3GPP TSG-RAN meeting #5
Kyongju, Korea, 6-8 October 1999

RP-99461

Title: Approved Change Requests on TS 25.302
Agenda item: 6.3.3

DOC	STATUS	SPEC	CR	REV	SUBJECT	CAT	CURRE	NEW
R2-99892	approved	25.302	001		Making all transport block equally sized within a transport block set	C	3.0.0	3.1.0
R2-99c63	approved	25.302	002	1	UE Simultaneous Physical Channel Combinations in TDD Mode	C	3.0.0	3.1.0
R2-99919	approved	25.302	003		New CPCH parameters for physical layer primitives	C	3.0.0	3.1.0
R2-99920	approved	25.302	004		Timing advance (TDD only)	B	3.0.0	3.1.0
R2-99921	approved	25.302	005		Measurements for TDD provided by physical layer	B	3.0.0	3.1.0
R2-99922	approved	25.302	006		Change of the Downlink model of the UE in relation to PCH	C	3.0.0	3.1.0
R2-99923	approved	25.302	007		Physical channel description for TDD	F	3.0.0	3.1.0
R2-99972	approved	25.302	008		Attributes of the semi-static part and coding terminology	D	3.0.0	3.1.0
R2-99904	approved	25.302	009		Editorial changes following LS received from WG1	D	3.0.0	3.1.0
R2-99c43	approved	25.302	010		Support of Uplink Synchronization Feature in UL channels (TDD only)	B	3.0.0	3.1.0
R2-99c14	approved	25.302	011		Simultaneous reception of AICH and S-CCPCH	C	3.0.0	3.1.0
R2-99c64	approved	25.302	012		Removal of Measurement Precision Requirements	D	3.0.0	3.1.0
R2-99c81	approved	25.302	013		Compressed mode	D	3.0.0	3.1.0
R2-99c37	approved	25.302	014		Change of the model of the UE with respect to shared channel	D	3.0.0	3.1.0

3GPP TSG-RAN meeting #5
Kyongju, Korea, 6-8 October 1999

Document ***R2-99892***

3G CHANGE REQUEST

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25.302	**CR**	**001**		Current Version:	3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG	RAN #5	for approval	**X**	*(only one box should*
list TSG meeting no. here ↑		for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: *(at least one should be marked with an X)*	USIM		ME	**X**	UTRAN	**X**	Core Network

Source: TSG-RAN WG2 **Date:** 1999-08-17

Subject: Making all transport block equally sized within a transport block set

3G Work item:

Category:

(only one category shall be marked with an X)

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	**X**
D	Editorial modification	

Reason for change: It is proposed that all transport blocks within a given transport block set shall be of the same size. The restriction has been proposed to RAN WG2 by RAN WG1 in order to avoid changes in the multiplexing within the physical layer, as defined by WG1.

Clauses affected: 7.1.3, 7.1.5, 7.1.7

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other 2G core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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7 Formats and configurations for L1 data transfer

7.1 General concepts about Transport Channels

Layer 2 is responsible for the mapping of data onto L1 via the L1/L2 interface that is formed by the transport channels. In order to describe how the mapping is performed and how it is controlled, some definitions and terms are required. The required definitions are given in the following sections. Note that the definitions are generic for all transport channel types, i.e. not only for DCHs.

All Transport Channels are defined as unidirectional (i.e. uplink, downlink, or relay-link). This means that a UE can have simultaneously (depending on the services and the state of the UE) one or several transport channels in the downlink, and one or more Transport Channel in the uplink.

7.1.1 Transport Block

This is the basic unit exchanged between L1 and MAC, for L1 processing.

A Transport Block typically corresponds to an RLC PDU or corresponding unit. In the TDD mode it may possibly also be formed by a MAC peer-to-peer message. Layer 1 adds a CRC for each Transport Block.

7.1.2 Transport Block Set

This is defined as a set of Transport Blocks which are exchanged between L1 and MAC at the same time instance using the same transport channel.

7.1.3 Transport Block Size

This is defined as the number of bits in a Transport Block. The Transport Block Size is always fixed within a given Transport Block Set, i.e. all Transport Blocks within a Transport Block Set are equally sized.

7.1.4 Transport Block Set Size

This is defined as the number of bits in a Transport Block Set.

7.1.5 Transmission Time Interval

This is defined as the inter-arrival time of Transport Block Sets, and is equal to the periodicity at which a Transport Block Set is transferred by the physical layer on the radio interface. It is always a multiple of the minimum interleaving period (e.g. 10ms, the length of one Radio Frame). The MAC delivers one Transport Block Set to the physical layer every TTI.

Figure 1 shows an example where Transport Block Sets, at certain time instances, are exchanged between MAC and L1 via three parallel transport channels. Each Transport Block Set consists of a number of Transport Blocks. The Transmission Time Interval, i.e. the time between consecutive deliveries of data between MAC and L1, is also illustrated. ~~Last, the case when the last Transport Block is smaller than the allowed size is shown, with the topmost Transport Block being partially empty.~~

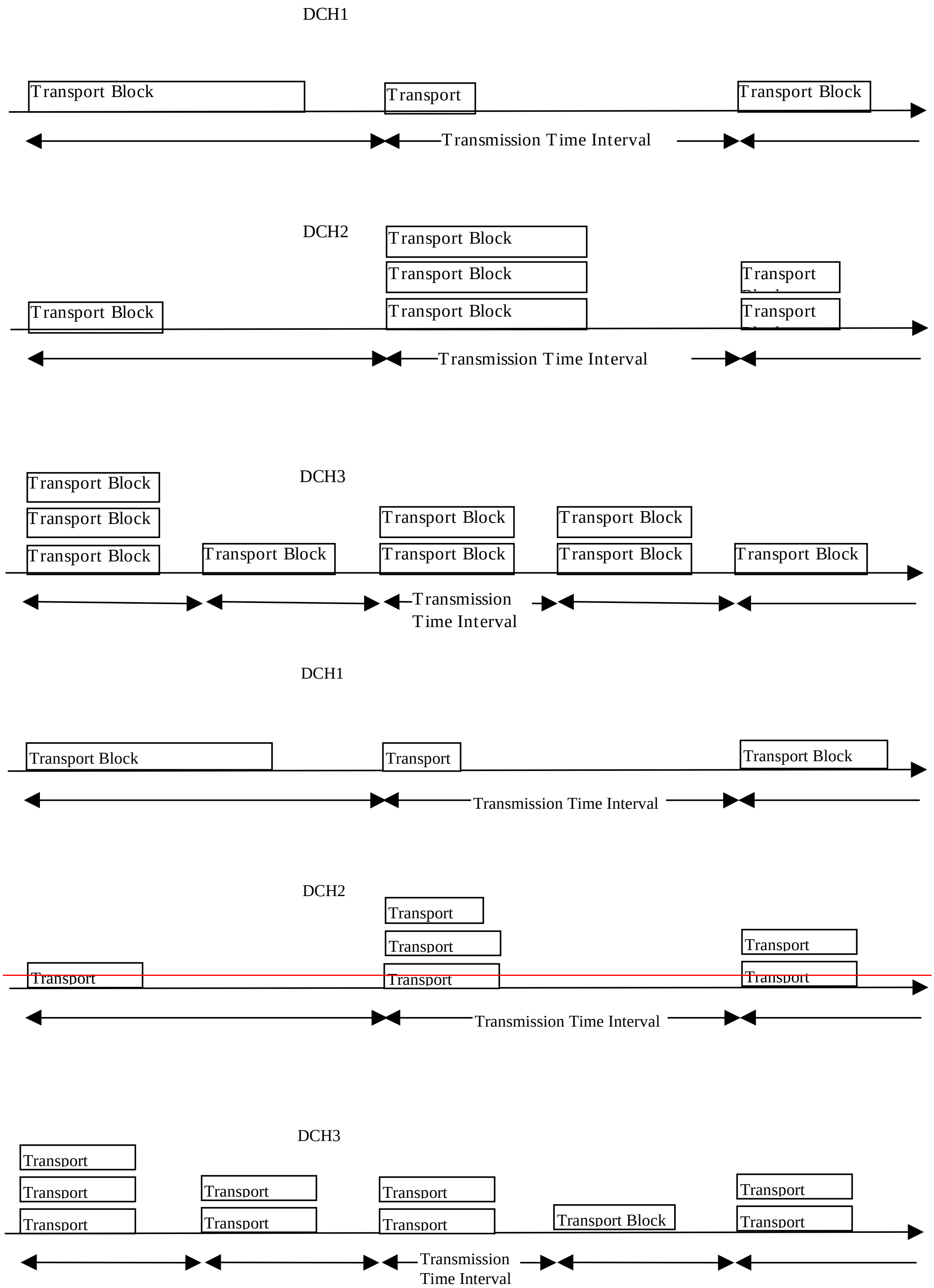

Figure 1. Exchange of data between MAC and L1

7.1.6 Transport Format

This is defined as a format offered by L1 to MAC (and vice versa) for the delivery of a Transport Block Set during a Transmission Time Interval on a Transport Channel. The Transport Format constitutes of two parts – one *dynamic* part and one *semi-static* part.
Attributes of the dynamic part are:

- Transport Block Size
- Transport Block Set Size
- Transmission Time Interval (optional dynamic attribute for TDD only)

Attributes of the semi-static part are:

- Transmission Time Interval (mandatory for FDD, optional for the dynamic part of TDD NRT bearers)
- Error protection scheme to apply
    - Type of error protection e.g. Turbo Code, Convolutionnal Code
    - convolutional code ratio
    - Resulting code ratio after static rate matching
- Size of CRC

In the following example, the Transmission time Interval is seen as a semi-static part
Example:

- Dynamic part: {320 bits, 640 bits}, Semi-static part: {10ms, Inner coding only, repeat 1/12 of the bits}

7.1.7 Transport Format Set

This is defined as the set of Transport Formats associated to a Transport Channel.
The semi-static parts of all Transport Formats are the same within a Transport Format Set.
Effectively the first two attributes of the dynamic part form the instantaneous bit rate on the Transport Channel.
Variable bit rate on a Transport Channel may, depending on the type of service which is mapped onto the transport channel, be achieved by changing between each Transmission Time Interval one of the following:
~~1.the Transport Block Size only~~
~~2.~~1. the Transport Block Set Size only
~~3.~~2. both the Transport Block Size and the Transport Block Set Size
Example 1:

- Dynamic part: {20 bits, 20 bits}; {40 bits, 40 bits}; {80 bits, 80 bits}; {160 bits, 160 bits}
- Semi-static part: {10ms, Inner coding only, repeat 1/12 of the bits}

Example 2:

- Dynamic part: {320 bits, 320 bits}; {320 bits, 640 bits}; {320 bits, 1280 bits}
- Semi-static part: {10ms, Inner coding only, repeat 1/12 of the bits}

The first example may correspond to a Transport Channel carrying a speech service, requiring blocks delivered on a constant time basis. In the second example, which illustrates the situation where a non-real time service is carried by the Transport Channel, the number of blocks delivered per Transmission Time Interval varies between the different Transport Formats within the Transport Format Set. Referring to Figure 1, the Transport Block Size is varied on DCH1and DCH2.~~ whereas the Transport Block Set Size is fix~~. That is, a Transport Format Set where the dynamic part has a variable Transport Block Size has been assigned for DCH1. On ~~DCH2 and~~ DCH3 it is instead only the Transport Block Set Size~~s~~ that is~~are~~ varied. That is, the dynamic parts of the corresponding Transport Format Sets only include variable Transport Block Set Sizes.

3GPP TSG-RAN meeting #5 **Document** ***RP-99c63***
Korea, 6-8 October 1999

3G CHANGE REQUEST

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TS 25.302 **CR** **002r1** Current Version: 3.0.0

3G specification number ↑ ↑ *CR number as allocated by 3G support team*

For submission to TSG RAN#5	for approval	X	*(only one box should*
list TSG meeting no. here ↑	for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM [ ] ME [X] UTRAN [X] Core Network [ ]
(at least one should be marked with an X)

Source: InterDigital **Date:** 9/23/99

Subject: UE Simultaneous Physical Channel Combinations in TDD Mode

3G Work item:

Category:
(only one category shall be marked with an X)

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	X
D	Editorial modification	

Reason for change: UE simultaneous physical channel combinations in TDD mode need to be specified. UL and DL tables equivalent to the current FDD definition has been defined. Additionally tables have been defined for TDD UL & DL combinations and combinations which can exist within particular time slots.

Clauses affected: 8, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6 and 8.7

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other 2G core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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8 UE Simultaneous Physical Channels combinations

This sections describes the requirements from the UE to send and receive on multiple Transport Channels which are mapped on different physical channels simultaneously depending on the service capabilities and requirements. The section will describe the impacts on the support for multiple services (e.g. speech call and SMS-CB) depending on the UE capabilities.

~~*EDITOR'S NOTE : The following tables have been completed for FDD, the TDD operation will be addressed later.*~~

8.1 FDD Uplink

The table describes the possible combinations of FDD physical channels that can be supported in the uplink by one UE at any one time.

8.2 FDD Downlink

The table describes the possible combinations of FDD physical channels that can be supported in the downlink by one UE at any one time.

8.3 TDD Uplink

The table describes the possible combinations of TDD physical channels that can be supported in the uplink by one UE in any one 10ms frame, where a TDD physical channel corresponds to one code, one timeslot, one frequency and is mapped to one resource unit (RU). This table addresses combinations of uplink physical channels in the same 10ms frame.

	Physical Channel Combination	**Transport Channel Combination**	**Baseline Capability or Service Dependent**	**Comment**
1	PRACH	RACH	Baseline	One RACH transport channel maps to one PRACH physical channel.
2	One or more DPCH	One or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.
3	PRACH + one or more DPCH	RACH + one or more DCH coded into one or more CCTrCH	Service dependent	One RACH transport channel maps to one PRACH physical channel The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.
4	One or more PUSCH	One or more USCH coded onto one or more CCTrCH	Service dependent	It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration. USCH requires a control channel (RACH or DCH); however, it is not required to be in the same 10ms frame as the USCH.
5	PRACH + one or more PUSCH	RACH + One or more USCH coded on to one or more CCTrCH	Service dependent	One RACH transport channel maps to one PRACH physical channel. It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.

6	One or more PUSCH + one or more DPCH	One or more USCH coded onto one or more CCTrCH + one or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability. It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.
7	PRACH + one or more PUSCH + one or more DPCH	RACH + one or more USCH coded onto one or more CCTrCH + one or more DCH coded into one or more CCTrCH	Service dependent	One RACH transport channel maps to one PRACH physical channel. The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability. It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.

