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Editor's Note : Revision marks show the changes based on decisions at the last meeting.
These changes have not yet been approved in RAN WG3

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Technical Specification

3GPP

3rd Generation Partnership Project (3GPP);
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UTRAN I_{ub} Interface User Plane Protocols for COMMON TRANSPORT CHANNEL Data Streams
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Contents

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Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).
The contents of this TS are subject to continuing work within 3GPP TSG RAN and may change following formal TSG RAN approval. Should the TSG modify the contents of this TS, it will be re-released with an identifying change of release date and an increase in version number as follows:

Version m.t.e

where:

m indicates [major version number]

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

y the third digit is incremented when editorial only changes have been incorporated into the specification.

Introduction

This clause is optional. If it exists, it is always the third unnumbered clause.
No text block identified.

1 Scope

This document shall provide a description of the UTRAN RNC-Node B(Iub) interface user plane protocols for Common Transport Channel data streams as agreed within the TSG-RAN working group 3.

Note : by Common Transport Channel one must understand RACH, FACH/PCH and DSCH.

2 References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply;

b) all versions up to and including the identified version (identified by "up to and including" before the version identity);

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] Merged version of Iub interface Description

Editor's Note : [1] is a temporary reference only to ease the definition of what should be in the different sections of this document.

3 Definitions, symbols and abbreviations

~~1.1~~3.1 Definitions

. *[Editor´s note: For list of definitions, see [1]. Only definitions specific to this document are listed below, in order to avoid inconsistency between documents. When list is stable, definitions relevant for this document should be extracted.]*

~~1.2~~3.2 Symbols

3.3 Abbreviations

[Editor´s note: For list of abbreviations, see [1]. Only abbreviations specific to this document are listed below, in order to avoid inconsistency between documents. When list is stable, abbreviations relevant for this document should be extracted.]

4 General aspects

4.1 Common Transport Channel Data Stream User Plane Protocol Services

4.1.1 RACH/FACH/PCH Data Streams User Plane Protocol Services

[Editor's Note: This chapter describes the services that the User Plane Protocols provide such as data transfer, flow control, etc.]

4.1.2 Downlink Shared Channels Data Streams User Plane Protocol Services

[Editor's Note: This chapter describes the services that the User Plane Protocols provide such as data transfer, flow control, etc.]

4.1.3 [TDD — Uplink Shared Channels Data Streams User Plane Protocol Services]

[Editor's Note: This chapter describes the services that the User Plane Protocols provide such as data transfer, flow control, etc.]

4.2 Services expected from data transport

5 Frame Structure and Coding

The general structure of a Common Transport Channel frame consists of a header, the payload and a tail. This structure is depicted in the table below

