~a~~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 [FDD - UL O~~uter loop power control~~UTER 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.

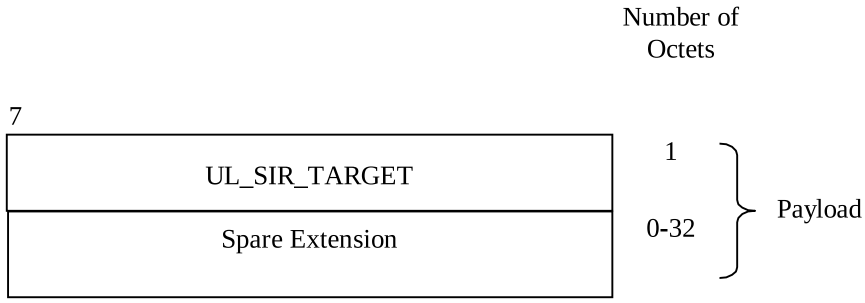


Figure 17: Structure of the payload for ~~outer loop~~OUTER LOOP PC control frame

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~~.

Granularity: 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 N~~ode~~ODE S~~ynchronization~~YNCHRONIZATION

6.3.3.5.1 Payload structure

Figure below shows the structure of the payload for the DL N~~ode~~ODE S~~ynchronization~~YNCHRONIZATION control frame.

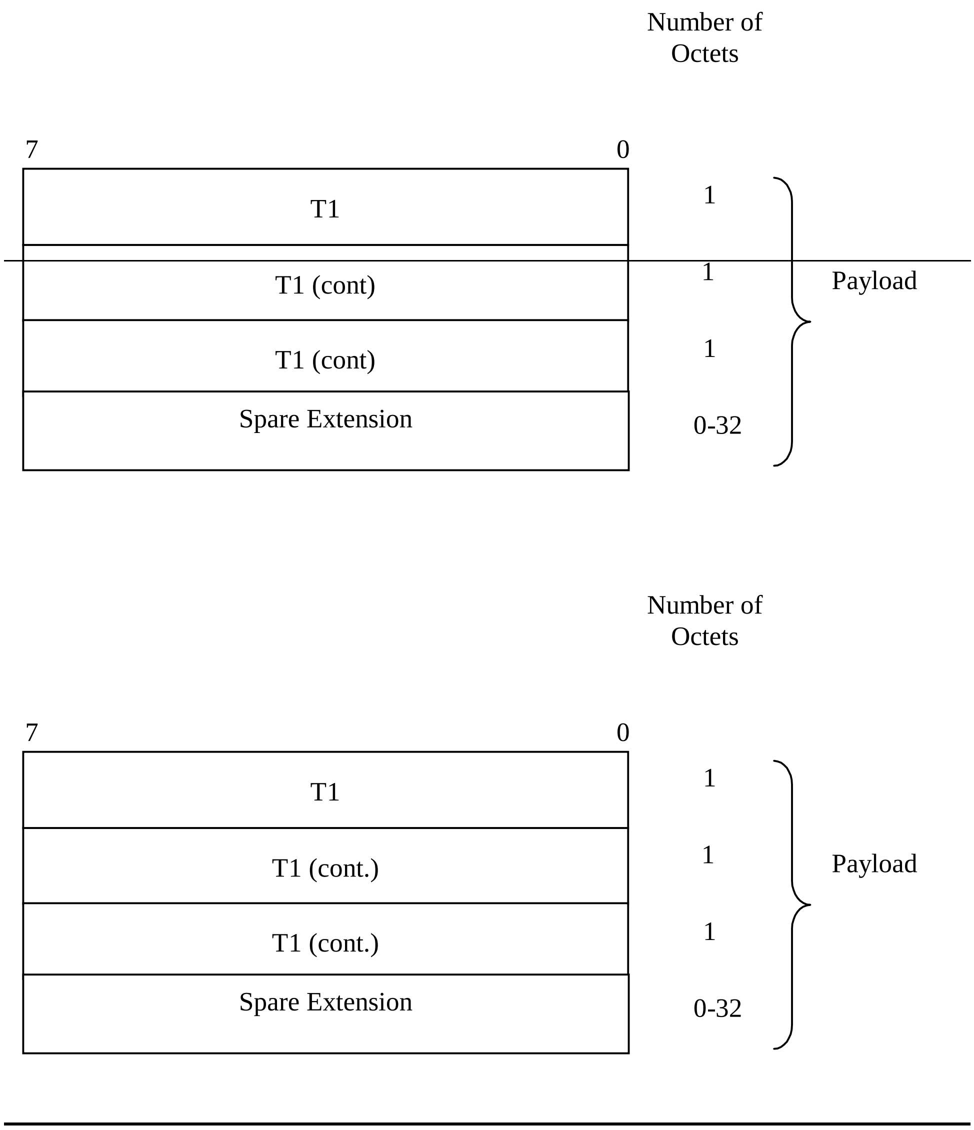


Figure 18: Structure of the payload for the DL N~~ode~~ODE S~~ynchronization~~YNCHRONIZATION control frame

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: ~~a~~As defined in subclause 6.3.3.6.2.

Field length: 24 bits.

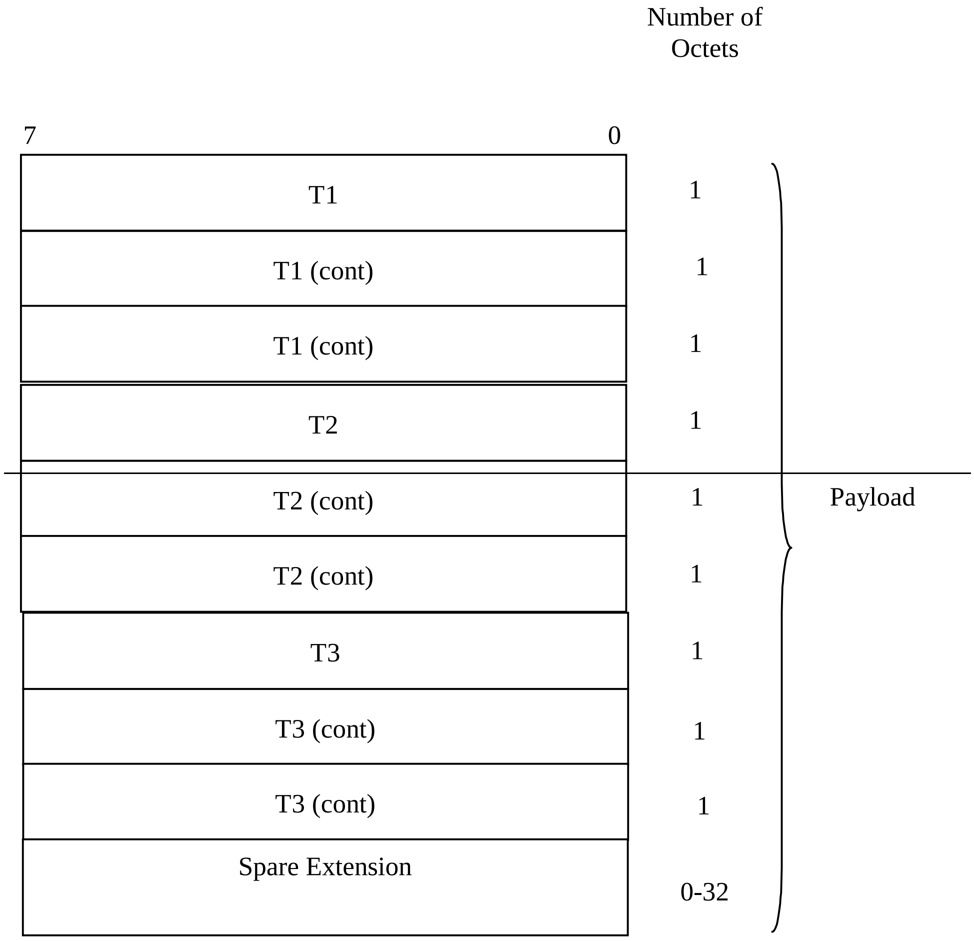
6.3.3.5.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.6 UL N~~ode~~ODE ~~Synchronization~~SYNCHRONIZATION

6.3.3.6.1 Payload structure

The payload of the UL N~~ode~~ODE ~~synch~~SYNCHRONIZATION control frames is shown in the figure below.