8.4 TDD Downlink

The table describes the possible combinations of TDD physical channels that can be supported in the downlink by one UE in any one 10ms frame, where a TDD physical channel corresponds to one code, one timeslot, one frequency and is mapped to one resource unit (RU). This table addresses combinations of downlink physical channels in the same 10ms frame.

	Physical Channel Combination	**Transport Channel Combination**	**Baseline Capability or Service dependent**	**Comment**
1	One or two PSCH	SCH	Baseline	SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)
2	One or more CCPCH	BCH and/or PCH and/or one or more FACH	Baseline	BCH can map to multiple CCPCH in a frame. FACH can map to multiple CCPCH in a frame. PCH can map to multiple CCPCH in a frame. See note 2.
3	One or more DPCH	One or more DCH coded into one or more CCTrCH	Service dependant	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability
4	One or more CCPCH + one or more DPCH	BCH and/or PCH and/or one or more FACH + one or more DCH coded into one or more CCTrCH	Service dependent	The number of DCHs and the maximum channel bit rate are dependent on the UE Service Capability. BCH can map to multiple CCPCH in a frame. FACH can map to multiple CCPCH in a frame. See note 2.

5	One or more PDSCH	One or more DSCH coded onto one or more CCTrCH	Service dependent	It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration. DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH.
6	One or more PDSCH + one or more CCPCH	BCH and/or PCH and/or one or more FACH + one or more DSCH coded onto one or more CCTrCH	Service dependant	BCH can map to multiple CCPCH in a frame. Each FACH can map to multiple CCPCH in a frame. It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration. For the case of DSCH + BCH, DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH. See note 2.
7	One or more PDSCH + one or more DPCH	One or more DSCH coded onto one or more CCTrCH + one or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.
8	One or more PDSCH + one or more CCPCH + one or more DPCH	BCH and/or PCH and/or one or more FACH + one or more DSCH coded onto one or more CCTrCH + one or more DCH coded into one or more CCTrCH	Service dependent	BCH can map to multiple CCPCH in a frame. Each FACH can map to multiple CCPCH in a frame. The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration. See note 2.

Notes:

1. Reference: TS25.221: Physical Channels and Mapping of Transport Channels Onto Physical Channels (TDD).
2. The possibility to multiplex PCH and one or more FACH on one or more CCTrCHs is FFS
3. The PSCH synchronization channel can co-exist with all listed combinations

8.5 TDD UE Uplink and Downlink Combinations (within 10 ms air frames)

This table describes the possible uplink and downlink physical channel combinations that can be supported by a UE in TDD mode.

	DL Physical Channel Combination	**DL Transport Channel Combination**	**UL Physical Channel Combination**	**UL Transport Channel Combination**	**Baseline Capability or Service Dependent**	**Comment**
1			PRACH	RACH	Baseline	One RACH transport channel maps to one PRACH physical channel
2	One or more CCPCH	BCH and/or PCH and/or one or more FACH			Baseline	BCH or FACH, or PCH can map to multiple CCPCH in a frame.
3	One or more CCPCH	BCH and/or PCH and/or one or more FACH	PRACH	RACH	Baseline	One RACH transport channel maps to one PRACH physical channel BCH or FACH, or PCH can map to multiple CCPCH in a frame.
4	One or more CCPCH	BCH and/or PCH and/or one or more FACH	PRACH and one or more DPCH	RACH and one or more DCH coded into one or more CCTrCH	Service Dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability. BCH or FACH, or PCH can map to multiple CCPCH in a frame.
5	One or more CCPCH and one or more DPCH	BCH and/or PCH and/or one or more FACH and one or more DCH coded onto one or more CCTrCH	PRACH and one or more DPCH	RACH and one or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability. See Note 1. BCH or FACH, or PCH can map to multiple CCPCH in a frame.
6			One or more DPCH	One or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.

7	One or more DPCH	One or more DCH coded onto one or more CCTrCH	One or more DPCH	One or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability. See Note 1.

Notes:

1. The requirement for an UL DCH to exist in every 10 ms frame for DL Power Control, Transmit Diversity, and Joint Pre-distortion is FFS.

2. The PSCH synchronization channel can co-exist with all listed combinations

3. USCH and DSCH combinations are FFS

8.6 TDD UE Uplink Timeslot Combinations

This table describes possible uplink physical channels that can be supported by a UE within a specific time slot.

	Physical Channel Combination	**Transport Channel Combination**	**Baseline Capability or Service Dependent**	**Comment**
1	PRACH	RACH	Baseline	Time slots supporting RACH do not support other channel types. One RACH transport channel maps to one PRACH physical channel.
2	One or more DPCH	One or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability.
3	One or more PUSCH	One or more USCH coded onto one or more CCTrCH	Service dependent	It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration. USCH requires a control channel (RACH/FACH or DCH); however, it is not required to be in the same 10ms frame as the USCH.
4	One or more PUSCH + one or more DPCH	One or more USCH coded onto one or more CCTrCH + one or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability. It is assumed here that a USCH transport channel may map to one or more PUSCH physical channels based on system configuration.

8.7 TDD UE Downlink Timeslot Combinations

This table describes possible downlink physical channels that can be supported by a UE within a specific time slot.

	Physical Channel Combination	Transport Channel Combination	Baseline Capability or Service dependent	Comment
1	One PSCH	SCH	Baseline	SCH can map to one or two PSCH in a frame depending on the synchronization case as defined in 25.221 (see note 1)
2	One or more CCPCH	BCH and/or PCH and/or one or more FACH	Baseline	BCH can map to multiple CCPCH in a frame. FACH can map to multiple CCPCH in a frame. PCH can map to multiple CCPCH in a frame. See note 2.
3	One or more DPCH	One or more DCH coded into one or more CCTrCH	Service dependant	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability
4	One or more CCPCH + one or more DPCH	BCH and/or PCH and/or one or more FACH and one or more DCH coded into one or more CCTrCH	Service dependent	The number of DCHs and the maximum channel bit rate are dependent on the UE Service Capability. BCH can map to multiple CCPCH in a frame. FACH can map to multiple CCPCH in a frame. See note 2.
5	One or more PDSCH	One or more DSCH coded onto one or more CCTrCH	Service dependent	It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration. DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH.
6	One or more PDSCH + one or more CCPCH	BCH and/or PCH and/or one or more FACH and one or more DSCH coded onto one or more CCTrCH	Service dependant	BCH can map to multiple CCPCH in a frame. Each FACH can map to multiple CCPCH in a frame. It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration. For the case of DSCH + BCH, DSCH requires a control channel (FACH or DCH); however, it is not required to be in the same 10ms frame as the DSCH. See note 2.
7	One or more PDSCH + one or more DPCH	One or more DSCH coded onto one or more CCTrCH + one or more DCH coded into one or more CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration.

8	One or more PDSCH + one or more CCPCH + one or more DPCH	BCH and/or PCH and/or one or more FACH and one or more DSCH coded onto one or more CCTrCH and one or more DCH coded into one or more CCTrCH	Service dependent	BCH can map to multiple CCPCH in a frame. Each FACH can map to multiple CCPCH in a frame. The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability It is assumed here that a DSCH transport channel may map to one or more PDSCH physical channels based on system configuration. See note 2.

Notes:

1. Reference: TS25.221: Physical Channels and Mapping of Transport Channels Onto Physical Channels (TDD).
2. The possibility to multiplex PCH and one or more FACH on one or more CCTrCHs is FFS
3. The PSCH synchronization channel can co-exist with all listed combinations

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Kyongju, Korea, 6-8 October 1999

Document ***R2-99919***

3G CHANGE REQUEST

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TS 25.302	**CR**	**003**	Current Version:	3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submission to TSG	RAN#5	for approval	X	*(only one box should*
list TSG meeting no. here ↑		for information		*be marked with an X)*

Proposed change affects: *(at least one should be marked with an X)*	USIM		ME	X	UTRAN	X	Core Network	

Source:	TSG-RAN WG2	**Date:**	20/08/99
Subject:	New CPCH parameters for physical layer primitives		
3G Work item:			

Category:	F	Correction	
	A	Corresponds to a correction in a 2G specification	
(only one category	B	Addition of feature	
shall be marked	C	Functional modification of feature	X
with an X)	D	Editorial modification	

Reason for change:	Interlayer primitives require modification to support use of CPCH resources.
Clauses affected:	10.1.3, 10.2.2.5

Other specs affected:	Other 3G core specifications		→ List of CRs:	
	Other 2G core specifications		→ List of CRs:	
	MS test specifications		→ List of CRs:	
	BSS test specifications		→ List of CRs:	
	O&M specifications		→ List of CRs:	

Other comments:	

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10.1.3 PHY-Status-IND

The PHY-STATUS primitive can be used by the layer 1 to notify higher layers of an event which has occurred.

Primitive Type: indication

Parameters

- Event values:

- CPCH event values:

1 Normal CPCH transmission.

2 No AICH received after Nap_retrans_max CPCH access attempt cycles.

3 Requested CPCH is busy, received an AP-AICH_nak.

4 Timeout, no CD-AICH received.

5 Collision, CD-AICH signature does not match.

6 CPCH channel busy, received AP-AICH_ack or AP-AICH_nak

7 CPCH channel idle, received CD-AICH_nak

10.2.2.5 CPHY-RL-Setup-REQ

The Request primitive is sent from RRC to L1 for configuration~~establishment~~ of a Radio link to a certain UE. **Primitive:**

Parameters:

- Physical channel description
- Physical channel ID

3GPP TSG-RAN meeting #5 ***Document*** ***R2-99920***
Kyongju, Korea, 6-8 October 1999

3G CHANGE REQUEST

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TS 25.302 CR 004 Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG		for approval	X
list TSG meeting no. here ↑		for information	

(only one box should be marked with an X)

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM [ ] ME [X] UTRAN [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** 18/08/99

Subject: Additions to TS25.302 for support of Timing Advance

3G Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	X
C	Functional modification of feature	
D	Editorial modification	

Reason for change: For support of Timing Advance in TDD the overview of L1 functions was extended by timing advance. Additionally the uplink model of the UE and the characterisations of some transport channels were changed. Timing Advance related parameters have been added to the primitives of the physical layer.

Clauses affected: 5.2, 6.1, 7.2, 10.1, 10.3.3

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	25.301-CR012, 25.321-CR012
Other 2G core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

5.2 Overview of L1 functions

The physical layer performs the following main functions:

- FEC encoding/decoding of transport channels
- Measurements and indication to higher layers (e.g. FER, SIR, interference power, transmission power, etc...)
- Macrodiversity distribution/combining and soft handover execution
- Error detection on transport channels
- Multiplexing of transport channels and demultiplexing of coded composite transport channels
- Rate matching
- Mapping of coded composite transport channels on physical channels
- Modulation and spreading/demodulation and despreading of physical channels
- Frequency and time (chip, bit, slot, frame) synchronization
- Closed-loop power control
- Power weighting and combining of physical channels
- RF processing
- Timing advance on uplink channels (TDD only)

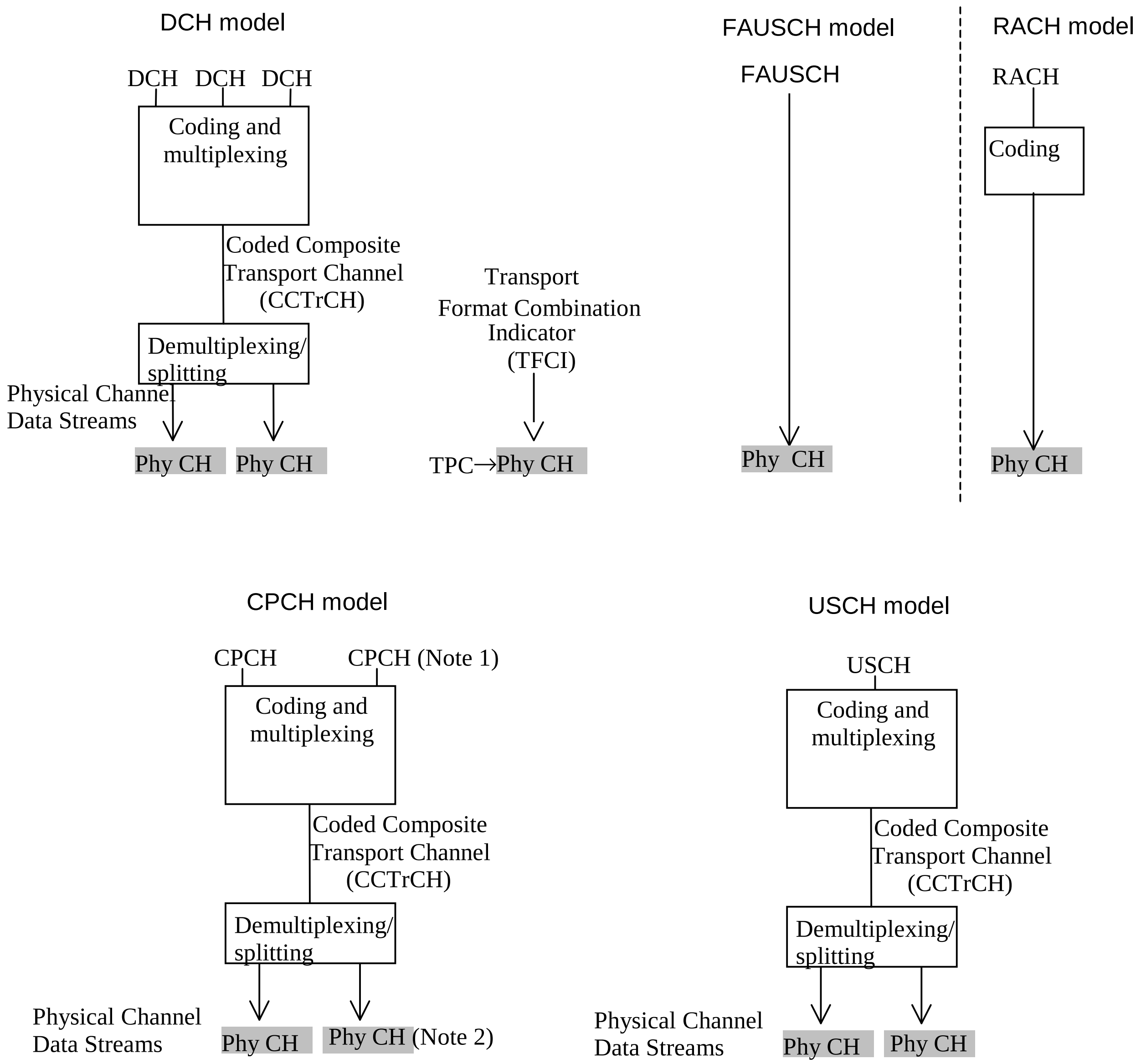
5.3 L1 interactions with L2 retransmission functionality

6 Model of physical layer of the UE

6.1 Uplink models

Figure 1 shows models of the UE's physical layer in the uplink for both FDD and TDD mode. It shows two models: DCH model and RACH model. Some restriction exist for the use of different types of transport channel at the same time, these restrictions are described in the chapter "UE Simultaneous Physical Channel combinations". More details can be found in [3] and [4].