Header	Payload: Data or Control Information	Tail

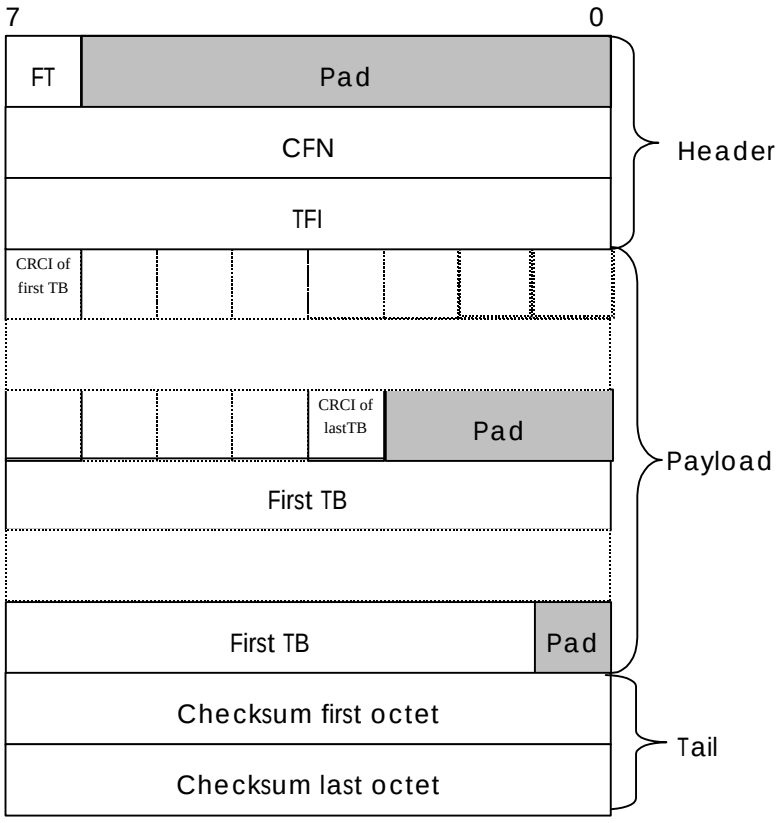
General Frame Structure

5.1 Data frame structure

5.1.1 RACH Channels

RACH Data Frame includes the Cell SFN in which the payload was received. If the payload was received in several Cell SFNs the first Cell SFN shall be indicated.

	~~Information element~~	~~Description~~
~~Header~~	~~Frame Type~~	~~Data Frame~~
	~~FN_{CELL}~~	~~Indicates the Cell Frame Number count when the RACH was received.~~
	~~Transport Format Indicator~~	~~The TFI to denote the format of the Transport Block set carrying the RACH payload.~~
~~Payload~~	~~Checksum indicator~~	~~Indicates if the transport block CRC is correct~~
	~~Transport Block 1~~	~~Data from the Radio interface~~
	~~÷~~	~~÷~~
	~~Checksum indicator~~	~~Indicates if the transport block CRC is correct~~
	~~Transport Block N~~	~~Data from the Radio interface~~
~~Tail~~	~~Data frame checksum.~~	~~Checksum of the header and payload~~



The meaning of the fields is the following:

- **Frame Type (FT)**
  Description: describes if it is a control frame or a data frame.
  Value range: {data, control}.
  Field Length: 1 bit
- **Connection Frame Number (CFN)**
  Description: indicator as to which radio frame the first data was received on uplink or shall be transmitted **on** downlink.
  Value range: {0-255}
  Field length: 8 bits
- **Transport Format Indicator (TFI)**
  Description: TFI is the local number of the transport format used for the transmission time interval.

Value range: {0-255}
Field length: 8 bits

- **CRC indicator (CRCI)**
  Description: Shows if the transport block has a correct CRC. The UL Outer Loop Power Control may use the CRC indication.
  Value range: {Correct, Not Correct}
  Field length: 1 bit
- **Transport Block (TB)**
  Description: A block of data to be transmitted or have been received over the air interface. The transport format indicated by the TFI describes the transport block length and transport block set size.
- **Cyclic Redundancy Checksum**
  Description: A CRC is needed on the frame protocol header and payload in order to ensure that the transmission has been correct.
  Value range: -
  Field length: 16 bits (FFS)

5.1.2 FACH~~/PCH~~ Channels

FACH~~/PCH~~ Data Frame includes the CFN corresponding to the Uu frame at which this data ~~Cell SFN~~ in which the payload (FACH TBS) has to be transmitted~~shall be sent~~. If the payload is to be sent in several Cell SFNs the first Cell SFN shall be indicated.