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

Bits 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 N~~ode~~ODE S~~ynchronization~~YNCHRONIZATION control frame

6.3.3.6.2 T1

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

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

Granularity: 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~~SYNCHRONIZATION control frame through the SAP from the transport layer.

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

Granularity: 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~~.

Granularity: 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 [TDD - R~~x~~X T~~iming~~IMING D~~eviation~~EVIATION]

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.

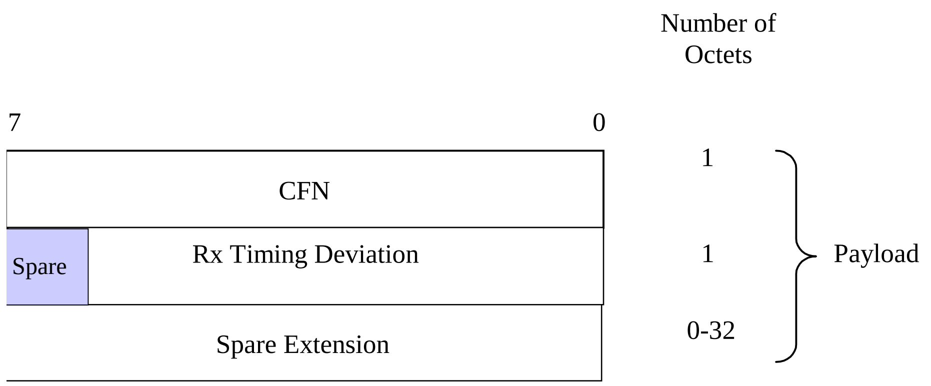


Figure 20: Structure of the payload for R~~x~~X ~~timing deviation~~TIMING DEVIATION control frame

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.

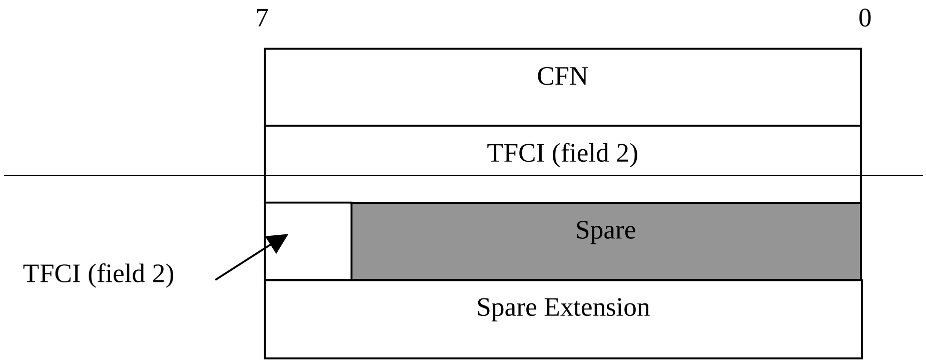
6.3.3.7.4 CFN

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~~ 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.



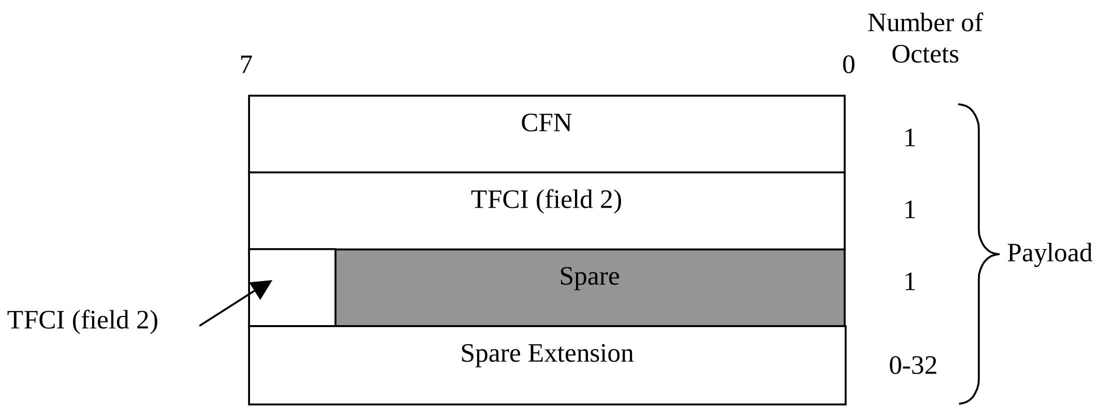


Figure 21: [~~FDD - ~~Structure of the payload for the DSCH~~ DL signalling~~ TFCI SIGNALLING control frame

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 [FDD - R~~adio~~ADIO I~~nterface~~NTERFACE P~~arameter~~ARAMETER U~~pdate~~PDATE]

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.

7							0
Radio Interface Parameter Update flags							
15	14	13	12	11	10	9	8
Radio Interface Parameter Update flags							
7	6	5	4	3	2	1	0
CFN							
7 6 5 spare			TPC PO				
Spare Extension							

Payload (>=4 bytes)

7							0	Number of Octets
Radio Interface Parameter Update Flags								
15	14	13	12	11	10	9	8	1
Radio Interface Parameter Update Flags								
7	6	5	4	3	2	1	0	1
CFN								1
7	6	5	TPC PO					1
Spare								
Spare Extension								0-32

Payload (>=4 bytes)

Figure 22: Structure of the payload for the R~~adio~~ADIO I~~nterface~~NTERFACE P~~arameter~~ARAMETER U~~pdate~~PDATE 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 ~~p~~Power ~~o~~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 dB}~~, resolution in 0.25 dB~~.

Granularity: 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 - T~~iming~~IMING A~~dvance~~DVANCE]

6.3.3.10.1 Payload structure

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

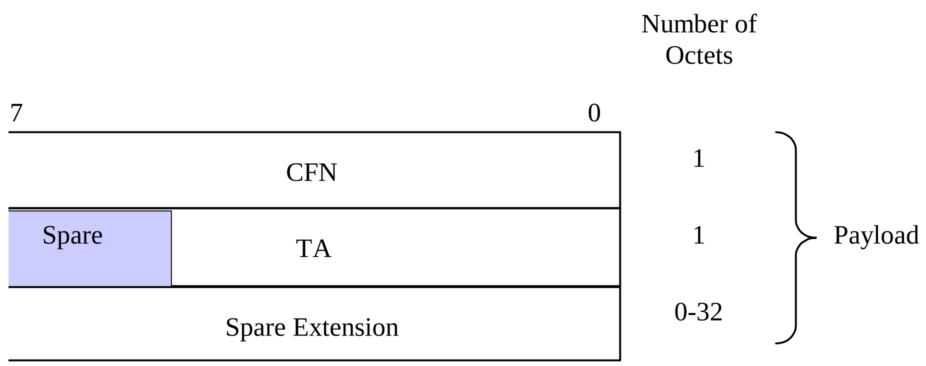


Figure 23: Structure of the T~~iming~~IMING A~~dvance~~DVANCE control frame

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~~.

Granularity: 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.