Editors note: Models for uplink transport channels currently marked ffs will be necessary if these channels are included in the description.



Note 1: The need to multiplex several CPCH transport channels is FFS
Note 2: Only the data part of the CPCH can be mapped on multiple physical channels
Note 3: FAUSCH and CPCH are for FDD only.
Note 4: USCH is for TDD only.

Figure 1: Model of the UE's physical layer – uplink

The DCH model shows that one or several DCHs can be processed and multiplexed together by the same coding and multiplexing unit. The detailed functions of the coding and multiplexing unit are not defined in this document but in [3] and [4]. The single output data stream from the coding and multiplexing unit is denoted *Coded Composite Transport Channel (CCTrCH).*

The bits on a CCTrCH Data Stream can be mapped on the same Physical Channel and should have the same C/I requirement.

On the downlink, multiple CCTrCH can be used simultaneously with one UE. In the case of FDD, only one fast power control loop is necessary for these different CCtrCH, but the different CCtrCH can have different C/I requirements to provide different QoS on the mapped Transport Channels. In the case of TDD, different power control loops can be applied for different CCTrCH. One physical channel can only have bits coming from the same CCTrCH.

On the uplink and in the case of FDD, only one CCTrCH can be used simultaneously. On the uplink and in the case of TDD, multiple CCTrCH can be used simultaneously.

When multiple CCTrCH are used by one UE, one or several TFCI can be used, but each CCTrCH has only zero or one corresponding TFCI. In the case of FDD, these different words are mapped on the same DPCCH. In the case of TDD, these different TFCI can be mapped on different DPCH.

The data stream of the CCTrCH is fed to a data demultiplexing/splitting unit that demultiplexes/splits the CCTrCH's data stream onto one or several *Physical Channel Data Streams*.

Editors's note: The term "splitting" used for above function in FDD mode has been replaced by "demultiplexing/splitting". The intention of using the term splitting is to express that this function is performed on bit level not on some block level. The term demultiplexing/splitting shall cover both cases, block or bit level demultiplexing, where block lengths larger than 1 bit may be applied in the TDD mode. This needs to be confirmed by the L1 group

The current configuration of the coding and multiplexing unit is either signalled to, or optionally blindly detected by, the network for each 10 ms frame. If the configuration is signalled, it is represented by the *Transport Format Combination Indicator (TFCI)* bits. Note that the TFCI signalling only consists of pointing out the current transport format combination within the already configured transport format combination set. In the uplink there is only one TFCI representing the current transport formats on all DCHs of one CCTrCH simultaneously. In FDD mode, the physical channel data stream carrying the TFCI is mapped onto the physical channel carrying the power control bits and the pilot.

The DCH and USCH have the possibility to perform Timing Advance in TDD mode.

For the FAUSCH, there is no coding, since the FAUSCH is only used for the transmission of a reservation request by sending an up-link signalling code (USC) at the time-offset allocated for the specific UE during the 10 ms frame. Due to the fixed time-offset allotted to a specific UE, the FAUSCH is a dedicated control channel.

The model for the RACH case shows that RACH is a common type transport channel in the uplink. RACHs are always mapped one-to-one onto physical channels, i.e. there is no physical layer multiplexing of RACH. Service multiplexing is handled by the MAC layer. The CPCH which is another common type transport channel has a physical layer model as shown in the above figure.

6.2 Downlink models

6.3 Relay link Model

7 Formats and configurations for L1 data transfer

7.1 General concepts about Transport Channels

7.2 Types of Transport Channels

A general classification of transport channels is into two groups:

- common channels and
- dedicated channels (where the UEs can be unambiguously identified by the physical channel, i.e. code and frequency)

Common transport channel types are:

1. Random Access Channel(s) (RACH) characterized by:
    - existence in uplink only,
    - limited data field. The exact number of allowed bits is FFS.
    - collision risk,
    - open loop power control,

2. ODMA Random Access Channel(s) (ORACH) characterized by:
   - used in TDD mode only (FDD is for FFS)
   - existence in relay-link
   - collision risk,
   - open loop power control,
   - no timing advance control
3. Forward Access Channel(s) (FACH) characterized by:
   - existence in downlink only,
   - possibility to use beam forming,
   - possibility to use slow power control,
   - possibility to change rate fast (each 10ms),
   - lack of fast power control and
4. Broadcast Channel (BCH) characterized by:
   - existence in downlink only,
   - low fixed bit rate and
   - requirement to be broadcast in the entire coverage area of the cell.
5. Paging Channel (PCH) characterized by:
   - existence in downlink only,
   - association with a physical layer signal, the Page Indicator, to support efficient sleep mode procedures and
   - requirement to be broadcast in the entire coverage area of the cell.
6. Synchronisation channel (SCH) characterised by :
   - existence in TDD and downlink only
   - low fixed bit rate
   - requirement to be broadcast in the entire coverage area of the cell
7. Downlink Shared Channel(s) (DSCH) characterised by:
   - existence in downlink only,
   - possibility to use beamforming,
   - possibility to use slow power control,
   - possibility to use fast power control, when associated with dedicated channel(s)
   - possibility to be broadcast in the entire cell
   - always associated with another channel (DCH or DSCH Control Channel).
8. DSCH Control Channel characterised by:
   - existence in downlink only,
   - possibility to use beam forming,
   - possibility to use slow power control,
   - lack of fast power control

   Editor' s note: It is for further study whether or not the DSCH Control Channel needs to be regarded as separate transport channel type from FACH. Seen from the upper layers, the current requirements are identical to a FACH, but some extra L1 information (e.g.TPC bits) may lead to a different physical channel.
9. CPCH Channel characterised by:

- existence in FDD only,
- existence in uplink only,
- fast power control on the message part,
- possibility to use beam forming,
- possibility to change rate fast,
- collision detection,
- open loop power estimate for pre-amble power ramp-up

9. Uplink Shared channel (USCH) characterised by:
    - used in TDD only
    - existence in uplink only,
    - possibility to use beam forming,
    - possibility to use power control,
    - possibility to change rate fast
    - possibility to use timing advance

Dedicated transport channel types are:

1. Dedicated Channel (DCH) characterized by:
    - existing in uplink or downlink
    - possibility to use beam forming,
    - possibility to change rate fast (each 10ms),
    - fast power control
    - possibility to use timing advance (TDD only)

2. Fast Uplink Signaling Channel (FAUSCH) to allocate, in conjunction with FACH, dedicated channels; the FAUSCH is characterized by:
    - existing in uplink only,
    - inherent addressing of a UE by a unique time-offset (indicating to a UE when to send an uplink signalling code, USC) related to the beginning of the 10 ms frame,
    - allowing for a UE to notify (by sending an USC) a request for a DCH, the allocation of which is messaged via the FACH. No further information is conveyed via the FAUSCH,
    - applicability for TDD mode is FFS.

3. ODMA Dedicated Channel (ODCH) characterized by:
    - used in TDD mode only (FDD is for FFS),
    - possibility to use beam forming,
    - possibility to change rate fast (each 10ms),
    - closed loop power control,
    - closed loop timing advance control

To each transport channel (except for the FAUSCH, since it only conveys a reservation request),, there is an associated Transport Format (for transport channels with a fixed or slow changing rate) or an associated Transport Format Set (for transport channels with fast changing rate).

7.3 Slotted Mode

8 UE Simultaneous Physical Channels combinations

9 Measurements provided by the physical layer

10 Primitives of the physical layer

10.1 10.1 Generic names of primitives between layers 1 and 2

The primitives between layer 1 and layer 2 are shown in the Table 1.

Table 1. Primitives between layer 1 and 2

Generic Name	Parameters
PHY-DATA-REQ	TFI, compressed mode type, TBS
PHY-DATA-IND	TFI, compressed mode type, TBS, CRC result, TD[(1)]
PHY-STATUS-IND	Event value

[(1)]: TDD only

10.1.1 PHY-Data-REQ

The PHY-DATA primitives are used to request SDUs used for communications passed to and from the physical layer. One PHY-DATA primitive is submitted every Transmission Time Interval for each Transport Channel.

Primitive Type: request.

Parameters:

- TFI
- Type of compressed mode (e.g. uncompressed, compressed with beginning/middle/end of frame)
- Transport Block Set

- FN_{CELL}
- Page indicators (PIs) (PCH only)

10.1.2 PHY- Data-IND

The PHY-DATA primitives are used to indicate SDUs used for Layer 2 passed to and from the physical layer. One PHY-DATA primitive is submitted every Transmission Time Interval for each Transport Channel.

Primitive Type: indicate

Parameters:

- TFI
- Type of compressed mode (e.g. uncompressed, compressed with beginning/middle/end of frame)
- Transport Block Set
- CRC check result
- TD (RX Timing Deviation measurement) (optional, TDD only)

10.1.3 10.1.3 PHY-Status-IND

10.2 Generic names of primitives between layers 1 and 3

10.3 Parameter definition

10.3.1 Error code

- Hardware failure

10.3.2 Event value

- Maximum transmission power has been reached
- Allowable transmission power has been reached
- Average transmission power is below allowable transmission power

10.3.3 Physical channel description

EDITOR'S NOTE: The applicability of these parameters to TDD remains FFS.

10.3.3.1 Primary SCH

- Tx diversity mode

10.3.3.2 Secondary SCH

- Tx diversity mode

10.3.3.3 Primary CCPCH

- Frequency info
- DL scrambling code
- Tx diversity mode

10.3.3.4 Secondary CCPCH

- DL scrambling code
- Channelisation code
- Tx diversity mode

10.3.3.5 PRACH

Editor's note: The PRACH can also be used to map the FAUSCH Transport Channel

- Access Slot
- Preamble spreading code
- Preamble signature
- Message channelisation code(Spreading factor)
- Power control info
  - UL target SIR
  - Primary CCPCH DL TX Power
  - UL interference
  - Power offset (Power ramping)
- Access Service Class Selection
  - Preamble signature classification information
- AICH transmission timing parameter
- Persistence value

10.3.3.6 Uplink DPCH

- UL scrambling code
- DPCCH Channelisation code
- DPDCH Channelisation code
- DPCCH Gate rate
- DPCCH slot structure (N_{pilot}, N_{TPC}, N_{TFCI}, N_{FBI})
- Transmission Time offset value
- Timing Advance (TDD only)

10.3.3.7 Downlink DPCH

- Transmission Time offset value

- DPCCH Gate rate
- DL scrambling code
  - DL Channelisation code
- Tx diversity mode
  - FB mode
- Slot structure ($N_{pilo,}$ N_{TPC}, N_{TFCI}, $N_{FBI,}$, N_{data1}, N_{data2})

10.3.3.8 PCPCH (Physical Common Packet Channel)

- CPCH Set ID to which this CPCH belongs.
- UE Access Preamble (AP) code
- DL AP-AICH Channelisation code
- UL CD preamble code
- DL CD-AICH Channelisation code
- CPCH UL scrambling code
- CPCH UL Channelisation code
- DPCCH DL Channelisation code
- Data rate (spreading factor)
- N_frames_max: Maximum packet length in frames
- Persistency value (PV_{cpch})
- Signature set: set of preamble signatures for AP to access this CPCH

10.3.3.9 PICH

- Scrambling code
- Channelisation code

10.3.3.10 AICH

- Scrambling code
- Channelisation code
- Tx diversity mode

Editor's Note: the value for the parameters need to be consistent with the corresponding PRACH. This needs to be confirmed by WG1.

10.3.3.11 PDSCH

- Scrambling code
- Chnnelisation code
- Tx diversity mode
  - FB mode

10.3.3.12 PUSCH

- Timing Advance (TDD only)

Editor's Note: the characteristics of the PUSCH are under review for TDD.

10.3.4 Transport channel description

3GPP TSG-RAN meeting #5
Kyongju, Korea, 6-8 October 1999

Document ***R2-99921***

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

TS 25.302 **CR** **005** Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG RAN #5 for approval X for information *(only one box should be marked with an X)*

list TSG meeting no. here ↑

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM [ ] ME [X] UTRAN [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** 17/08/99

Subject: Measurements for TDD provided by the physical layer

3G Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	X
C	Functional modification of feature	
D	Editorial modification	

Reason for change:
Introduction of TDD specific measurements and additions to the measurements already described in TS 25.302.
Apart from some minor modifications, the main changes/additions are:
- Reflection of TDD TDMA component in the measurements by reference to ‘specified timeslots’ if necessary.
- Furthermore, 3 additional ‘TDD only’ measurements on uplink channels (that means measured in the Node B) were introduced: a. Received timing deviation which allows the update of the timing advance of a moving UE, b. received Interference Signal Code (ISCP) Power in specified timeslots and c. Received Signal Code Power (RSCP) on DPCH or PUSCH. b. and c. allow (e. g.) SIR determination of uplink time slots which is necessary for the dynamic channel allocation.

Clauses affected: 9, 9.1, 9.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other 2G core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments: Based on 3GPP RAN WG2 Tdoc (99) 855

9 Measurements provided by the physical layer

One of the key services provided by the physical layer is the measurement of various quantities which are used to trigger or perform a multitude of functions. Both the UE and the UTRAN are required to perform a variety of measurements. The standard will not specify the method to perform these measurements or stipulate that the list of measurements provided in this section must all be performed. While some of the measurements are critical to the functioning of the network and are mandatory for delivering the basic functionality (e.g., handover measurements, power control measurements), others may be used by the network operators in optimising the network (e.g., radio environment).

Measurements may be made periodically and reported to the upper layers or may be event-triggered (e.g., primary CCPCH becomes better than the previous best primary CCPCH). Another reporting strategy may combine the event triggered and the periodical approach (e.g. falling of link quality below a certain threshold initiates periodical reporting). The measurements are tightly coupled with the service primitives in that the primitives' parameters may constitute some of the measurements.

The list and frequency of measurements which the physical layer reports to higher layers is described in this section.