	Information element	**Description**
Header	Frame Type	Data Frame
	~~FN~~$_{CELL}$CFN	Indicates the ~~Cell~~ Connection Frame Number on which this DL FACH/PCH TBSs need to be transmitted
	FACH Transport Format Indicator	This TFI to denote the format of the Transport Block set carrying the FACH payload.
	Transmission power level	Indicator of the transmission power level
Payload	FACH Transport Block Set	The TBS includes the FACH payload data to be transmitted by the physical layer over the air-interface.
Tail	Data frame checksum.	Checksum of the header and payload

~~*Note: The presence of the FACH related part and/or PCH related part in the Frame is determined at the setup of the common channel.*~~

5.1.3 PCH Channels

PCH Data Frame includes the CFN corresponding to the Uu frame at which this data in which the payload (PCH TBS, Paging indicator information) has to be transmitted. If the payload is to be sent in several Cell SFNs the first Cell SFN shall be indicated.
The node-B has no responsibility concerning ensuring the consistency between the paging indication information and the corresponding paging messages. E.g. if the paging indication information is lost over the Iub, the paging messages might be sent over the Uu while no UE is actually listening.

	Information element	**Description**
Header	Frame Type	Data Frame
	CFN	Indicates the Connection Frame Number on which this DL FACH/PCH TBSs need to be transmitted
	PCH Transport Format Indicator	This TFI to denote the format of the Transport Block set carrying the PCH payload.
	Transmission power level	Indicator of the transmission power level
Payload	Paging Indication Information	Its content and coding is FFS.
	PCH Transport Block Set	The TBS includes the PCH payload data to be transmitted by the physical layer over the air-interface.
Tail	Data frame checksum.	Checksum of the header and payload

~~5.1.3~~5.1.4 Downlink Shared Channels

DSCH Data Frame includes the Cell SFN in which the payload shall be sent. If the payload is to be sent in several Cell SFNs the first Cell SFN shall be indicated.

~~5.1.4~~5.1.5 [TDD — Uplink Shared Channels]

5.2 Control frame structure

The Common Control Channel control frames are used to transport control information between the CRNC and the Node B. The table below defines the Control Frame structure for common transport channels.

	Information Element	**Description**
Header	Frame Type	Common Transport Channel Control Frame
Payload	NAME	Name of the control information element
	Parameters	The Parameters of the control information.
Tail	Control Frame checksum	Checksum of the header and payload data

Iub Common Transport Channel Control Frame Format

The payload defines the type of the control information and its parameters (measurement or command). The control information in the frame protocol are defined below.

5.2.1 Timing Adjustment

Timing adjustment control frames are sent by the Node B to notify to the CRNC that the DL data is received too late or too early, accordingly to the timing adjustment procedure.
Table below shows the structure of the payload when control frame is used for the timing adjustment. This control information is sent in UL only on the transport connection used to convey the FACH/PCH transport channel and the DSCH transport channel.

NAME	Timing Adjustment
Parameters	Time of Arrival: time difference between the arrival of the DL frame with respect to the optimal time (based on the CN value in the frame)
	~~FN~~$_{CELL}$CFN

Note: The range of the timing adjustment report parameter is equivalent to the Radio Frame period multiplied by the maximum CFN value. The resolution of the Timing Adjustment Report parameter is 1 ms.

5.2.2 DL Synchronisation

DL Synchronisation control frames are used to achieve and maintain the initial synchronisation of the CTCH user plane accordingly to the synchronisation procedure.
Table below shows the structure of the payload when control frame is used for the user plane synchronisation (DL). This control information is sent in DL only.

NAME	DL Synchronisation
Parameters	~~FN~~$_{CELL}$CFN

5.2.3 UL Synchronisation

UL Synchronisation control frames are used to achieve and maintain the initial synchronisation of the CTCH user plane accordingly to the synchronisation procedure.
Table below shows the structure of the payload when control frame is used for the user plane synchronisation (UL). This control information is sent in UL only.

NAME	Synchronisation
Parameters	~~FN~~$_{CELL}$CFN
	TOA, Time of arrival

5.2.4 DL Node Synchronisation

Editor's Note: This section is a editorial proposal from Tdoc R3-99A45 to reflect the outcome of the Sync Ad hoc on Node Synchronisation.