3GPP TSG-RAN WG 3 Meeting #23
Helsinki, Finland, 27th – 31st August, 2001

R3-012243

CR-Form-v3

CHANGE REQUEST

⌘	**25.427**	**CR**	**063**	⌘	rev	**1**	⌘	Current version:	**4.1.0**	⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [ ] Radio Access Network [X] Core Network [ ]

Title:	⌘	General Corrections on Iub/Iur UP protocol for DCH data streams		
Source:	⌘	R-WG3		
Work item code:	⌘	TEI	***Date:*** ⌘	August, 2001
Category:	⌘	**A**	***Release:*** ⌘	*REL-4*
		Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	- There are some editorial errors on the specification. - Some abbreviations used in the text are missed in 3.2. - In 6.3, the representations of granularity of information elements are incoherent. - In 6.3.3.4, the control frame name is inconsistent with the name used in other parts of specification. ~~-In figure 22, DPC Mode information element is missed.~~ - In 6.3.3.9, although the control frame is used in only FDD mode, [FDD] is not specified in the text.
Summary of change:	⌘	- Editorial corrections on font, indentation and grammar. - When referring to a control frame name in the specification the CONTROL FRAME NAME is written with all letters in upper case characters, e.g. OUTER LOOP POWER CONTROL control frame. - When referring to a data frame name in the specification the DATA FRAME NAME is written with all letters in upper case characters, e.g. UL DATA FRAME. - In 3.2, LOTA, ToAWE and ToAWS are added. - In 6.3, the mixed usage of step, resolution and granularity is unified to granularity. - In 6.3.3.4, UL Outer loop power control is changed to OUTER LOOP POWER CONTROL. ~~-In figure 22, DPC Mode information element is clarified as bit 5 of 4th byte of control frame payload.~~ - In 6.3.3.9, [FDD] indication is added.
Consequences if not approved:	⌘	If this CR is not approved this erroneous description will remain in the specification. Backward compatibility: This CR is backward compatible.

Clauses affected:	⌘	3.1, 3.2, 4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6.1, 6.2.2, 6.2.4.2, 6.2.4.3, 6.2.4.5, 6.2.4.6, 6.3.1, 6.3.2.2, 6.3.2.3, 6.3.3.1, 6.3.3.2, 6.3.3.3, 6.3.3.4, 6.3.3.5, 6.3.3.6, 6.3.3.7, 6.3.3.8, 6.3.3.9, 6.3.3.10
Other specs affected:	⌘	X Other core specifications ⌘ 25.427 v3.7.0 CR 062 Test specifications O&M Specifications
Other comments:	⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3 Definitions and abbreviations

3.1 Definitions

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

Transport Bearer: sService 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
LTOA	Latest Time of Arrival
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 aArrival
ToAWE	Time of Arrival Window Endpoint
ToAWS	Time of Arrival Window Startpoint
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 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 User 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 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 (3.84Mcps 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 the ~~d~~Data ~~t~~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 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

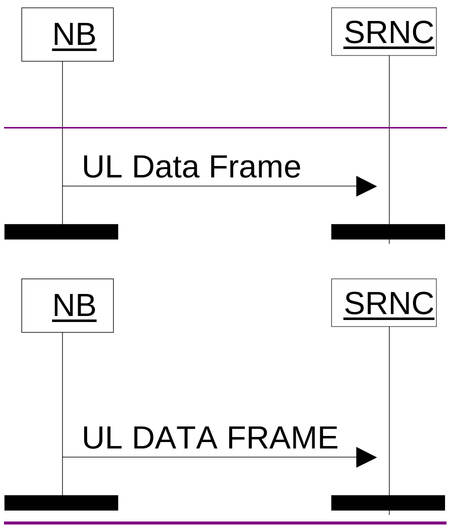


Figure 1: Uplink ~~d~~Data ~~t~~Transfer procedure

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 D~~ata~~ATA F~~rame~~RAME 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 D~~ata~~ATA F~~rame~~RAME 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~~DATA ~~frame~~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~~DATA ~~frame~~FRAME to the SRNC.

When Node B receives an invalid TFCI, no Data Frame shall be sent to the SRNC.

5.1.2 Downlink

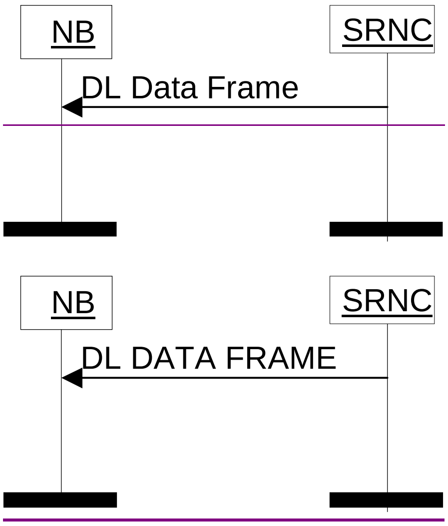


Figure 2: Downlink dData tTransfer procedure

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 dataDATA frameFRAMEs 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 DataATA FrameRAME 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 DataATA FrameRAMEs, 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 aAdjustment

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~~ SIGNALLING control frame.

If a DL ~~data~~DATA ~~frame~~FRAME or a DSCH TFCI ~~Signalling~~ 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 D~~ata~~ATA F~~rame~~RAME.

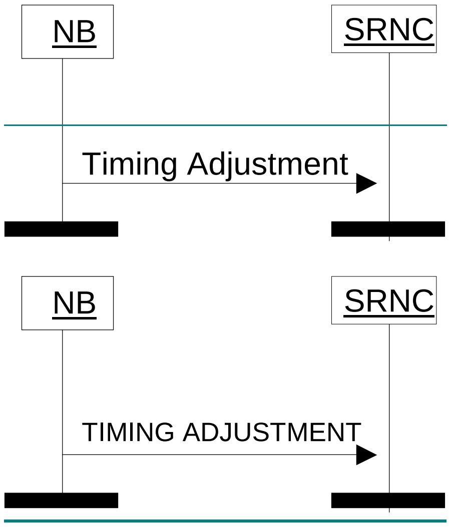


Figure 3: Timing Adjustment procedure

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~~TIMING ADJUSTMENT ~~C~~control ~~F~~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~~TIMING ADJUSTMENT ~~C~~control ~~F~~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 ~~t~~Timing ~~a~~Adjustment procedure is reported in [2].

5.3 DCH 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~~ control frame 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~~SYNCHRONIZATION control frame and the CFN indicated in the received DL SYNCHRONIZATION ~~message~~ control frame.

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.

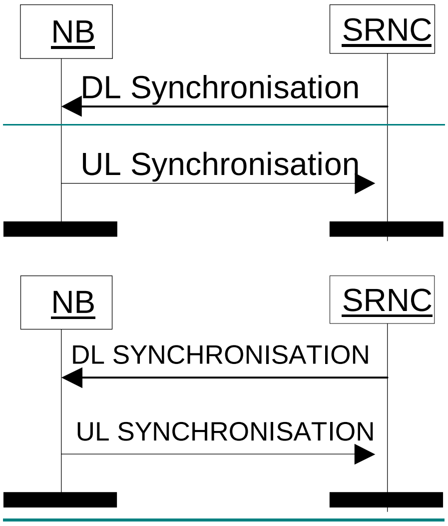


Figure 4: DCH Synchronization procedure

5.4 Outer lLoop PC iInformation tTransfer [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.

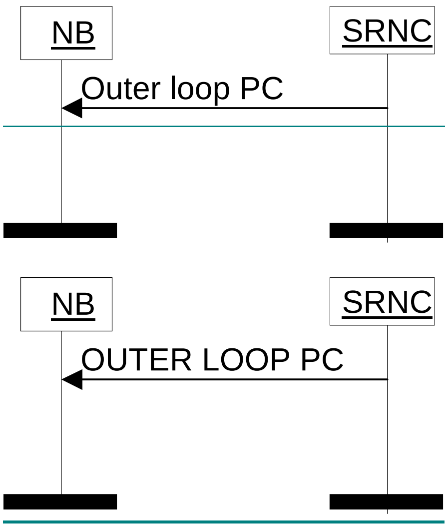


Figure 5: Outer lLoop pPower cControl iInformation tTransfer procedure

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 Ccontrol Fframe, 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~~ SYNCHRONIZATION control 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].