> ~~*EDITOR'S NOTE :These measurements are considered equally applicable to FDD and TDD modes., however, the applicabilityof all measurements to the TDD mode needs to be reviewed.*~~

> *EDITOR'S NOTE : The measurements CCPCH Rx SIR and CCPCH Rx ISCP should be reviewed by WG1 for practicality in the UE and WG2 informed of the implications of these measures being mandatory.*

The measurement quantities measured by the physical layer shall be such that the following principles are applied:

For handover measurements, the decoding of parameters on the BCCH logical channel of monitored neighbouring cells, should not, in general, be needed for calculating the measurement result. If there is a need to adjust the measurement result with parameters broadcast on the PCCPCH, these parameters shall be provided by the UTRAN in inband measurement control messages. There may be some exceptions to this rule. *For example, it may be necessary to decode the SFN of the measured neighbouring cell for time difference measurements. [Note: It should be clarified whether the SFN is a L3 or L1 parameter.]*

In idle mode or in RRC connected mode using common Transport Channels, the UE shall be able to monitor cells for cell reselection, without being required to frequently decode parameters on the BCCH logical channel of the monitored neighbouring cells. The decoding frequency of these parameters, set by the cell reselection algorithm, should be such that UE standby times are not significantly decreased.

9.1 Measurements of downlink channels

9.1.1 ~~CFN-SFN~~ Observed time difference to UTRA cell

This measure is mandatory for the UE.

Measurement	Measured time difference to UTRA cell
Source	L1 (UE)
Destination	RRC (RNC) for handover
Reporting Trigger	On-demand, Event-triggered
Definition	***For FDD:* The ~~CFN-SFN~~ 'Observed time difference to UTRA cell' indicates the time difference which is measured by UE between CFN in the UE and the SFN of the target neighbouring cell. It is notified to SRNC by Measurement Report message or Measurement Information Element in other RRC messages.** ***For TDD: This is the relative time difference in the frame timing between the serving and the target cell measured at the UE.***
Precision Requirement	***For handover, precision to [1] chip unit***

9.1.2 Observed time difference to GSM cell

This measure is mandatory for the UE if the handover to GSM service is to be supported.

Measurement	Measured time difference to GSM cell
Source	L1 (UE)
Destination	RRC (RNC) for maintenance and handover to GSM
Reporting Trigger	On-demand, Event-triggered
Definition	***Time difference between the Primary CCPCH of the current cell and the timing of the GSMcell.***
Precision Requirement	***For handover, precision to [x] microseconds***

9.1.3 Primary CCPCH RX E_c/I_0

This measure is mandatory for the UE.

Measurement	primary CCPCH Rx Ec/Io
Source	L1(UE)
Destination	RRC (UE, RNC),
Reporting Trigger	Periodic, on demand and event triggered
Definition	$-20\log_{10}(E_c/I_o)$ where E_c is the energy per chip of the Primary CCPCH (for FDD: measured in the searcher) and I_o is the received spectral density.
Precision Requirement	1 dB

9.1.4 Primary CCPCH Rx SIR

This measure is mandatory for the UE.

Measurement	Primary CCPCH Rx SIR
Source	L1 (UE)
Destination	RRC (UE, RNC)
Reporting Trigger	periodic or event triggered
Definition	***This quantity is a ratio of the Primary CCPCH Received Signal Code Power (RSCP) to the Interference Signal Code Power (ISCP). The RSCP is the measured symbol power of the Primary CCPCH at the demodulator output and the ISCP is the measured interference symbol power.***
Precision Requirement	1 dB

9.1.5 Primary CCPCH Rx RSCP

This measure is mandatory for the UE.

Measurement	Primary CCPCH Rx RSCP
Source	L1(UE)
Destination	RRC (UE, RNC)
Reporting Trigger	periodic or event triggered
Definition	***Received Signal Code Power, is received power on one code~~ after despreading~~, defined on the pilot symbols after despreading for FDD and on the midamble for TDD..***
Precision Requirement	1 dB

9.1.6 ~~Primary CCPCH~~ Rx ISCP

This measure is mandatory for the UE.

Measurement	~~Primary CCPCH~~ Rx ISCP
Source	L1(UE)
Destination	RRC (UE, RNC)
Reporting Trigger	periodic or event triggered
Definition	***Interference on Signal Code Power, is the interference ~~on the mentioned received signa~~l after despreading. Thereby only the non-orthogonal part of the interference is included. For FDD this is measured on the Primary CCPCH. For TDD this is measured in specified timeslots.***
Precision Requirement	1 dB

9.1.7 DP~~C~~CH SIR

This measure is mandatory for the UE.

Measurement	DP~~C~~CH SIR
Source	L1(UE)
Destination	RRC(UE,RNC)
Reporting Trigger	Periodic, once every power control cycle ~~slot for DPCCH~~ , event triggered
Definition	The ratio of the measured symbol power at the demodulator output to the measured interference power at the demodulator output. For FDD this is measured on the DPCCH.
Precision Requirement	less than the minimum DL power control step size

9.1.8 UTRA Cell Signal strength (RSSI)

This measure is mandatory for the UE.

Measurement	signal strength
Source	L1(UE)
Destination	RRC (RNC),
Reporting Trigger	Periodic, event triggered, on demand
Definition	Received Signal Strength Indicator, the wideband received power within the channel bandwidth averaged over [1 s] interval. For TDD this is measured in specified timeslots.
Precision Requirement	1 dB

9.1.9 Alternate mode Signal strength

9.1.9.1 GSM Signal Strength

This measure is mandatory for the UE if the service handover to GSM is to be supported.

Measurement	GSM signal strength
Source	L1(UE)
Destination	RRC (RNC)
Reporting Trigger	Periodic, event triggered, on demand
Definition	reference GSM document 05.08
Precision Requirement	reference GSM document 05.08

9.1.10 Transport CH BLER

This measure is mandatory for the UE.

Measurement	transport channel BLER (BLock Error Rate)
Source	L1(UE)
Destination	RRC(RNC,UE)
Reporting Trigger	Periodic, on demand
Definition	The error detection mechanism will determine whether or not a block error occurred.
Precision Requirement	Transport channel dependent

9.1.11 Physical CH BER

This measure is mandatory for the UE.

Measurement	physical channel BER
Source	L1(UE)
Destination	RRC(UE,RNC)
Reporting Trigger	On-demand, Event-triggered
Definition	The estimate of the raw BER of the physical channel calculated only on the data part.
Precision Requirement	[10%]

9.1.12 Total Tx Power

Measurement	total Tx power
Source	L1(Node-B)
Destination	RRC(RNC)
Reporting Trigger	On-demand, periodic, Event-triggered
Definition	The total power emitted by the Node-B within the channel bandwidth averaged over an interval of [1 s]. For TDD this is measured in specified timeslots.
Precision Requirement	1 dB

9.1.13 Code Tx Power

Measurement	Code Tx power
Source	L1(Node-B)
Destination	RRC (RNC)
Reporting Trigger	On-demand, periodic, Event-triggered
Definition	The total power emitted by the Node-B on one channelisation code for one UE averaged over [100 ms]. For TDD this is measured in specified timeslots.
Precision Requirement	1 dB

9.2 Measurements on uplink channels

9.2.1 UL load

Measurement	UL load
Source	L1 (Node B)
Destination	RRC(RNC)
Reporting Trigger	On-demand, Event-triggered, Periodic
Definition	the total received signal power for a carrier within the cell. For TDD this is measured in specified timeslots.
Precision Requirement	1 dB

9.2.2 UE Tx Power

This measure is mandatory for the UE.

Measurement	UE Tx power
Source	L1(UE)
Destination	RRC (UE,RNC)
Reporting Trigger	On-demand, periodic, Event-triggered
Definition	RRC (UE) – the total Tx power, measured at the antenna connector, averaged over [100 ms]. For TDD this is measured in specified timeslots. RRC (RNC) – indication of Tx power reaching threshold (for example, upper or lower power limits)
Precision Requirement	3 dB

9.2.3 Transport CH BLER

Measurement	transport channel BLER (BLock Error Rate)
Source	L1(Node-B)
Destination	RRC(RNC)
Reporting Trigger	periodic, event triggered, on demand
Definition	The error detection mechanism will determine whether or not a block error occurred.
Precision Requirement	Transport channel dependent

9.2.4 Physical CH BER

Measurement	physical channel BER
Source	L1(Node-B)
Destination	RRC(RNC)
Reporting Trigger	On-demand, Event-triggered, periodic
Definition	The estimate of the raw BER of the physical channel calculated only on the data part.
Precision Requirement	[10%]

9.2.5 RX Timing deviation (TDD only)

Measurement	RX timing deviation (TDD only)
Source	L1 (Node B)
Destination	RRC (RNC)
Reporting Trigger	Periodic, event triggered
Definition	The difference of the time of arrival of the UL transmissions in relation to the arrival time of a signal with zero propagation delay.
Precision Requirement	±2 chips

9.2.6 Rx ISCP (TDD only)

Measurement	Rx ISCP
Source	L1(Node B)
Destination	RRC (RNC)
Reporting Trigger	periodic or event triggered
Definition	Interference on Signal Code Power, is the interference after despreading in specified timeslots. Thereby only the non-orthogonal part of the interference is included.
Precision Requirement	1 dB

9.2.7 Rx RSCP (TDD only)

Measurement	Rx RSCP
Source	L1(Node B)
Destination	RRC (RNC)
Reporting Trigger	periodic or event triggered
Definition	Received Signal Code Power, is received power on DPCH or PUSCH
Precision Requirement	1 dB

9.3 Miscellaneous measurements

9.3.1 Time of Arrival (TOA)

The Time of Arrival (TOA) measurement at a single node-B may provide an estimate of the round trip time of signals between the Node-B and the UE and this may be used to calculate a radial distance to the UE within the sector. A group of simultaneous TOA measurements made from a number of Node-B or LMU may be used to estimate the location of the UE. This support for this measurement is LCS positioning method dependant..

Measurement	Time of arrival (TOA)
Source	L1(Node-B or LMU)
Destination	RRC (RNC-LCS)
Reporting Trigger	on demand, event triggered
Definition	the time of arrival of the uplink transmissions in relation to the CCPCH timing reference..
Precision Requirement	[0,5] chip

9.3.2 SFN-SFN Observed time difference

The SFN-SFN observed time difference at the UE of a group of Node-B may be used for location calculation. . The applicability of this measure is LCS method dependent This support for this measurement is LCS positioning method dependant.

Measurement	SFN-SFN observed time difference
Source	L1 (UE)
Destination	RRC (RNC) for handover, maintenance and LCS
Reporting Trigger	On-demand, Event-triggered
Definition	***Time difference between the Primary CCPCH of the current cell and the Primary CCPCH of a neighboring cell.***
Precision Requirement	***For LCS, precision to a fraction of a chip***

9.3.3 Frequency Offset (FO)

The Frequency Offset (FO) measures the rate of change (drift) of the Relative Time Difference and may be used to estimate the RTD at the time the UE location measurements are made. . This support for this measurement is LCS positioning method dependant.

Measurement	Frequency Offset (FO)
Source	L1(LMU)
Destination	RRC (RNC-LCS)
Reporting Trigger	On demand, event triggered, periodic
Definition	The Frequency Offset (FO) measures the rate of change (drift) of the Relative Time Difference of the CCPCH transmissions of two Node-B.
Precision Requirement	[1] Hz

3GPP TSG-RAN meeting #5 *Document* ***R2-99922***

Kyongju, Korea, 6-8 October 1999

3G CHANGE REQUEST

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TS 25.302	**CR**	**006**	Current Version:	3.0.0
3G specification number ↑		*↑ CR number as allocated by 3G support team*		

For submision to TSG		for approval	X	*(only one box should*
list TSG meeting no. here ↑		for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: *(at least one should be marked with an X)*	USIM		ME	X	UTRAN	X	Core Network	

Source:	TSG-RAN WG2	**Date:**	18/08/99
Subject:	Change of the Downlink model of the UE in relation to PCH		
3G Work item:			

Category:			
	F	Correction	
	A	Corresponds to a correction in a 2G specification	
(only one category	B	Addition of feature	
shall be marked	C	Functional modification of feature	X
with an X)	D	Editorial modification	

Reason for change:	The PICH channel was introduced for TDD in RAN WG1. The PCH related downlink models of the UE are changed accordingly.
Clauses affected:	6.1

Other specs affected:				
	Other 3G core specifications		→ List of CRs:	
	Other 2G core specifications		→ List of CRs:	
	MS test specifications		→ List of CRs:	
	BSS test specifications		→ List of CRs:	
	O&M specifications		→ List of CRs:	

Other comments:	

help.doc

<--------- double-click here for help and instructions on how to create a CR.

6.1 Downlink models

Figure 1 and Figure 2 show the model of the UE's physical layer for the downlink in FDD and TDD mode, respectively. Note that there is a different model for each transport channel type.

Editors note: Models for downlink transport channels currently marked ffs will be necessary if these channels are included in the description.