DL Node Synchronisation control frames are sent by the RNC to the Node B in order to measure the offset between the RFN and the BFN according to the Node Synchronisation procedure. This control frame is sent in DL only, and is sent on the transport bearer used to convey "channel".

NAME	DL Node Synchronisation
Parameters	t1 Time when the RNC sends the frame.

Note,t1 is the RNC specific frame time (RFN) in the range 0-40959.875 ms, and the resolution is 0.125 ms.

5.2.5 UL Node Synchronization

Editor's Note: This section is a editorial proposal from Tdoc R3-99A45 to reflect the outcome of the Sync Ad hoc on Node Synchronisation.

UL Node Synchronisation control frames are sent by the Node B to the RNC as a response to the DL according to the Node Synchronisation procedure. This control frame is sent in UL only, and is sent on the transport bearer used to convey "channel".

NAME	UL Node Synchronisation
Parameters	t1 Time when sending frame the RNC. (from DL Node Synchronisation Frame). t2 Time when Node B received the DL t3 Time when Node B sends the frame

Note,t2, and t3 are the Node B specific frame time (BFN) in the range 0-40959.875 ms, and the resolution is 0.125 ms. For t1, see the DL Node Synchronisation control frame.

5.3 Coding

6 Data Streams User Plane Procedures

[Editor's Note: This chapter specifies the user plane procedures for RACH/FACH/PCH data streams. Typical related scenarios at Iub interface should be described.]

6.1 Data Transfer

6.1.1 RACH Channels

Data Transfer procedure is used to transfer data received from Uu interface from NodeB to CRNC. Data Transfer procedure consists of a transmission of Data Frame from Node B to CRNC.

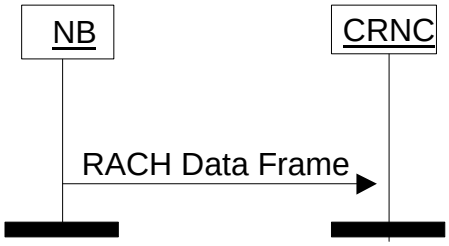


Figure 1. RACH Data Transfer Procedure.

6.1.2 FACH~~/PCH~~ Channels

Data Transfer procedure is used to transfer data from CRNC to node B. Data Transfer Procedure Consists of a transmission of Data Frame from CRC to node B.

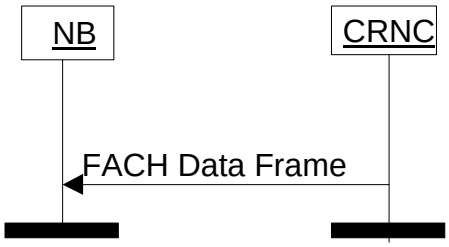


Figure 2. FACH~~/PCH~~ Data Transfer Procedure.

6.1.3 PCH Channels

Data Transfer procedure is used to transfer data from CRNC to node B. Data Transfer Procedure Consists of a transmission of Data Frame from CRC to node B.

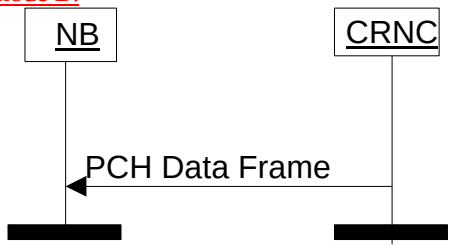


Figure 3. PCH Data Transfer Procedure.

~~6.1.3~~6.1.4 Downlink Shared Channels

Data Transfer procedure is used to transfer data from CRNC to node B. Data Transfer Procedure Consists of transmission a Data Frame from CRNC to node B.

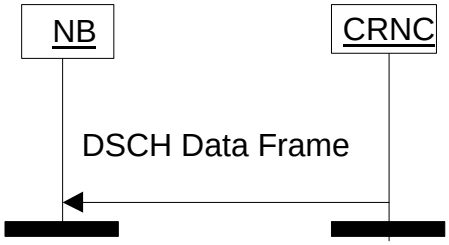


Figure 4. DSCH Data Transfer Procedure.