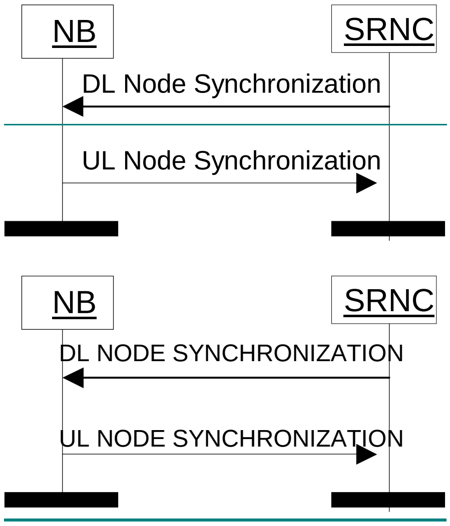


Figure 6: Node Synchronization procedure

5.6 Rx ~~t~~Timing ~~d~~Deviation ~~m~~Measurement [3.84Mcps 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 ~~C~~control ~~F~~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 ~~C~~control ~~F~~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 ~~C~~control ~~F~~frame shall be sent.

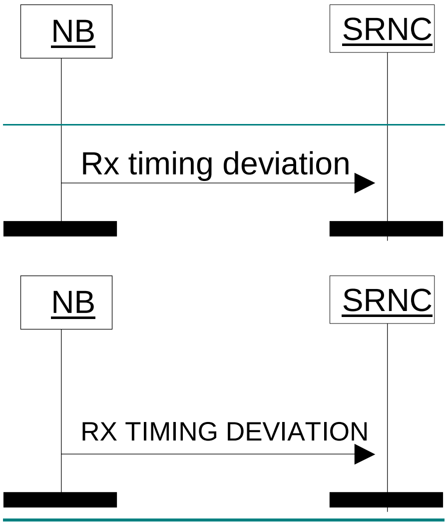


Figure 7: Rx tTiming dDeviation Measurement procedure

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 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 SIGNALLING control 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 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.

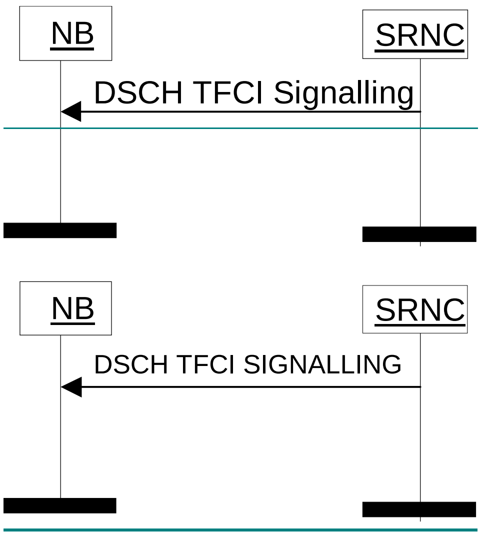


Figure 8: DSCH TFCI Signalling procedure

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.

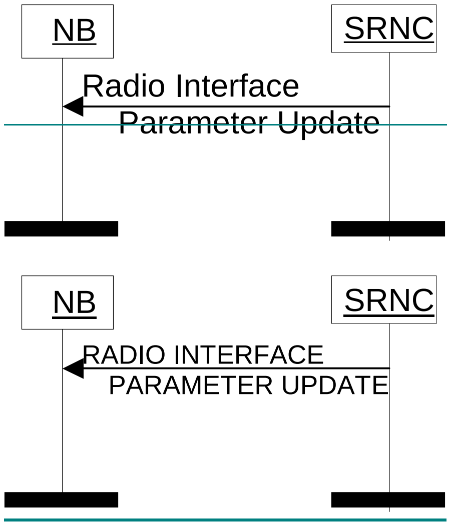


Figure 9: Radio Interface Parameter Update procedure

If the RADIO INTERFACE PARAMETER UPDATE control frame contains a TPC Power Offset value, the Node B shall apply the newly provided TPC PO in DL. If the frame contains a DPC mode value, the Node B shall apply the newly provided value in DL power control. The new values shall be applied as soon as possible in case no CFN is included or from the indicated CFN.

5.9 Timing Advance [3.84Mcps 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.

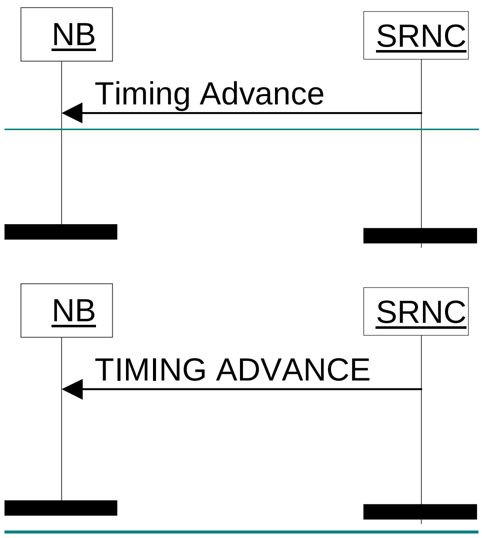


Figure 9A: Timing Advance ~~Signalling~~procedure

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 ~~t~~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.

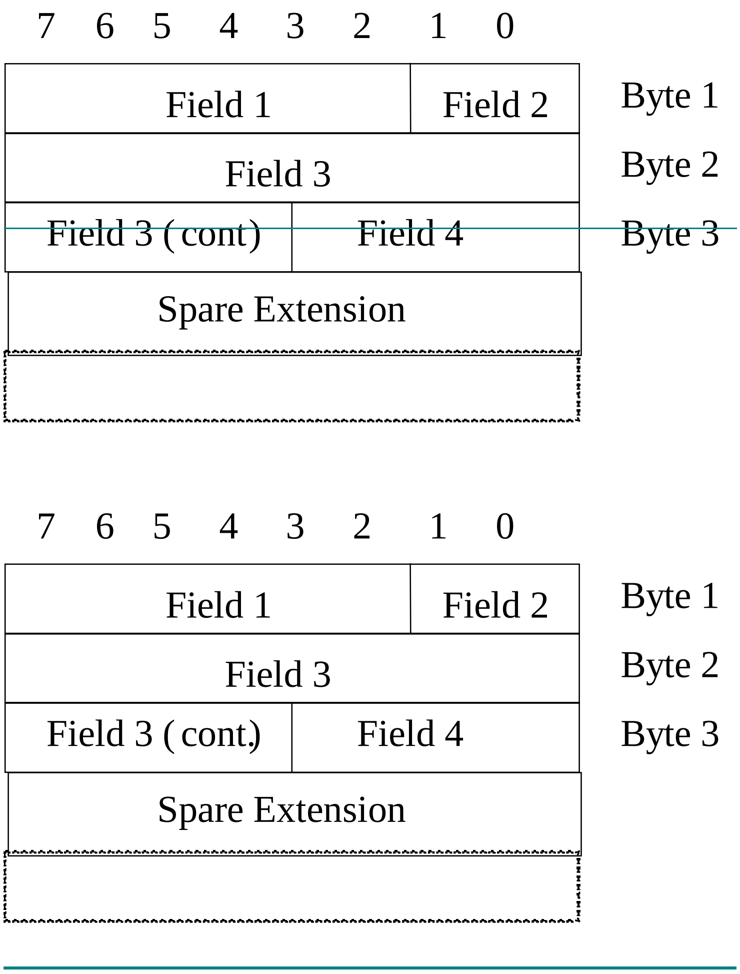


Figure 10: Example of notation used for the definition of the frame structure

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 UplinkPLINK dataDATA frameFRAME

The structure of the UL dataDATA frameFRAME is shown below.