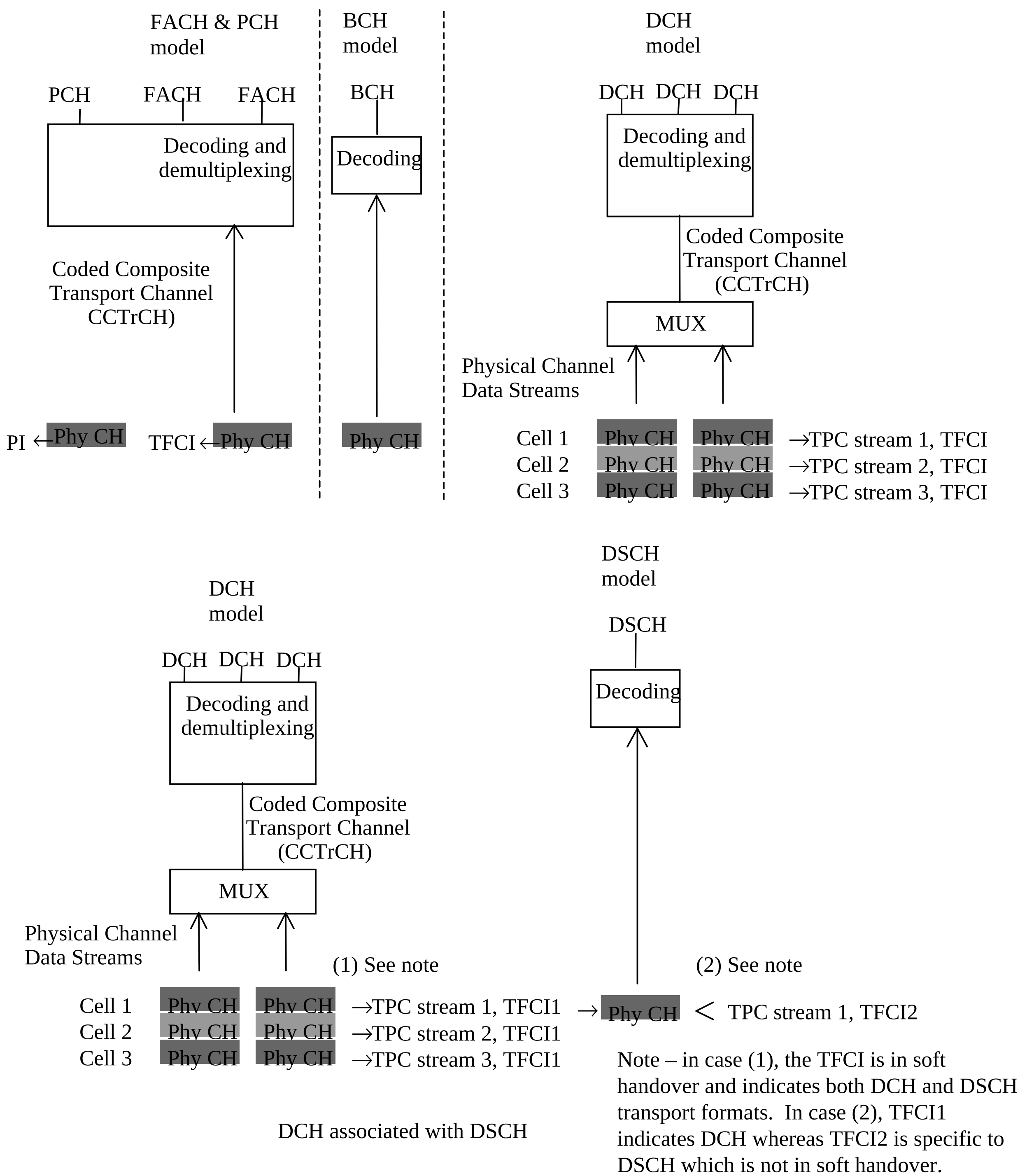
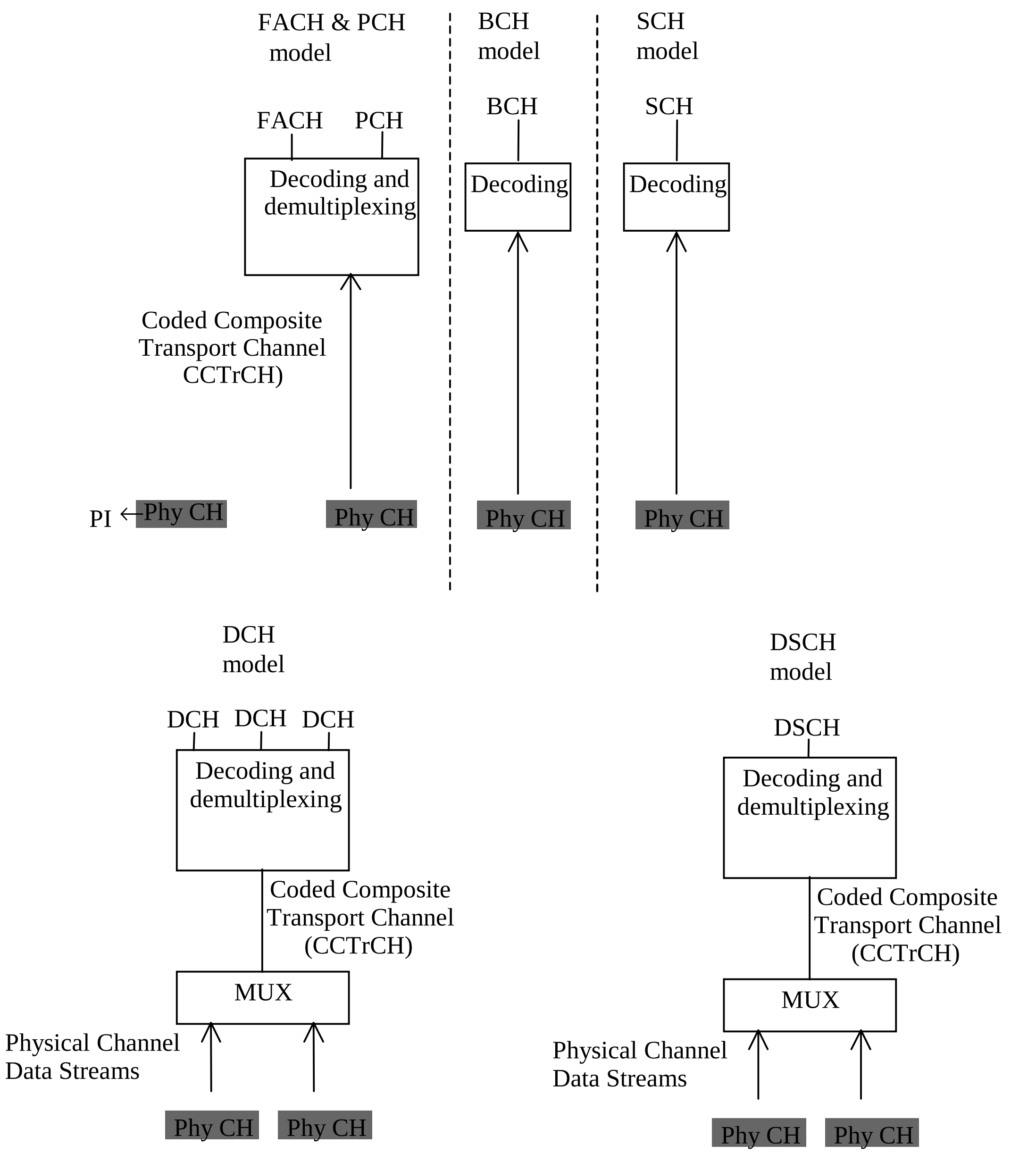


Figure 1: Model of the UE's physical layer – downlink FDD mode


FACH & PCH
model
BCH
model
SCH
model
FACH
PCH
BCH
SCH
Decoding and demultiplexing
Decoding
Decoding
Coded Composite
Transport Channel
CCTrCH)
PI
Phy CH
Phy CH
Phy CH
Phy CH
DCH
model
DSCH
model
DCH
DCH
DCH
DSCH
Decoding and demultiplexing
Decoding and demultiplexing
Coded Composite
Transport Channel
(CCTrCH)
Coded Composite
Transport Channel
(CCTrCH)
MUX
MUX
Physical Channel
Data Streams
Physical Channel
Data Streams
Phy CH
Phy CH
Phy CH
Phy CH

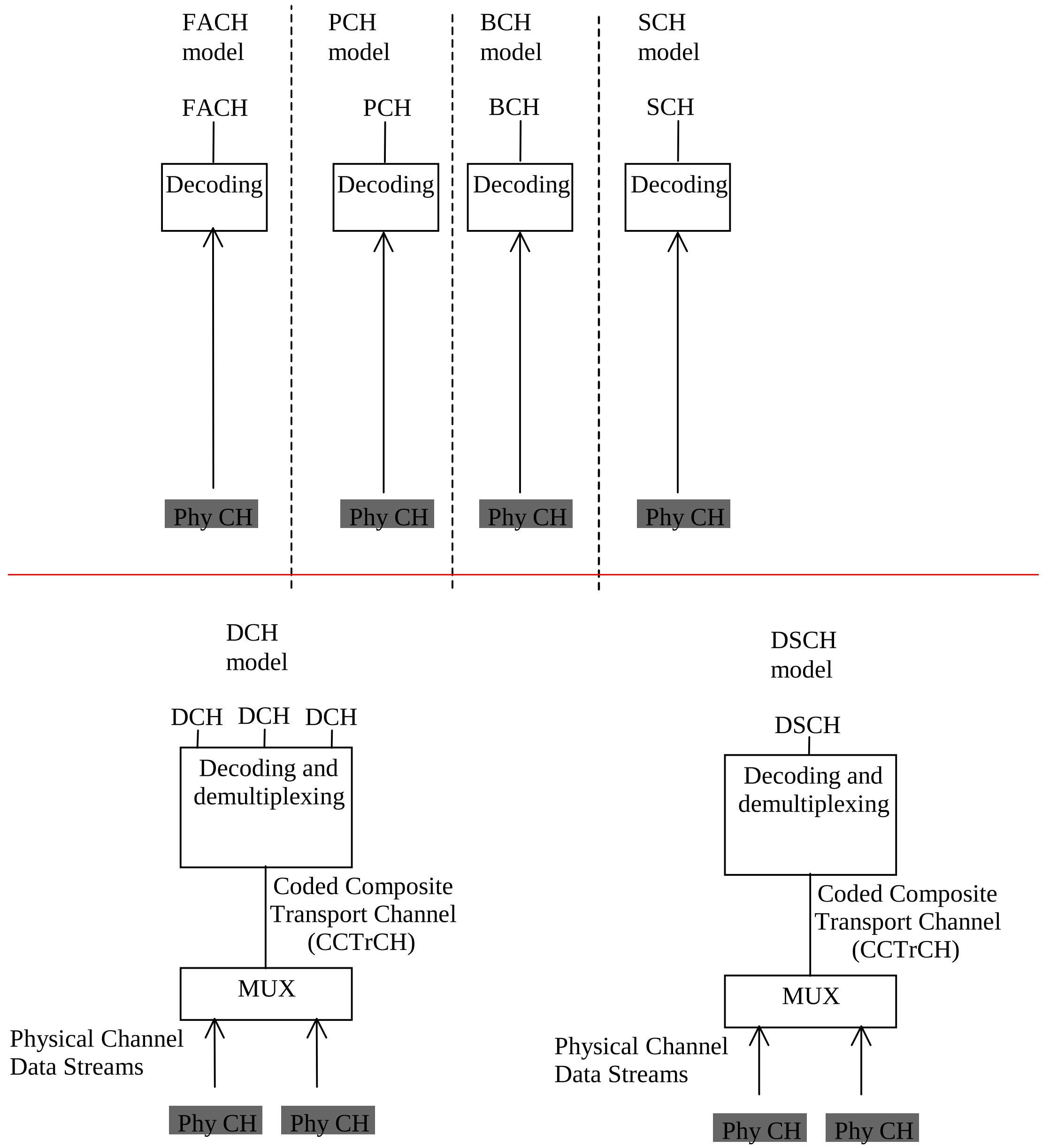


Figure 2: Model of the UE's physical layer – downlink TDD mode

For the DCH case, the mapping between DCHs and physical channel data streams works in the same way as for the uplink. Note however, that the number of DCHs, the coding and multiplexing etc. may be different in uplink and downlink.

In the FDD mode, the differences are mainly due to the soft and softer handover. Further, the pilot, TPC bits and TFCI are time multiplexed onto the same physical channel(s) as the DCHs. Further, the definition of physical channel data stream is somewhat different from the uplink.

Note that it is logically one and the same physical data stream in the active set of cells, even though physically there is one stream for each cell. The same processing and multiplexing is done in each cell. The only difference between the cells is the actual codes, and these codes correspond to the same spreading factor.

The physical channels carrying the same physical channel data stream are combined in the UE receiver, excluding the pilot, and in some cases the TPC bits. TPC bits received on certain physical channels may be combined provided that UTRAN has informed the UE that the TPC information on these channels is identical.

~~In the TDD mode, the downlink models for the BCH, PCH and FACH show that BCH, PCH and FACH are always mapped one-to-one onto physical channels, i.e. there is no physical layer multiplexing of BCH, PCH and FACH. Service multiplexing is handled by the MAC layer.~~

In the TDD mode, a PCH and a FACH can be encoded and multiplexed together forming a CCTrCH. The PCH is associated with a separate physical channel carrying page indicators (PIs) which are used to trigger UE reception of the physical channel that carries PCH. A FACH or a PCH can also be individually mapped onto separate physical channels. The BCH is always mapped onto one physical channel without any multiplexing with other transport channels.

Note, in the TDD mode there is the SCH in addition (not shown in Figure 2).

In the FDD mode, a PCH and one or several FACH can be encoded and multiplexed together forming a CCTrCH. Similarly as in the DCH model there is one TFCI for each CCTrCH for indication of the transport formats used on each PCH and FACH. The PCH is associated with a separate physical channel carrying page indicators (PIs) which are used to trigger UE reception of the physical channel that carries PCH. A FACH or a PCH can also be individually mapped onto a separate physical channel. The BCH is, as for TDD, always mapped onto one physical channel without any multiplexing with other transport channels.

TS 25.302 V3.0.0

3GPP TSG-RAN meeting #5 ***Document*** ***R2-99923***

Kyongju, Korea, 6-8 October 1999

3G CHANGE REQUEST

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TS 25.302	**CR**	**007**	Current Version:	3.0.0

3G specification number ↑ ↑ *CR number as allocated by 3G support team*

For submision to TSG — *list TSG meeting no. Here ↑*

for approval	X	*(only one box should*
for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: *(at least one should be marked with an X)*

USIM	ME	UTRAN	Core Network
	X	X	

Source: TSG-RAN WG2 **Date:** 19/08/99

Subject: Physical channel description for TDD

3G Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Reason for change: In the Physical Channel Description some TDD specific parameters have been added.