~~6.1.4~~6.1.5 [TDD — Uplink Shared Channels]

6.2 Synchronisation

6.2.1 Node Synchronisation

Editor's Note: This section is a editorial proposal from Tdoc R3-99A45 to reflect the outcome of the Sync Ad hoc on Node Synchronisation.

In the Node Synchronisation procedure, the RNC sends a DL Node Synchronisation control frame to Node B. Upon reception of a DL Synchronisation control frame, the Node B shall respond with UL Synchronisation Control Frame, indicating t2 and t3, as well as t1 which was indicated in the initiating DL Node Synchronisation control frame.

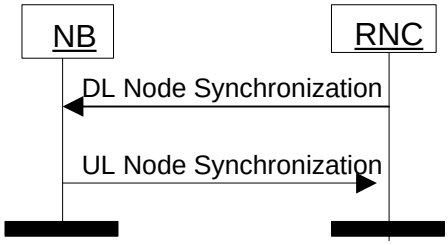


Figure 5. Node Synchronisation procedure.

6.2.16.2.2 FACH Channels and/ PCH Channels

CRNC sends a DL SYNCHRONISATION Control Frame to node B. This message indicates the target Cell SFN. Upon reception of the DL SYNCHRONISATION Control Frame Node B shall immediately respond with UL SYNCHRONISATION Control Frame indicating the ToA for the DL Synchronisation frame and the Cell SFN indicated in the received message.

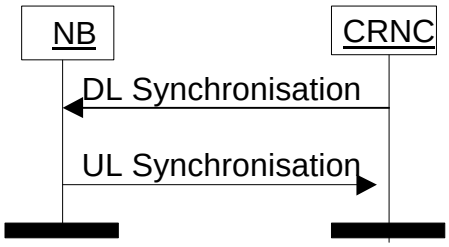


Figure 6. FACH and /PCH Synchronisation procedure.

6.2.26.2.3 DSCH Channels

CRNC sends a DL SYNCHRONISATION Control Frame to node B. This message indicates the target Cell SFN. Upon reception of the DL SYNCHRONISATION Control Frame Node B shall immediately respond with UL SYNCHRONISATION Control Frame indicating the ToA for the DL Synchronisation frame and the Cell SFN indicated in the received message.

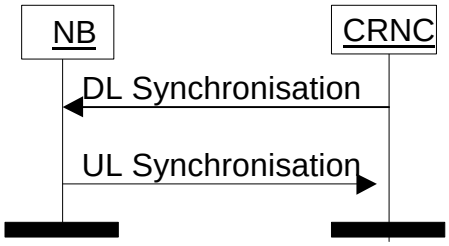


Figure 7. DSCH Synchronisation procedure.

6.3 DL Timing Adjustment

6.3.1 FACH Channels and/ PCH Channels

Timing Adjustment procedure is used to indicate for the CRNC the incorrect arrival time of downlink data to node B. Timing adjustment procedure is initiated by the node B if a DL frame arrives outside of the defined arrival window. If the DL frame has arrived before the ToAWS or after the ToAWE nodeB includes the ToA and the target Cell SFN as message parameters for TIMING ADJUSTMENT Control Frame.

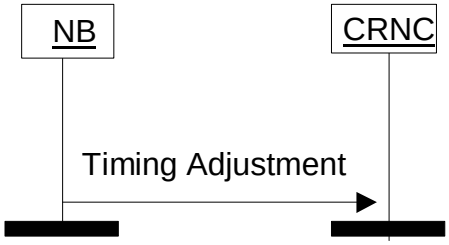


Figure 8. FACH and /PCH Timing Adjustment procedure.