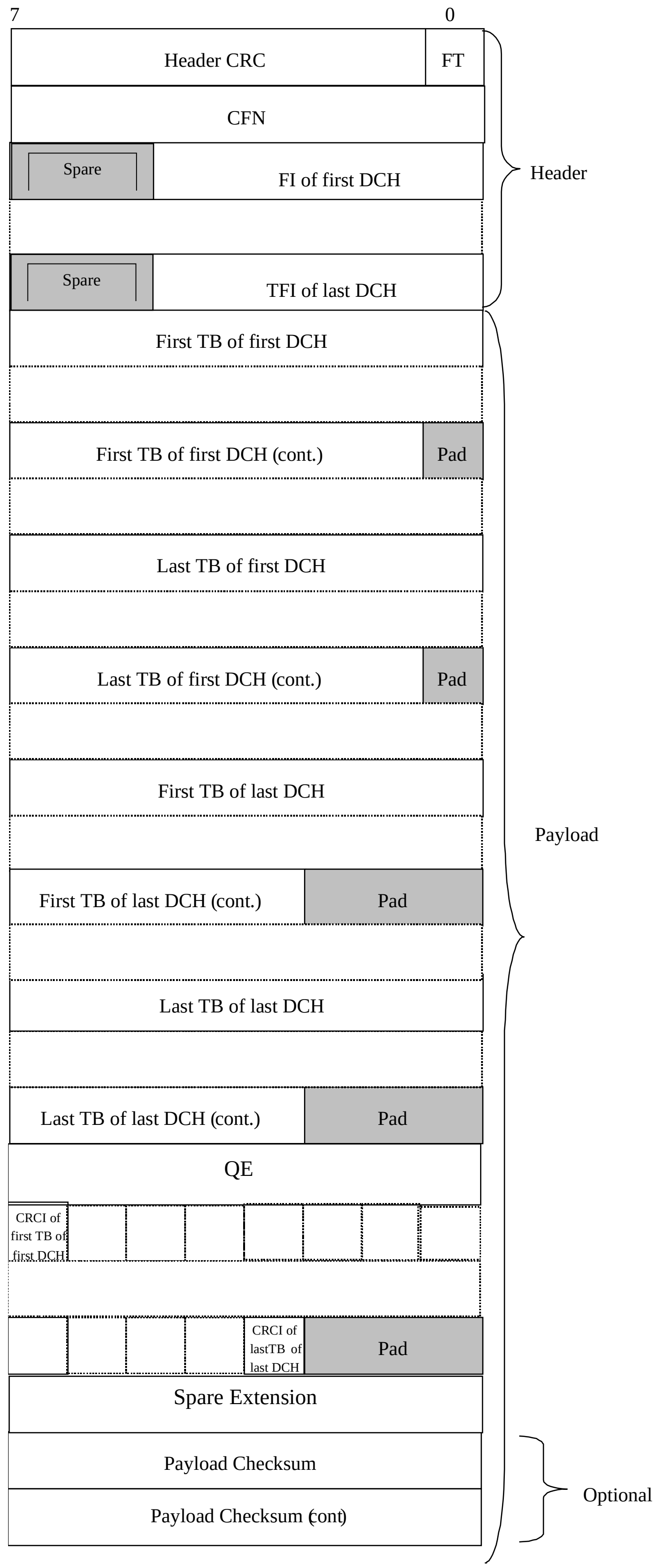


Figure 11: U~~plink~~PLINK ~~data~~DATA ~~frame~~FRAME structure

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 isare 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 DownlinkOWNLINK dataDATA frameFRAME

The structure of the DL dataDATA frameFRAME is shown below.

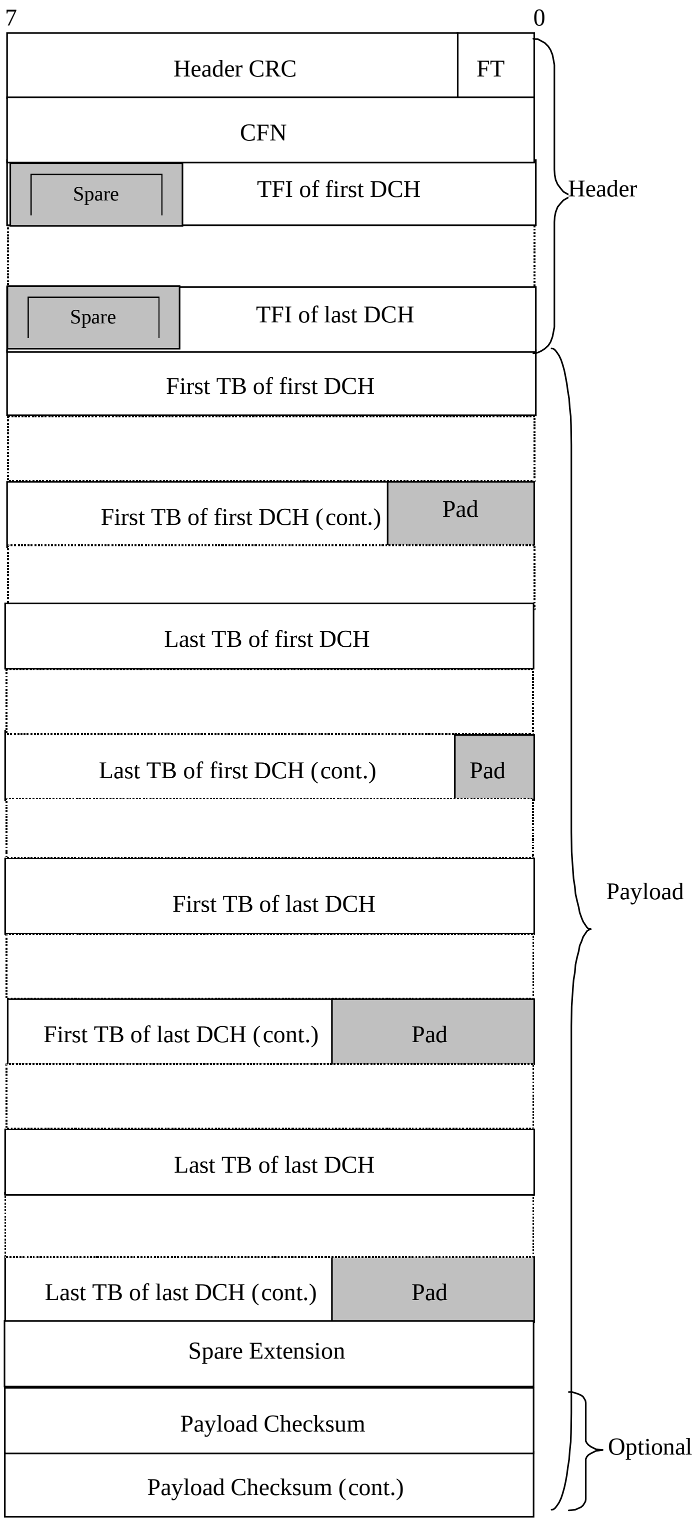


Figure 12: D~~ownlink~~OWNLINK ~~data~~DATA ~~frame~~FRAME structure

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: ~~d~~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: ~~i~~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.~~.

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: ~~t~~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 ~~F~~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:

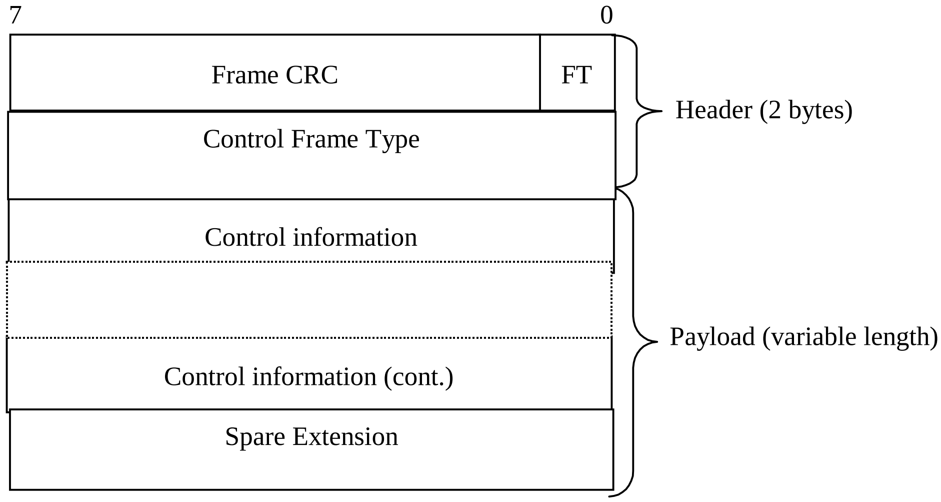


Figure 13: General structure of the control frames

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: ~~d~~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 controlUTER LOOP POWER CONTROL	0000 0001
Timing adjustmentIMING ADJUSTMENT	0000 0010
DL synchronizationSYNCHRONIZATION	0000 0011
UL synchronizationSYNCHRONIZATION	0000 0100
DL signalling for DSCH TFCI SIGNALLING	0000 0101
DL Node synchronizationODE SYNCHRONIZATION	0000 0110
UL Node synchronizationODE SYNCHRONIZATION	0000 0111
RxX TimingIMING DeviationEVIATION	0000 1000
RadioADIO InterfaceNTERFACE ParameterARAMETER UpdatePDATE	0000 1001
TimingIMING AdvanceDVANCE	0000 1010