Clauses affected: 10.3.3

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other 2G core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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10.3.3 Physical channel description

10.3.3.1 Primary SCH

- Tx diversity mode

10.3.3.2 Secondary SCH

- Tx diversity mode

10.3.3.3 Primary CCPCH

- Frequency info
- DL scrambling code
- Tx diversity mode
- Timeslot (TDD only)
- Midamble type (TDD only)
- Superframe offset (TDD only)
- Repetition period (TDD only)
- Repetition length (TDD only)

10.3.3.4 Secondary CCPCH

- DL scrambling code
- Channelisation code
- Tx diversity mode
- Timeslot (TDD only)
- Midamble type (TDD only)
- Midamble shift (TDD only)
- Superframe offset (TDD only)
- Repetition period (TDD only)
- Repetition length (TDD only)

10.3.3.5 PRACH

Editor's note: The PRACH can also be used to map the FAUSCH Transport Channel

- Access Slot
- Preamble spreading code
- Preamble signature
- Message channelisation code(Spreading factor)
- Power control info
- UL target SIR
- Primary CCPCH DL TX Power
- UL interference
- Power offset (Power ramping)
- Access Service Class Selection
- Preamble signature classification information
- AICH transmission timing parameter
- Persistence value
- Timeslots (TDD only)
- Spreading codes (TDD only)
- Midamble codes (TDD only)

10.3.3.6 Uplink DPCH

- UL scrambling code
- DPCCH Channelisation code

- DPDCH Channelisation code
- DPCCH Gate rate
- DPCCH slot structure (N_{pilot}, N_{TPC}, N_{TFCI}, N_{FBI})
- Transmission Time offset value
- DPCH channelization code (TDD only)
- Midamble Type (TDD only)
- DPCH midamble shift (TDD only)
- Timeslot (TDD only)
- Superframe offset (TDD only)
- Repetition Period (TDD only)
- Repetition length (TDD only)
- TFCI presence (TDD only)

10.3.3.7 Downlink DPCH

- Transmission Time offset value
- DPCCH Gate rate
- DL scrambling code
- DL Channelisation code
- Tx diversity mode
- FB mode
- Slot structure ($N_{pilo,}$ N_{TPC}, N_{TFCI}, $N_{FBI,}$, N_{data1}, N_{data2})
- Midamble Type (TDD only)
- DPCH midamble shift (TDD only)
- Timeslot (TDD only)
- Superframe offset (TDD only)
- Repetition period (TDD only)
- Repetition length (TDD only)
- TFCI presence (TDD only)

10.3.3.8 PCPCH (Physical Common Packet Channel)

- CPCH Set ID to which this CPCH belongs.
- UE Access Preamble (AP) code
- DL AP-AICH Channelisation code
- UL CD preamble code
- DL CD-AICH Channelisation code
- CPCH UL scrambling code
- CPCH UL Channelisation code
- DPCCH DL Channelisation code
- Data rate (spreading factor)
- N_frames_max: Maximum packet length in frames
- Persistency value (PV_{cpch})
- Signature set: set of preamble signatures for AP to access this CPCH

10.3.3.9 PICH

- Scrambling code
- Channelisation code
- Timeslot (TDD only)
- Midamble Type (TDD only)
- Midamble shift (TDD only)
- Superframe offset (TDD only)

- Repetition period (TDD only)
- Repetition length (TDD only)

10.3.3.10 AICH

- Scrambling code
- Channelisation code
- Tx diversity mode

Editor's Note: the value for the parameters need to be consistent with the corresponding PRACH. This needs to be confirmed by WG1.

10.3.3.11 PDSCH

- Scrambling code
- Chnnelisation code
- Tx diversity mode
- FB mode
- DL channelisation code (TDD only)
- Midamble Type (TDD only)
- PDSCH Midamble shift (TDD only)
- Timeslot (TDD only)
- Superframe offset (TDD only)
- Repetition period (TDD only)
- Repetition length (TDD only)
- TFCI presence (TDD only)

10.3.3.12 PUSCH

- PUSCH channelisation code (TDD only)
- Midamble Type (TDD only)
- PUSCH midamble shift (TDD only)
- Timeslot (TDD only)
- Superframe offset (TDD only)
- Repetition period (TDD only)
- Repetition length (TDD only)
- TFCI presence (TDD only)

3GPP TSG-RAN meeting #5 | ***Document*** ***R2-99972***
Kyongju, Korea, 6-8 October 1999

3G CHANGE REQUEST

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TS 25.302 **CR** **008** Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submission to TSG RAN#5	for approval	X	*(only one box should*
list TSG meeting no. here ↑	for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: USIM [ ] ME [X] UTRAN [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** 17/08/99

Subject: Attributes of the semi-static part and coding terminology

3G Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	X

Reason for change: Attributes of the semi-static part and coding terminology are aligned with current working assumptions and terminology in WG1.

Clauses affected: 5.1, 7.1.6, 7.1.7, 7.1.8, 7.1.9

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other 2G core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:


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5. Services and functions of the physical layer

5.1 General

The physical layer offers data transport services to higher layers. The access to these services is through the use of transport channels via the MAC sub-layer. The characteristics of a transport channel are defined by its transport format (or format set), specifying the physical layer processing to be applied to the transport channel in question, such as ~~inner~~ convolutional channel coding and interleaving, and any service-specific rate matching as needed.

The physical layer operates exactly according to the L1 radio frame timing. A transport block is defined as the data accepted by the physical layer to be jointly encoded. The transmission block timing is then tied exactly to this L1 frame timing, e.g. every transmission block is generated precisely every 10ms, or a multiple of 10 ms.

A UE can set up multiple transport channels simultaneously, each having own transport characteristics (e.g. offering different error correction capability). Each transport channel can be used for information stream transfer of one radio bearer or for layer 2 and higher layer signalling messages.

The multiplexing of these transport channels onto the same or different physical channels is carried out by L1. In addition, the Transport Format Combination Indication field (TFCI) shall uniquely identify the transport format used by each transport channel of the Coded Composite Transport Channel within the current radio frame.

7.1.6 Transport Format

This is defined as a format offered by L1 to MAC (and vice versa) for the delivery of a Transport Block Set during a Transmission Time Interval on a Transport Channel. The Transport Format constitutes of two parts – one *dynamic* part and one *semi-static* part.

Attributes of the dynamic part are:

- Transport Block Size
- Transport Block Set Size
- Transmission Time Interval (optional dynamic attribute for TDD only)

Attributes of the semi-static part are:

- Transmission Time Interval (mandatory for FDD, optional for the dynamic part of TDD NRT bearers)
- Error protection scheme to apply
    - Type of error protection, ~~e.g.~~ t~~T~~urbo c~~C~~ode, c~~C~~onvolutio~~n~~nal c~~C~~ode or no channel coding
    - ~~convolutional~~ coding rate~~e~~ ~~ratio~~
    - ~~Resulting code ratio after static~~ R~~r~~Static rate matching parameter
    - Puncturing limit for uplink
- Size of CRC

In the following example, the Transmission time Interval is seen as a semi-static part
Example:

- Dynamic part: {320 bits, 640 bits}, Semi-static part: {10ms, ~~Inner~~ convolutional coding only, ~~repeat 1/12 of the bits~~ static rate matching parameter = 1}

7.1.7 Transport Format Set

This is defined as the set of Transport Formats associated to a Transport Channel.

The semi-static parts of all Transport Formats are the same within a Transport Format Set.

Effectively the first two attributes of the dynamic part form the instantaneous bit rate on the Transport Channel. Variable bit rate on a Transport Channel may, depending on the type of service which is mapped onto the transport channel, be achieved by changing between each Transmission Time Interval one of the following:

1. the Transport Block Size only
2. the Transport Block Set Size only
3. both the Transport Block Size and the Transport Block Set Size

Example 1:

- Dynamic part: {20 bits, 20 bits}; {40 bits, 40 bits}; {80 bits, 80 bits}; {160 bits, 160 bits}
- Semi-static part: {10ms, ~~Inner~~Convolutional coding only, ~~repeat 1/12 of the bits~~r static rate matching parameter = 1}

Example 2:

- Dynamic part: {320 bits, 320 bits}; {320 bits, 640 bits}; {320 bits, 1280 bits}
- Semi-static part: {10ms, ~~Inner~~Convolutional coding only, ~~repeat 1/12 of the bits~~ static rate matching parameter = 2}

The first example may correspond to a Transport Channel carrying a speech service, requiring blocks delivered on a constant time basis. In the second example, which illustrates the situation where a non-real time service is carried by the Transport Channel, the number of blocks delivered per Transmission Time Interval varies between the different Transport Formats within the Transport Format Set. Referring to **Error! Reference source not found.**, the Transport Block Size is varied on DCH1 whereas the Transport Block Set Size is fix. That is, a Transport Format Set where the dynamic part has a variable Transport Block Size has been assigned for DCH1. On DCH2 and DCH3 it is instead the Transport Block Set Sizes that are varied. That is, the dynamic parts of the corresponding Transport Format Sets include variable Transport Block Set Sizes.

7.1.8 Transport Format Combination

The layer 1 multiplexes one or several Transport Channels, and for each Transport Channel, there exists a list of transport formats (Transport Format Set) which are applicable. Nevertheless, at a given point of time, not all combinations may be submitted to layer 1 but only a subset, the Transport Format Combination. This is defined as an authorised combination of the combination of currently valid Transport Formats that can be submitted simultaneously to the layer 1 for transmission on a Coded Composite Transport Channel of a UE, i.e. containing one Transport Format from each Transport Channel.

Example:

DCH1: Dynamic part: {20 bits, 20 bits}, Semi-static part: {10ms, ~~Inner~~Convolutional coding only, ~~repeat 1/12 of the bits~~ static rate matching parameter = 2}
DCH2: Dynamic part: {320 bits, 1280 bits}, Semi-static part: {10ms, ~~Inner~~Convolutional coding only, ~~puncture 1/14 of the bits~~ static rate matching parameter = 3}
DCH3: Dynamic part: {320 bits, 320 bits}, Semi-static part: {40ms, ~~Outer~~Turbo coding, ~~repeat 1/20 of the bits~~ static rate matching parameter = 2}

7.1.9 Transport Format Combination Set

This is defined as a set of Transport Format Combinations on a Coded Composite Transport Channel.

Example:

Dynamic part:

Combination 1: DCH1: {20 bits, 20 bits}, DCH2: {320 bits, 1280 bits}, DCH3: {320 bits, 320 bits}
Combination 2: DCH1: {40 bits, 40 bits}, DCH2: {320 bits, 1280 bits}, DCH3: {320 bits, 320 bits}
Combination 3: DCH1: {160 bits, 160 bits}, DCH2: {320 bits, 320 bits}, DCH3: {320 bits, 320 bits}

Semi-static part:

DCH1: {10ms, ~~Inner~~Convolutional coding only, static rate matching parameter = 1~~repeat 1/12 of the bits~~}
DCH2: {10ms, ~~Inner~~Convolutional coding only, static rate matching parameter = 1 ~~puncture 1/14 of the bits~~}
DCH3: {40ms, ~~Outer~~Turbo coding, static rate matching parameter = 2 ~~repeat 1/20 of thebits~~}

The Transport Format Combination Set is what is given to MAC for control. However, the assignment of the Transport Format Combination Set is done by L3. When mapping data onto L1, MAC chooses between the different Transport Format Combinations given in the Transport Format Combination Set. Since it is only the dynamic part that differ between the Transport format Combinations, it is in fact only the dynamic part that MAC has any control over.

3GPP TSG-RAN meeting #5
Kyongju, Korea, 6-8 October 1999

Document R2-99904

3G CHANGE REQUEST

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25.302 CR 009 Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG RAN #5 for approval [X] for information [ ] *(only one box should be marked with an X)*

list TSG meeting no. here ↑

Proposed change affects: USIM [ ] ME [X] UTRAN [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** 1999-08-17

Subject: Editorial changes following LS received from WG1

3G Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	X

Reason for change: Alignment of S25.302 with comments received in LS from WG1 (Tdoc R299-738)

Clauses affected:

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other 2G core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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7.3 ~~Slotted~~ Compressed Mode

~~Slotted~~Compressed Mode is defined as the mechanism whereby certain idle periods are created in downlink radio frames so that the UE can perform measurement reports during these periods (more details can be found in [3]). Applicability to uplink is FFS.

~~Slotted~~ Compressed Mode is obtained by layer 2 using transport channels provided by the layer 1 as follows :

- ~~Slotted~~Compressed Mode is controlled by the RRC layer which configures the layer 2 and the physical layer
- The number of occurrences of ~~slotted~~compressed frames is controlled by RRC, and can be modified by RRC signalling
- Layer 2 instructs every Transmission Time Interval the Layer 1 on whether ~~slotted~~compressed mode should be applied for a given Transport Format Combination Set. The instruction may indicate also the type of ~~slotted~~compressed mode (beginning, middle or end of the frame).
- The ~~slotting~~ compression of frames can be either cyclic (typically for circuit services) or a-periodic (typically for NRT services)
- It is under the responsibility of the layer 2 if necessary to either buffer some layer 2 PDUs (typically at the RLC layer for NRT services) or to rate adapt the data flow (similarly to GSM) so that there is no loss of data because of ~~slotted~~compressed mode. This will be service dependant and controlled by the RRC layer.

8.1 Uplink

The table describes the possible combinations of physical channels that can be supported in the uplink by one UE at any one time.

	Physical Channel Combination	Transport Channel Combination	**Baseline Capability or Service dependent**	**Comment**
1	PRACH	RACH	Baseline	The PRACH physical channel includes the preambles and the message.
2	PRACH	FAUSCH	Service dependent	
3	PCPCH consisting of one control and one data part during the message portion	CPCH	Service dependent	The PCPCH physical channel includes the preambles and the message. The maximum channel bit rate is dependant on UE Service Capability
4	PCPCH consisting of one control and more than one data part during the message portion	CPCH	Service dependent	The PCPCH physical channel includes the preambles and the message. The maximum channel bit rate is dependant on UE Service Capability
5	~~DPCH consisting of one~~ DPCCH+ ~~and one~~ DPDCH	One or more DCH coded into a single CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependant on UE Service Capability
6	~~DPCH consisting of one~~ DPCCH+ ~~and~~ more than one DPDCH	One or more DCH coded into a single CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependant on UE Service Capability

9 Measurements provided by the physical layer

One of the key services provided by the physical layer is the measurement of various quantities which are used to trigger or perform a multitude of functions. Both the UE and the UTRAN are required to perform a variety of measurements. The standard will not specify the method to perform these measurements or stipulate that the list of measurements provided in this section must all be performed. While some of the measurements are critical to the functioning of the network and are mandatory for delivering the basic functionality (e.g., handover

measurements, power control measurements), others may be used by the network operators in optimising the network (e.g., radio environment).
Measurements may be made periodically and reported to the upper layers or may be event-triggered (e.g., primary CCPCH becomes better than the previous best primary CCPCH. The measurements are tightly coupled with the service primitives in that the primitives' parameters may constitute some of the measurements.

The list and frequency of measurements which the physical layer reports to higher layers is described in this section.