6.3.2 DSCH Channels

Timing Adjustment procedure is used to indicate the incorrect arrival time of downlink data for the CRNC.
Timing adjustment procedure is initiated by the node B if a DL frame arrives outside of the defined arrival window.
If the DL frame has arrived before the ToAWS or after the ToAWE nodeB includes the ToA and the target Cell SFN as parameters to the TIMING ADJUSTMENT Control Frame

Figure 9. DSCH Timing Adjustment procedure.

6.4 Flow Control

6.4.1 RACH/FACH/PCH Channels

6.4.2 Downlink Shared Channels

6.4.3 [TDD — Uplink Shared Channels]

7 Bibliography

Appendices

Annex A Document Stability Assessment Table

Section	Content missing	Incomplete	Restructuring needed	Checking needed	Editorial work required	Finalisation needed	Almost stable	Stable
1					√			
2					√			
3	√							
4	√							
5.1						√		
5.2						√		
5.3	√							
6						√		
7	√							

Annex B List of Open Issues

The open issues identified by the editor are the following:

1. Exact definition of the CRC in the tail of the FP frame
2. Handling of the 8 bits CFN in the current byte aligned structure for the header of the FP data frame.
3. CFN Lenght especially for paging
4. Backward compatibility and definition of the compatibility information
5. Coding of the parameters (especially control frames)
6. Definition of performances and response time of the procedures (if needed)
7. Handling of abnormal conditions (if something shall be specified)

8. Support for CPCH and USCH
9. Details of the DSCH frames structure
10. Flow control if needed
11. Positionning

History

Document history		
Edition x	<MMMM yyyy>	Publication as <old doctype> <old docnumber>
0.0.1	February 1999	Proposal for document structure.
0.0.2	February 1999	Renaming of section 4.1, 5.1 and 6.1 to RACH/FACH instead of common channels.
0.0.3	March 1999	• Alignment of document structure to the structure of S3.25 • Renaming of CCH to Common Transport Channel.
0.1.0	April 1999	Mail Approval of version 0.0.3 by TSG RAN WG3.
0.1.1	May 1999	Addition of Document Stability Assessment Table
0.2.0	June 1999	Approval of 0.1.1 by 3GPP TSG RAN WG3. Version raised to 0.2.0
0.2.1	June 1999	Revised according to the decisions of 3GPP TSG RAN WG3 Meeting #4 • Creation of sections related to USCH (sections 4.1.3, 5.1.5, ~~5.2.4~~, 6.1.5 and 6.4.3) from Tdoc R3-99497
0.3.0	July 1999	Approval of 0.2.1 by 3GPP TSG RAN WG3. Version raised to 0.3.0
0.3.1	July 1999	Revised according to the decisions of 3GPP TSG RAN WG3 Meeting #5 • Filling of section "5 Frame Structure and Coding" from Tdocs R3-99632, R3-99633, R3-99674 and R3-99735. • Filling of section "6 Data Streams User Plane Procedures" from Tdoc R3-99663 • Editorial work to reach some consistency. • New Stability Assessment proposal.
0.3.0	September 1999	Addition to the FACH/PCH frame of the following note: *" Note: The presence of the FACH related part and/or PCH related part in the Frame is determined at the setup of the common channel."* Approval of 0.3.1 by 3GPP TSG RAN WG3. Version raised to 0.4.0
0.3.1	September 1999	Revised according to the decisions of 3GPP TSG RAN WG3 meeting #6 • Separation of the FACH/PCH FP into FACH FP and PCH FP. • Add precision on the meaning of the frame number in the FACH FP and PCH FP according to Tdoc R3-99934 • Modified RACH FP layout according to Tdoc R3-99848 and R3-99923. • Reflect the use of CFN on common channels instead of FN_{CELL}. • Addition as editorial proposal of sections "5.2.4 DL Node Synchronisation", "5.2.5 UL Node Synchronization" and "6.2.1 Node Synchronisation" to reflect the outcome of the Sync Ad Hoc on Node Synchronisation according to Tdoc R3-99A45. • Addition of "Annex B List of Open Issues"
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