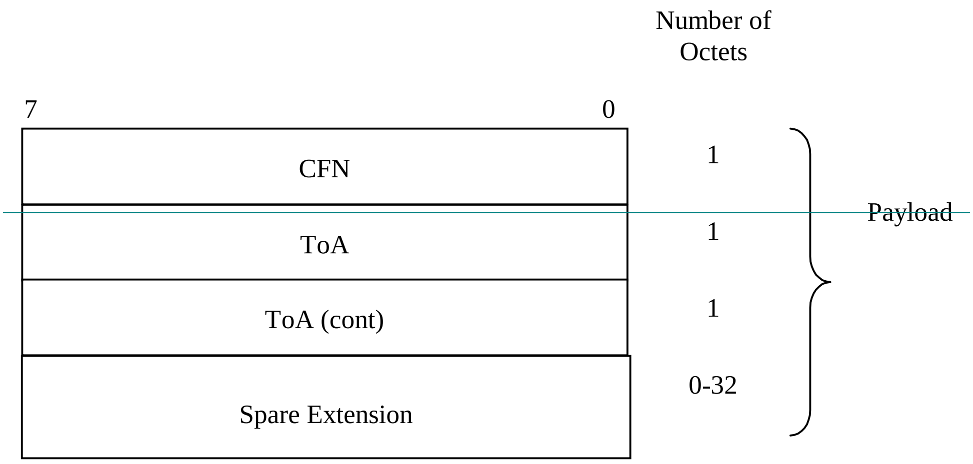
Field length: 8 bits.

6.3.3 Payload structure and information elements

6.3.3.1 TimingIMING AdjustmentDJUSTMENT

6.3.3.1.1 Payload structure

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



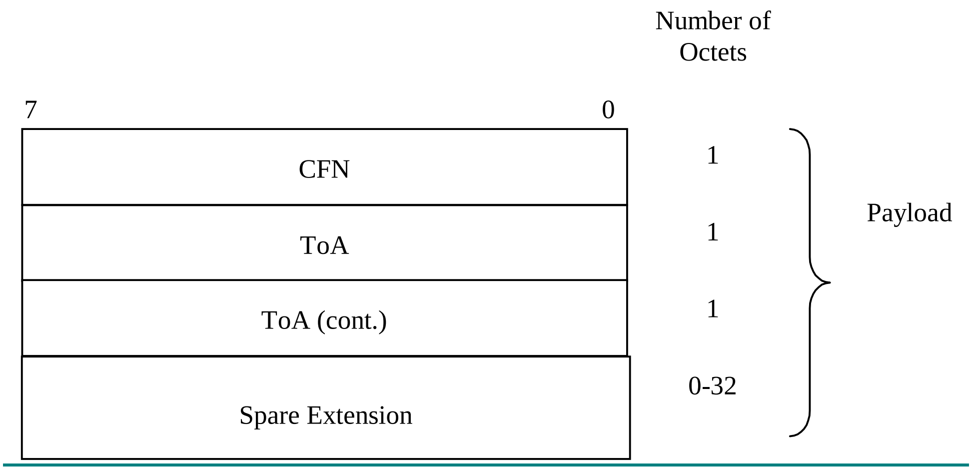


Figure 14: Structure of the payload for the TIMING ADJUSTMENT~~Timing Adjustment~~ control frame

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 ~~a~~Arrival (ToA)

Description: ~~t~~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~~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.

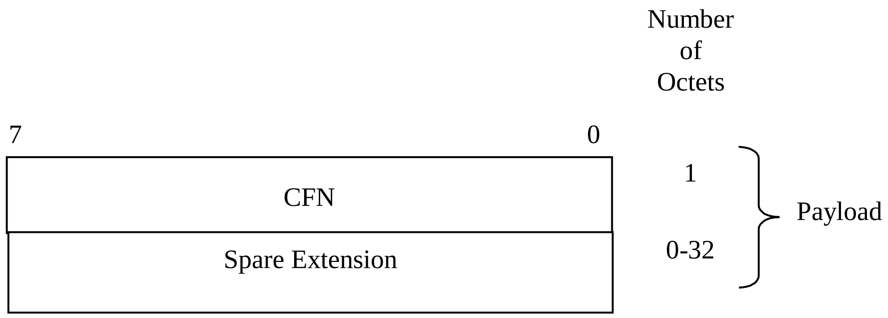


Figure 15: Structure of the payload for the DL ~~synchronization~~ SYNCHRONIZATION control frame

6.3.3.2.2 CFN

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

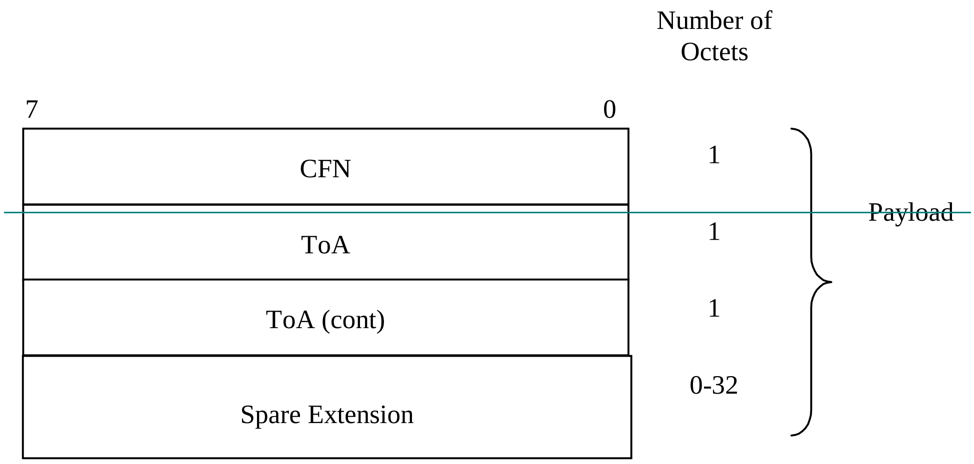
6.3.3.2.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.3 UL ~~synchronization~~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).



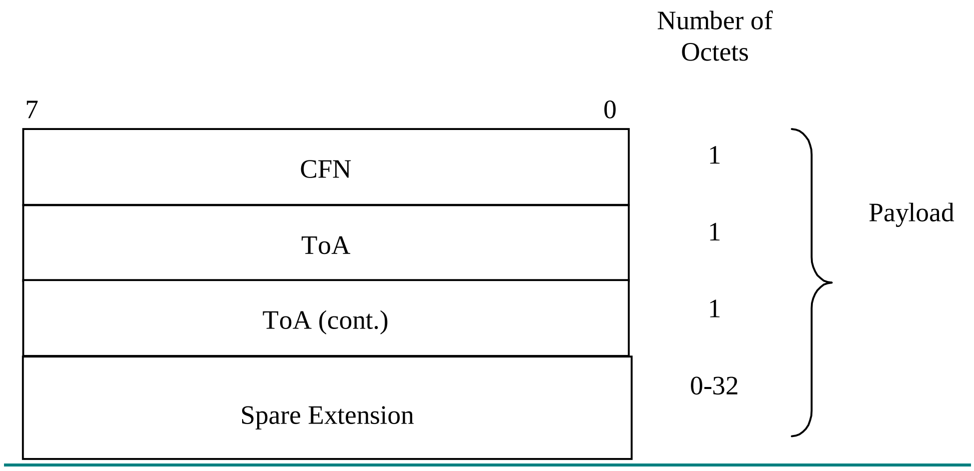


Figure 16: Structure of the UL ~~Synchronization~~ SYNCHRONIZATION control frame

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 ~~a~~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 [FDD - ~~UL~~ O~~uter loop power control~~UTER 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.