EDITOR'S NOTE :These measurements are considered equally applicable to FDD and TDD modes., however, the applicabilityof all measurements to the TDD mode needs to be reviewed.
~~*EDITOR'S NOTE : The measurements CCPCH Rx SIR and CCPCH Rx ISCP should be reviewed by WG1 for practicality in the UE and WG2 informed of the implications of these measures being mandatory.*~~

The measurement quantities measured by the physical layer shall be such that the following principles are applied:

For handover measurements, the decoding of parameters on the BCCH logical channel of monitored neighbouring cells, should not, in general, be needed for calculating the measurement result. If there is a need to adjust the measurement result with parameters broadcast on the PCCPCH, these parameters shall be provided by the UTRAN in inband measurement control messages. There may be some exceptions to this rule. *For example, it may be necessary to decode the SFN of the measured neighbouring cell for time difference measurements. [Editor's Note: It should be ~~clarified~~ decided whether the SFN is a L3 or L1 parameter. WG1 has approved that SFN is a L1 parameter.In a LS sent to WG2, they also indicate that the SFN is encoded together with the BCH transport blocks, with a joint CRC. However WG2 had questions regarding the advantage of this method, compared to having the SFN as a L3 parameter, and have sent back a LS to WG1.]*

In idle mode or in RRC connected mode using common Transport Channels, the UE shall be able to monitor cells for cell reselection, without being required to frequently decode parameters on the BCCH logical channel of the monitored neighbouring cells. The decoding frequency of these parameters, set by the cell reselection algorithm, should be such that UE standby times are not significantly decreased.

9.1.3 ~~Primary CCPCH~~ CPICH RX E_c/I_0

This measure is mandatory for the UE.

Measurement	~~primary CCPCH~~ CPICHRx Ec/Io
Source	L1(UE)
Destination	RRC (UE, RNC),
Reporting Trigger	Periodic, on demand and event triggered
Definition	$-20\log_{10}(E_c/I_o)$ where E_c is the energy per chip of the CPICH~~Primary CCPCH~~ measured in the searcher and I_o is the received spectral density.
Precision Requirement	1 dB

9.1.4 ~~Primary CCPCH~~ CPICH Rx SIR

Editor's note : WG1 has not yet come to any agreement on the impact on terminal complexity if L1 should support measurement of RX CPICH SIR. Therefore, this measurement is currently not supported by L1. However, it is too early to rule out the possibility that it will eventually be included also in the WG1 specifications.

This measure is mandatory for the UE.

Measurement	~~Primary CCPCH~~CPICH Rx SIR
Source	L1 (UE)
Destination	RRC (UE, RNC)
Reporting Trigger	periodic or event triggered
Definition	***This quantity is a ratio of the ~~Primary CCPCH~~CPICH Received Signal Code Power (RSCP) to the Interference Signal Code Power (ISCP). The RSCP is the measured symbol power of the ~~Primary CCPCH~~CPICH at the demodulator output and the ISCP is the measured interference symbol power.***
Precision Requirement	1 dB

9.1.5 ~~Primary CCPCH~~ CPICH Rx RSCP

This measure is mandatory for the UE.

Measurement	~~Primary CCPCH~~CPICH Rx RSCP
Source	L1(UE)
Destination	RRC (UE, RNC)
Reporting Trigger	periodic or event triggered
Definition	***Received Signal Code Power, is received power on one code after despreading, defined on the pilot symbols.***
Precision Requirement	1 dB

9.1.6 ~~Primary CCPCH~~ CPICH Rx ISCP

Editor's note : WG1 has not yet come to any agreement on the impact on terminal complexity if L1 should support measurement of RX CPICH ISCP. Therefore, this measurement is currently not supported by L1. However, it is too early to rule out the possibility that it will eventually be included also in the WG1 specifications.

This measure is mandatory for the UE.

Measurement	~~Primary CCPCH~~ CPICH Rx ISCP
Source	L1(UE)
Destination	RRC (UE, RNC)
Reporting Trigger	Periodic or event triggered
Definition	***Interference on Signal Code Power, is the interference on the mentioned received signal after despreading. Thereby only the non-orthogonal part of the interference is included.***
Precision Requirement	1 dB

10.3.3.5 PRACH

Editor's note: The PRACH can also be used to map the FAUSCH Transport Channel

- Access Slot
- Preamble spreading code
- Preamble signature
- ~~Message channelisation code(Spreading factor)~~Spreading factor for data part
- Power control info
  - UL target SIR
  - Primary CCPCH DL TX Power

    - UL interference
    - Power offset (Power ramping)
- Access Service Class Selection
    - Preamble signature classification information
- AICH transmission timing parameter
- Persistence value

10.3.3.6 Uplink DPDCH+DPCCH

- UL scrambling code
- ~~DPCCH Channelisation code~~
- ~~DPDCH Channelisation code~~
- DPCCH Gate rate
- DPCCH slot structure (N_{pilot}, N_{TPC}, N_{TFCI}, N_{FBI})
- Transmission Time offset value

3GPP TSG-RAN WG2 meeting #7 ***Document R2-99C43***

Malmö, Sweden, 20-24 September 1999

3G CHANGE REQUEST

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TS 25.302 CR 010 Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submission to TSG RAN#5 for approval X for information

list TSG meeting no. here ↑ *(only one box should be marked with an X)*

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM [ ] ME [X] UTRAN [X] Core Network [ ]

(at least one should be marked with an X)

Source: CWTS **Date:** 1999-09-21

Subject: Support of Uplink Synchronization Feature in UL channels (TDD only)

3G Work item:

Category:

(only one category Shall be marked with an X)

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	X
C	Functional modification of feature	
D	Editorial modification	

Reason for change: Due to the introduction of Uplink Synchronization feature in 3gpp specifications a corresponding L1 function and UL channel property is included

Clauses affected: 5.2, 7.2

Other specs Affected:

Other 3G core specifications	X	→ List of CRs:	CRxxx on 25.301
Other 2G core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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1 Scope

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] ETSI UMTS 23.10 : UMTS Access Stratum Services and Functions
[2] 3GPP TS 25.301 : Radio Interface Protocol Architecture
[3] 3GPP TS 25.212 : UTRA FDD multiplexing, channel coding and interleaving description
[4] 3GPP TS 25.222 : UTRA TDD multiplexing, channel coding and interleaving description
[5] 3GPP TS 25.224: “Physical Layer Procedures (TDD)”

3 Definitions and Abbreviations

4 Interfaces to the physical layer

5 Services and functions of the physical layer

5.1General

5.2 Overview of L1 functions

The physical layer performs the following main functions:

- FEC encoding/decoding of transport channels
- Measurements and indication to higher layers (e.g. FER, SIR, interference power, transmission power, etc...)
- Macrodiversity distribution/combining and soft handover execution
- Error detection on transport channels
- Multiplexing of transport channels and demultiplexing of coded composite transport channels
- Rate matching
- Mapping of coded composite transport channels on physical channels
- Modulation and spreading/demodulation and despreading of physical channels
- Frequency and time (chip, bit, slot, frame) synchronization
- Closed-loop power control
- Power weighting and combining of physical channels
- RF processing
- Support of Uplink Synchronization as defined in [5] (TDD only)

5.3 L1 interactions with L2 retransmission functionality

6 Model of physical layer of the UE

7 Formats and configurations for L1 data transfer

7.1 General concepts about Transport Channels

7.2 Types of Transport Channels

A general classification of transport channels is into two groups:

- common channels and
- dedicated channels (where the UEs can be unambiguously identified by the physical channel, i.e. code and frequency)

Common transport channel types are:

1. Random Access Channel(s) (RACH) characterized by:

- existence in uplink only,
- limited data field. The exact number of allowed bits is FFS.
- collision risk,
- open loop power control,

2. ODMA Random Access Channel(s) (ORACH) characterized by:

- used in TDD mode only (FDD is for FFS)
- existence in relay-link
- collision risk,
- open loop power control,
- no timing advance control

3. Forward Access Channel(s) (FACH) characterized by:

- existence in downlink only,
- possibility to use beam forming,
- possibility to use slow power control,
- possibility to change rate fast (each 10ms),
- lack of fast power control and

4. Broadcast Channel (BCH) characterized by:

- existence in downlink only,
- low fixed bit rate and
- requirement to be broadcast in the entire coverage area of the cell.

5. Paging Channel (PCH) characterized by:

- existence in downlink only,
- association with a physical layer signal, the Page Indicator, to support efficient sleep mode procedures and

- requirement to be broadcast in the entire coverage area of the cell.

6. Synchronisation channel (SCH) characterised by :

- existence in TDD and downlink only
- low fixed bit rate
- requirement to be broadcast in the entire coverage area of the cell

7. Downlink Shared Channel(s) (DSCH) characterised by:

- existence in downlink only,
- possibility to use beamforming,
- possibility to use slow power control,
- possibility to use fast power control, when associated with dedicated channel(s)
- possibility to be broadcast in the entire cell
- always associated with another channel (DCH or DSCH Control Channel).

8. DSCH Control Channel characterised by:

- existence in downlink only,
- possibility to use beam forming,
- possibility to use slow power control,
- lack of fast power control

Editor' s note: It is for further study whether or not the DSCH Control Channel needs to be regarded as separate transport channel type from FACH. Seen from the upper layers, the current requirements are identical to a FACH, but some extra L1 information (e.g.TPC bits) may lead to a different physical channel.

9. CPCH Channel characterised by:

- existence in FDD only,
- existence in uplink only,
- fast power control on the message part,
- possibility to use beam forming,
- possibility to change rate fast,
- collision detection,
- open loop power estimate for pre-amble power ramp-up

9. Uplink Shared channel (USCH) characterised by:

- used in TDD only
- existence in uplink only,
- possibility to use beam forming,
- possibility to use power control,
- possibility to change rate fast
- possibility to use Uplink Synchronization.

Dedicated transport channel types are:

1. Dedicated Channel (DCH) characterized by:

- existing in uplink or downlink

- possibility to use beam forming,
- possibility to change rate fast (each 10ms),
- fast power control
- possibility to use Uplink Synchronization

2. Fast Uplink Signaling Channel (FAUSCH) to allocate, in conjunction with FACH, dedicated channels; the FAUSCH is characterized by:

- existing in uplink only,
- inherent addressing of a UE by a unique time-offset (indicating to a UE when to send an uplink signalling code, USC) related to the beginning of the 10 ms frame,
- allowing for a UE to notify (by sending an USC) a request for a DCH, the allocation of which is messaged via the FACH. No further information is conveyed via the FAUSCH,
- applicability for TDD mode is FFS.

3. ODMA Dedicated Channel (ODCH) characterized by:

- used in TDD mode only (FDD is for FFS),
- possibility to use beam forming,
- possibility to change rate fast (each 10ms),
- closed loop power control,
- closed loop timing advance control

To each transport channel (except for the FAUSCH, since it only conveys a reservation request),, there is an associated Transport Format (for transport channels with a fixed or slow changing rate) or an associated Transport Format Set (for transport channels with fast changing rate).

7.3 Slotted Mode

8. UE Simultaneous Physical Channels combinations

9. Measurements provided by the physical layer

3GPP TSG-RAN meeting #7 | ***Document*** ***R2-99c14***

Malmö, Sweden, 20-24 September 1999

3G CHANGE REQUEST

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TS 25.302	**CR**	**011**		Current Version:	3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submission to TSG	RAN#5	for approval	X	*(only one box should*
list TSG meeting no. here ↑		for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: *(at least one should be marked with an X)*	USIM		ME	X	UTRAN	X	Core Network

Source:	TSG RAN WG2	**Date:**	1999-09-21
Subject:	Simultaneous reception of AICH and S-CCPCH		
3G Work item:			

Category: *(only one category Shall be marked with an X)*

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	X
D	Editorial modification	

Reason for change: After clarification from TSG RAN WG1 it has been concluded that simultaneous reception of AICH and S-CCPCH shall be considered as a UE baseline implementation capability.

Clauses affected: 8.2

Other specs Affected:

Other 3G core specifications		→ List of CRs:	
Other 2G core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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8. UE Simultaneous Physical Channels combinations

8.1 Uplink

8.2 Downlink

The table describes the possible combinations of physical channels that can be supported in the downlink by one UE at any one time.

	Physical Channel Combination	**Transport Channel Combination**	**Baseline Capability or Service dependent**	**Comment**
1	PCCPCH	BCH	Baseline	
2	SCCPCH	FACH + PCH	Baseline	The maximum channel bit rate that can be supported is dependent on the UE Service Capability
3	SCCPCH + AICH	FACH + PCH + RACH in uplink Or FACH + PCH + CPCH in uplink	~~FFS~~Baseline	The maximum channel bit rate that can be supported is dependent on the UE Service Capability. This physical channel combination facilitates the preamble portion of the CPCH in the uplink ~~*See note 1*~~
4	SCCPCH + DPCCH	FACH + PCH + CPCH in uplink	Service dependent	This physical channel combination facilitates the message portion of the CPCH in the uplink
5	More than one SCCPCH	More than one FACH + PCH	Service dependent	
6	PICH	N/A	Baseline	
7	DPCCH + DPDCH	One or more DCH coded into a single CCTrCH	Service dependant	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability
8	DPCCH + more than one DPDCH	One or more DCH coded into a single CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability
9	PDSCH + DPCCH + one or more DPDCH	DSCH + one or more DCH coded into a single CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability
10	SCCPCH + DPCCH + one or more DPDCH	FACH + one or more DCH coded into a single CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability This combination of physical channels is used for DRAC control of an uplink DCH and for receiving services such as cell broadcast or multicast whilst in connected mode.
11	SCCPCH + PDSCH + DPCCH + one or more DPDCH	FACH + DSCH + one or more DCH coded into a single CCTrCH	Service dependent	The maximum number of DCHs and the maximum channel bit rate are dependent on UE Service Capability This combination of physical channels is used for simultaneous DSCH and DRAC control of an uplink DCH.
12	More than one DPCCH + more than one DPDCH	More than one DCH coded into one or more CCTrCH	Service dependent	*See note ~~2~~1*

Notes:

~~*1 Whether the support of simultaneous AICH and SCCPCH is part of the UE baseline implementation capabilities is still under discussion within TSG RAN WG1.*~~

~~*2*~~*1 The use of more than one DPCCH and/or more than one CCTrCH are currently for FFS within TSG RAN WG1.*

3GPP TSG-RAN meeting #7 *Document* ***R2-99c64***

Malmö, Sweden, 20-24 September 1999

3G CHANGE REQUEST

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TS 25.302 CR 012 Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submission to TSG	RAN#5	for approval	X	*(only one box should*
list TSG meeting no. here ↑		for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: USIM [ ] ME [X] UTRAN [X] Core Network [ ]
(at least one should be marked with an X)

Source: Ericsson **Date:** 1999-09-21

Subject: Removal of Measurement Precision Requirements

3G Work item:

Category:
(only one category Shall be marked with an X)

F	Correction	
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	X

Reason for change: After clarification from TSG RAN-WG4 where they stated that they are specifying precision requirement on measurements in TS 25.103, it was concluded that this is no longer needed in the TSG RAN-WG2 specifications.