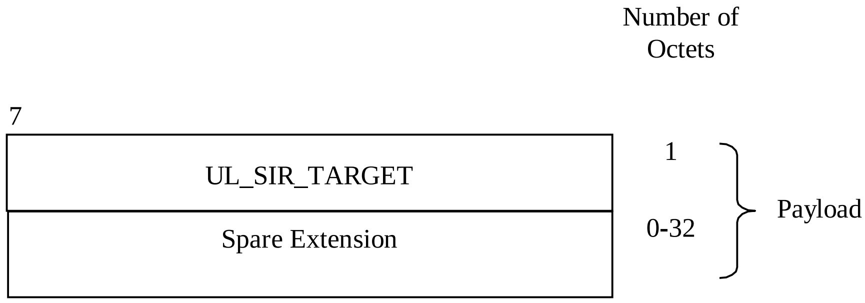


Figure 17: Structure of the payload for ~~outer loop~~OUTER LOOP PC control frame

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.~~.

Granularity: 0.1 dB.

Field length: 8 bits.

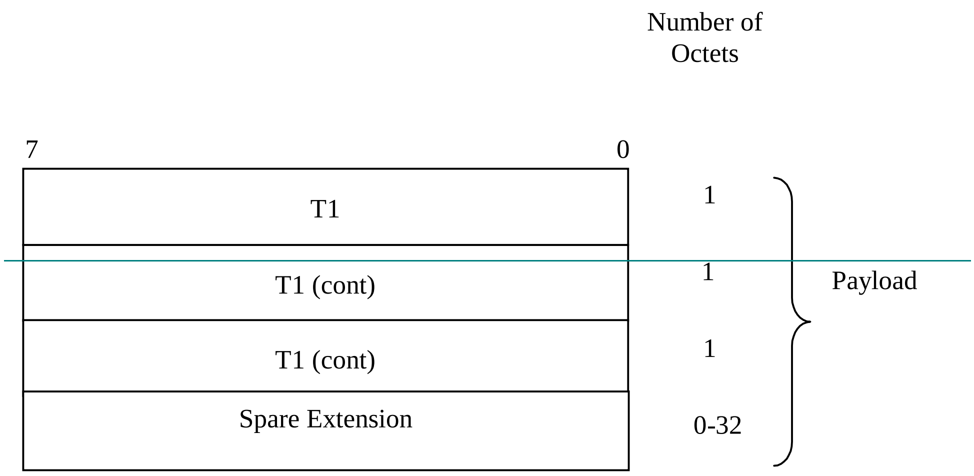
6.3.3.4.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.5 DL N~~ode~~ODE S~~ynchronization~~YNCHRONIZATION

6.3.3.5.1 Payload structure

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



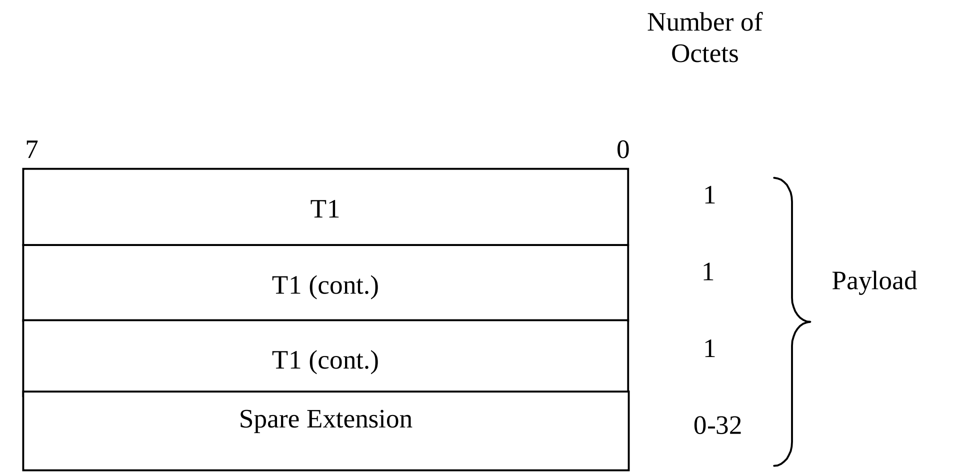


Figure 18: Structure of the payload for the DL ~~Node Synchronization~~ NODE SYNCHRONIZATION control frame

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: ~~a~~As defined in subclause 6.3.3.6.2.

Field length: 24 bits.

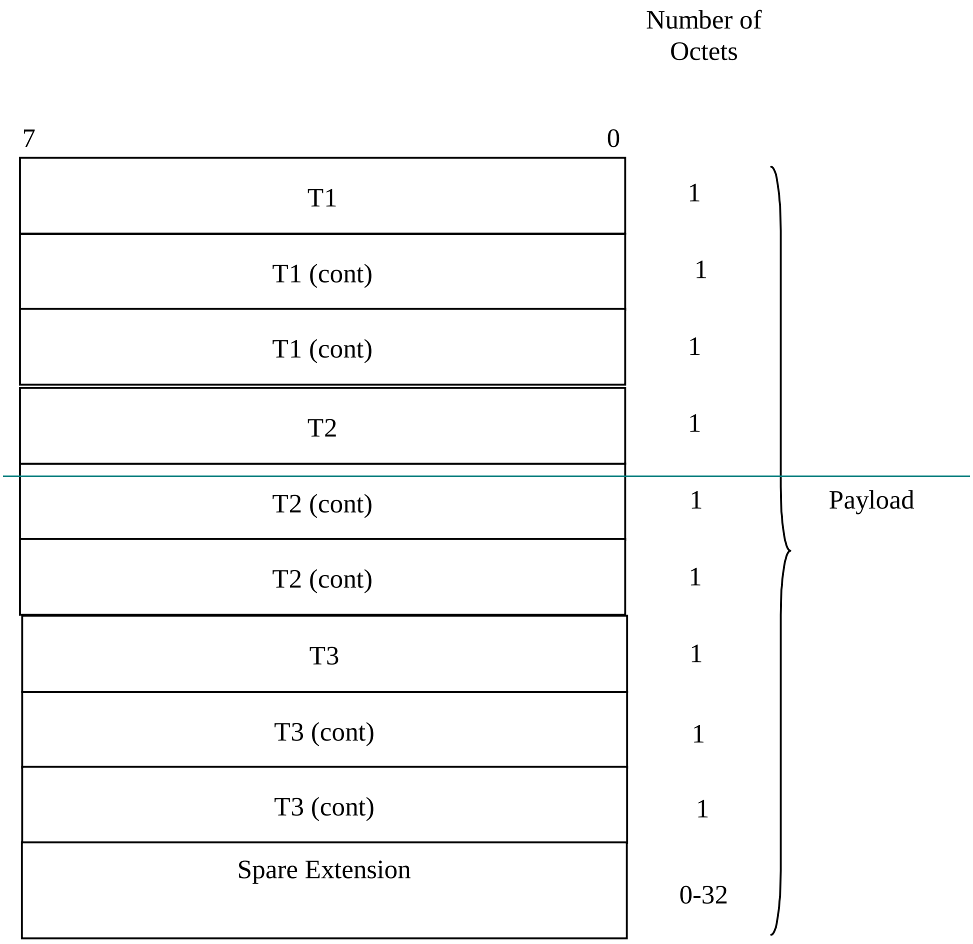
6.3.3.5.3 Spare Extension

The Spare Extension is described in subclause 6.3.3.1.4.

6.3.3.6 UL N~~ode~~ODE S~~ynchronization~~YNCHRONIZATION

6.3.3.6.1 Payload structure

The payload of the UL N~~ode~~ODE ~~synch~~SYNCHRONIZATION control frames is shown in the figure below.


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

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~~ NODE SYNCHRONIZATION control frame

6.3.3.6.2 T1

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

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

Granularity: 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~~ SYNCHRONIZATION control frame through the SAP from the transport layer.

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

Granularity: 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.~~

Granularity: 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 [3.84 Mcps TDD - R~~x~~X T~~iming~~IMING D~~eviation~~EVIATION]

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.

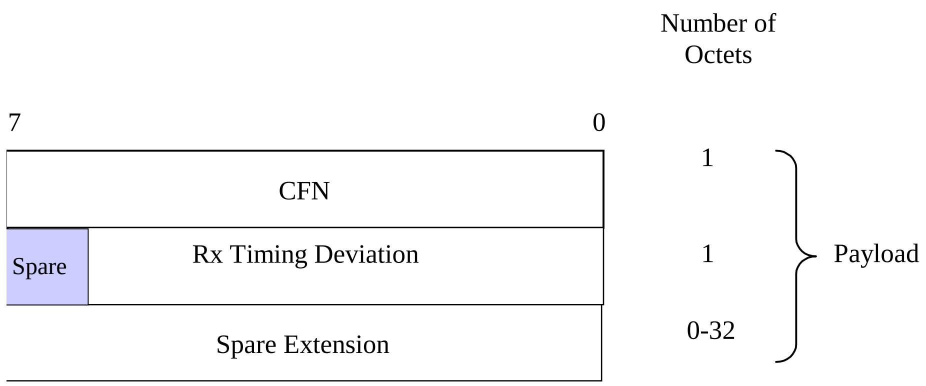


Figure 20: Structure of the payload for R~~x~~X ~~timing deviation~~ TIMING DEVIATION control frame

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 $\leq$ 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~~ 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.

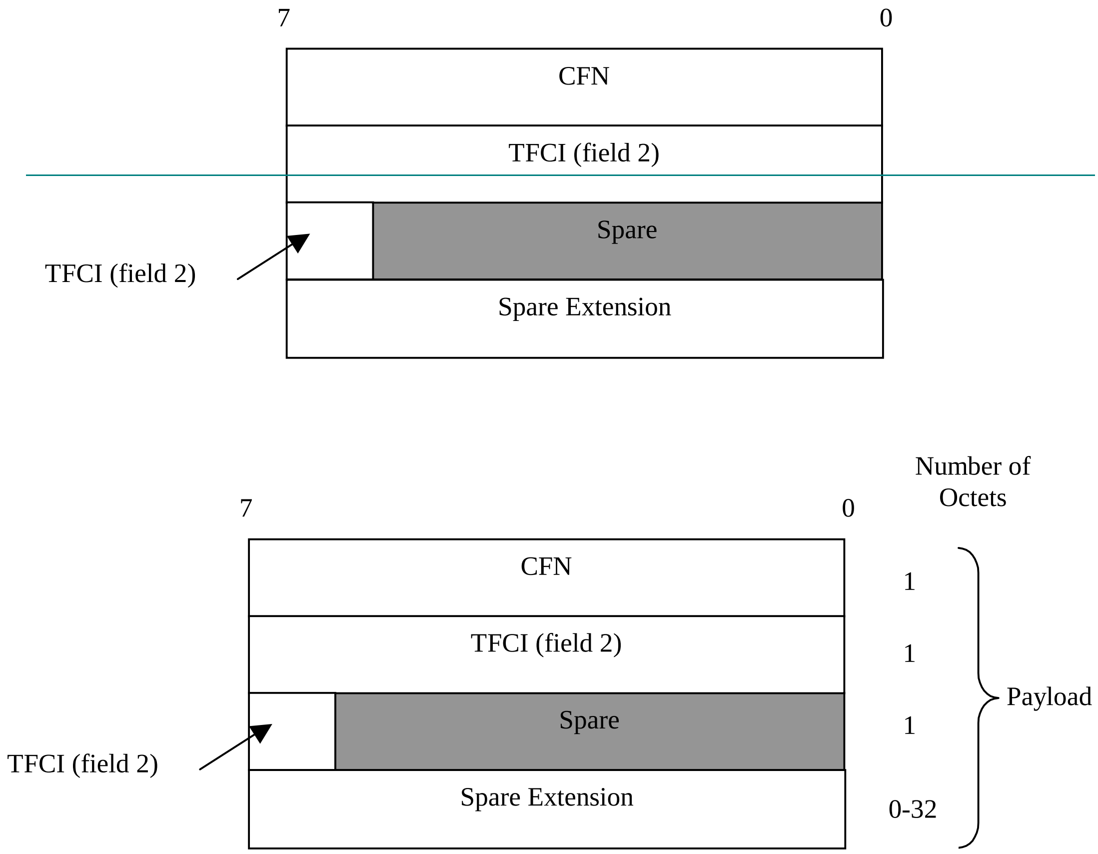


Figure 21: ~~[FDD -~~ Structure of the payload for the DSCH ~~DL signalling~~ TFCI SIGNALLING control frame

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 [FDD - R~~adio~~ADIO I~~nterface~~NTERFACE P~~arameter~~ARAMETER U~~pdate~~PDATE]

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.

7							0	
Radio Interface Parameter Update flags								Payload (>=4 bytes)
15	14	13	12	11	10	9	8	
Radio Interface Parameter Update flags								
7	6	5	4	3	2	1	0	
CFN								
7 6 5 spare			TPC PO					
Spare Extension								

Number of Octets

7							0	Number of Octets	
Radio Interface Parameter Update Flags								1	Payload (>=4 bytes)
15	14	13	12	11	10	9	8		
Radio Interface Parameter Update Flags								1	
7	6	5	4	3	2	1	0		
CFN								1	
7	6	5	TPC PO					1	
Spare									
Spare Extension								0-32	

Figure 22: Structure of the payload for the ~~Radio Interface Parameter Update~~ 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: Indicates if the 4th byte (bit 5) of the control frame payload contains a DPC mode (1) or not (0);

Bit 3-15: 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 ~~p~~Power ~~o~~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 dB}~~., resolution in 0.25 dB.~~

Granularity: 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.

6.3.3.9.5 DPC ~~m~~Mmode

Description: DPC mode to be applied in the UL.

Value range:

Bit 0: The Node B shall estimate the UE transmitted TOC command and update the power in every slot;

Bit 1: The Node B shall estimate the UE transmitted TOC command over three slots and shall update the power in every three slots.

Field length: 1 bit.

6.3.3.10 [3.84Mcps TDD - T~~iming~~IMING A~~dvance~~DVANCE]

6.3.3.10.1 Payload structure

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

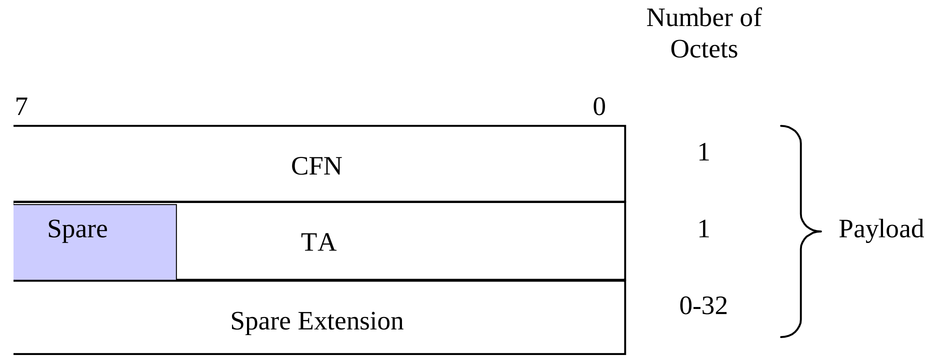


Figure 23: Structure of the ~~Timing Advance~~ TIMING ADVANCE control frame

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.

Granularity: 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.