Clauses affected: 9

Other specs Affected:

Other 3G core specifications		→ List of CRs:
Other 2G core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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9 Measurements provided by the physical layer

One of the key services provided by the physical layer is the measurement of various quantities which are used to trigger or perform a multitude of functions. Both the UE and the UTRAN are required to perform a variety of measurements. The standard will not specify the method to perform these measurements or stipulate that the list of measurements provided in this section must all be performed. While some of the measurements are critical to the functioning of the network and are mandatory for delivering the basic functionality (e.g., handover measurements, power control measurements), others may be used by the network operators in optimising the network (e.g., radio environment).
Measurements may be made periodically and reported to the upper layers or may be event-triggered (e.g., primary CCPCH becomes better than the previous best primary CCPCH. The measurements are tightly coupled with the service primitives in that the primitives' parameters may constitute some of the measurements.

The list and frequency of measurements which the physical layer reports to higher layers is described in this section. The precision requirements of the measurements are specified in TS25.103.

EDITOR'S NOTE :These measurements are considered equally applicable to FDD and TDD modes., however, the applicabilityof all measurements to the TDD mode needs to be reviewed.
EDITOR'S NOTE : The measurements CCPCH Rx SIR and CCPCH Rx ISCP should be reviewed by WG1 for practicality in the UE and WG2 informed of the implications of these measures being mandatory.

The measurement quantities measured by the physical layer shall be such that the following principles are applied:

For handover measurements, the decoding of parameters on the BCCH logical channel of monitored neighbouring cells, should not, in general, be needed for calculating the measurement result. If there is a need to adjust the measurement result with parameters broadcast on the PCCPCH, these parameters shall be provided by the UTRAN in inband measurement control messages. There may be some exceptions to this rule. *For example, it may be necessary to decode the SFN of the measured neighbouring cell for time difference measurements. [Note: It should be clarified whether the SFN is a L3 or L1 parameter.]*

In idle mode or in RRC connected mode using common Transport Channels, the UE shall be able to monitor cells for cell reselection, without being required to frequently decode parameters on the BCCH logical channel of the monitored neighbouring cells. The decoding frequency of these parameters, set by the cell reselection algorithm, should be such that UE standby times are not significantly decreased.

9.1 Measurements of downlink channels

9.1.1 CFN-SFN Observed time difference

This measure is mandatory for the UE.

Measurement	Measured time difference to UTRA cell
Source	L1 (UE)
Destination	RRC (RNC) for handover
Reporting Trigger	On-demand, Event-triggered
Definition	The CFN-SFN Observed time difference to cell indicates the time difference which is measured by UE between CFN in the UE and the SFN of the target neighbouring cell. It is notified to SRNC by Measurement Report message or Measurement Information Element in other RRC messages.
~~Precision Requirement~~	~~For handover, precision to [1] chip unit~~

9.1.2 Observed time difference to GSM cell

This measure is mandatory for the UE if the handover to GSM service is to be supported.

Measurement	Measured time difference to GSM cell
Source	L1 (UE)
Destination	RRC (RNC) for maintenance and handover to GSM
Reporting Trigger	On-demand, Event-triggered
Definition	Time difference between the Primary CCPCH of the current cell and the timing of the GSMcell.
~~Precision Requirement~~	~~For handover, precision to [x] microseconds~~

9.1.3 Primary CCPCH RX E_c/I_0

This measure is mandatory for the UE.

Measurement	Primary CCPCH Rx Ec/Io
Source	L1(UE)
Destination	RRC (UE, RNC),
Reporting Trigger	Periodic, on demand and event triggered
Definition	$-20\log_{10}(E_c/I_o)$ where E_c is the energy per chip of the Primary CCPCH measured in the searcher and I_o is the received spectral density.
~~Precision Requirement~~	~~1 dB~~

9.1.4 Primary CCPCH Rx SIR

This measure is mandatory for the UE.

Measurement	Primary CCPCH Rx SIR
Source	L1 (UE)
Destination	RRC (UE, RNC)
Reporting Trigger	Periodic or event triggered
Definition	This quantity is a ratio of the Primary CCPCH Received Signal Code Power (RSCP) to the Interference Signal Code Power (ISCP). The RSCP is the measured symbol power of the Primary CCPCH at the demodulator output and the ISCP is the measured interference symbol power.
~~Precision Requirement~~	~~1 dB~~

9.1.5 Primary CCPCH Rx RSCP

This measure is mandatory for the UE.

Measurement	Primary CCPCH Rx RSCP
Source	L1(UE)
Destination	RRC (UE, RNC)
Reporting Trigger	Periodic or event triggered
Definition	Received Signal Code Power, is received power on one code after despreading, defined on the pilot symbols.
~~Precision Requirement~~	~~1 dB~~

9.1.6 Primary CCPCH Rx ISCP

This measure is mandatory for the UE.

Measurement	Primary CCPCH Rx ISCP
Source	L1(UE)
Destination	RRC (UE, RNC)
Reporting Trigger	Periodic or event triggered
Definition	Interference on Signal Code Power, is the interference on the mentioned received signal after despreading. Thereby only the non-orthogonal part of the interference is included.
~~Precision Requirement~~	~~1 dB~~

9.1.7 DPCCH SIR

This measure is mandatory for the UE.

Measurement	DPCCH SIR
Source	L1(UE)
Destination	RRC(UE,RNC)
Reporting Trigger	Periodic, once every power control slot for DPCCH
Definition	The ratio of the measured symbol power at the demodulator output to the measured interference power at the demodulator output.
~~Precision Requirement~~	~~less than the minimum DL power control step size~~

9.1.8 UTRA Cell Signal strength (RSSI)

This measure is mandatory for the UE.

Measurement	signal strength
Source	L1(UE)
Destination	RRC (RNC),
Reporting Trigger	Periodic, event triggered, on demand
Definition	Received Signal Strength Indicator, the wideband received power within the channel bandwidth averaged over [1 s] interval.
~~Precision Requirement~~	~~1 dB~~

9.1.9 Alternate mode Signal strength

9.1.9.1 GSM Signal Strength

This measure is mandatory for the UE if the service handover to GSM is to be supported.

Measurement	GSM signal strength
Source	L1(UE)
Destination	RRC (RNC)
Reporting Trigger	Periodic, event triggered, on demand
Definition	Reference GSM document 05.08
~~Precision Requirement~~	~~Reference GSM document 05.08~~

9.1.10 Transport CH BLER

This measure is mandatory for the UE.

Measurement	Transport channel BLER (BLock Error Rate)
Source	L1(UE)
Destination	RRC(RNC,UE)
Reporting Trigger	Periodic
Definition	The error detection mechanism will determine whether or not a block error occurred.
~~Precision Requirement~~	~~Transport channel dependent~~

9.1.11 Physical CH BER

This measure is mandatory for the UE.

Measurement	Physical channel BER
Source	L1(UE)
Destination	RRC(UE,RNC)
Reporting Trigger	On-demand, Event-triggered
Definition	The estimate of the raw BER of the physical channel calculated only on the data part.
~~Precision Requirement~~	~~[10%]~~

9.1.12 Total Tx Power

Measurement	total Tx power
Source	L1(Node-B)
Destination	RRC(RNC)
Reporting Trigger	On-demand, periodic, Event-triggered
Definition	The total power emitted by the Node-B within the channel bandwidth averaged over an interval of [1 s]
~~Precision Requirement~~	~~1 dB~~

9.1.13 Code Tx Power

Measurement	Code Tx power
Source	L1(Node-B)
Destination	RRC (RNC)
Reporting Trigger	On-demand, periodic, Event-triggered
Definition	The total power emitted by the Node-B on one channelisation code for one UE averaged over [100 ms]
~~Precision Requirement~~	~~1 dB~~

9.2 Measurements on uplink channels

9.2.1 UL load

Measurement	UL load
Source	L1 (Node B)
Destination	RRC(RNC)
Reporting Trigger	On-demand, Event-triggered, Periodic
Definition	the total received signal power for a carrier within the cell
~~Precision Requirement~~	~~1 dB~~

9.2.2 UE Tx Power

This measure is mandatory for the UE.

Measurement	UE Tx power
Source	L1(UE)
Destination	RRC (UE,RNC)
Reporting Trigger	On-demand, periodic, Event-triggered
Definition	RRC (UE) – the total Tx power, measured at the antenna connector, averaged over [100 ms] RRC (RNC) – indication of Tx power reaching threshold (for example, upper or lower power limits)
~~Precision Requirement~~	~~3 dB~~

9.2.3 Transport CH BLER

Measurement	Transport channel BLER (BLock Error Rate)
Source	L1(Node-B)
Destination	RRC(RNC)
Reporting Trigger	Periodic, event triggered, on demand
Definition	The error detection mechanism will determine whether or not a block error occurred.
~~Precision Requirement~~	~~Transport channel dependent~~

9.2.4 Physical CH BER

Measurement	Physical channel BER
Source	L1(Node-B)
Destination	RRC(RNC)
Reporting Trigger	On-demand, Event-triggered, periodic
Definition	The estimate of the raw BER of the physical channel calculated only on the data part.
~~Precision Requirement~~	~~[10%]~~

9.3 Miscellaneous measurements

9.3.1 Time of Arrival (TOA)

The Time of Arrival (TOA) measurement at a single node-B may provide an estimate of the round trip time of signals between the Node-B and the UE and this may be used to calculate a radial distance to the UE within the sector. A group of simultaneous TOA measurements made from a number of Node-B or LMU may be used to estimate the location of the UE. This support for this measurement is LCS positioning method dependant..

Measurement	Time of arrival (TOA)
Source	L1(Node-B or LMU)
Destination	RRC (RNC-LCS)
Reporting Trigger	on demand, event triggered
Definition	the time of arrival of the uplink transmissions in relation to the CCPCH timing reference..
~~Precision Requirement~~	~~[0,5] chip~~

9.3.2 SFN-SFN Observed time difference

The SFN-SFN observed time difference at the UE of a group of Node-B may be used for location calculation. . The applicability of this measure is LCS method dependent This support for this measurement is LCS positioning method dependant.

Measurement	SFN-SFN observed time difference
Source	L1 (UE)
Destination	RRC (RNC) for handover, maintenance and LCS
Reporting Trigger	On-demand, Event-triggered
Definition	Time difference between the Primary CCPCH of the current cell and the Primary CCPCH of a neighboring cell.
~~Precision Requirement~~	~~For LCS, precision to a fraction of a chip~~

9.3.3 Frequency Offset (FO)

The Frequency Offset (FO) measures the rate of change (drift) of the Relative Time Difference and may be used to estimate the RTD at the time the UE location measurements are made. . This support for this measurement is LCS positioning method dependant.

Measurement	Frequency Offset (FO)
Source	L1(LMU)
Destination	RRC (RNC-LCS)
Reporting Trigger	On demand, event triggered, periodic
Definition	The Frequency Offset (FO) measures the rate of change (drift) of the Relative Time Difference of the CCPCH transmissions of two Node-B.
~~Precision Requirement~~	~~[1] Hz~~

3GPP TSG-RAN meeting #7 ***Document R2-99c81***
Malmö, Sweden, 20-24 September 1999

3G CHANGE REQUEST

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TS 25.302 CR 013 Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG	RAN #5	for approval	X	*(only one box should*
List TSG meeting no. here ↑		for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: *(at least one should be marked with an X)*	USIM		ME	X	UTRAN	X	Core Network

Source: TSG RAN WG2 **Date:** 1999-09-24

Subject: Compressed mode

3G Work item:

Category:	F	Correction	
	A	Corresponds to a correction in a 2G specification	
(only one category	B	Addition of feature	
shall be marked	C	Functional modification of feature	
with an X)	D	Editorial modification	X

Reason for change: It is proposed to update 25.302 with a parameterisation of compressed mode based on the parameterisation defined by RAN-WG1 in 25.315. The parameters are to be used in the RRC control of compressed mode.

Clauses affected:

Other specs affected:			
	Other 3G core specifications		→ List of CRs:
	Other 2G core specifications		→ List of CRs:
	MS test specifications		→ List of CRs:
	BSS test specifications		→ List of CRs:
	O&M specifications		→ List of CRs:

Other comments: 7.3, 10

help.doc

<---------- double-click here for help and instructions on how to create a CR.

7.3 ~~Slotted~~Compressed Mode

~~Slotted~~Compressed Mode is defined as the mechanism whereby certain idle periods are created in ~~downlink~~ radio frames so that the UE can perform measurements ~~reports~~ during these periods (more details can be found in [3]). ~~Applicability to uplink is FFS.~~

~~Slotted~~Compressed Mode is obtained by layer 2 using transport channels provided by the layer 1 as follows :

- ~~Slotted~~Compressed Mode is controlled by the RRC layer which configures the layer 2 and the physical layer
- The number of occurrences of ~~slotted~~compressed frames is controlled by RRC, and can be modified by RRC signalling
- Layer 2 instructs every Transmission Time Interval the Layer 1 on whether ~~slotted~~compressed mode should be applied for a given Transport Format Combination Set. The instruction may indicate also the type of compressed~~slotted~~ mode ~~(beginning, middle or end of the frame~~).
- The ~~slotting~~compression of frames can be either cyclic (typically for circuit services) in a compressed mode pattern (defined below) or a-periodic (typically for NRT services)
- It is under the responsibility of the layer 2 if necessary and if possible to either buffer some layer 2 PDUs (typically at the RLC layer for NRT services) or to rate adapt the data flow (similarly to GSM) so that there is no loss of data because of ~~slotted~~compressed mode. This will be service depende~~a~~nt and controlled by the RRC layer.

The following parameters characterize a transmission gap :

- TGL : Transmission Gap Length is the duration of no transmission, expressed in number of slots.
- CFN : The connection frame number when the transmission gap starts
- SN : The slot number when the transmission gap starts

With this definition, it is possible to have a flexible position of the transmission gap in the frame.

The following parameters characterize a compressed mode pattern (illustrated in Figure 1) :

- TGP : Transmission Gap Period is the period of repetition of a set of consecutive frames containing up to 2 transmission gaps (*).
- TGL : As defined above
- TGD : Transmission Gap Distance is the duration of transmission between two consecutive transmission gaps within a transmission gap period, expressed in number of frames. In case there is only one transmission gap in the transmission gap period, this parameter shall be set to zero.
- PD: Pattern duration is the total time of all TGPs expressed in number of frames.
- CFN : The connection frame number when the first transmission gap starts
- PCM: Power Control Mode specifies the uplink power control algorithm applied during recovery period after each transmission gap in compressed mode. PCM can take 2 values (0 or 1). The different power control modes are described in TS 25.214.

In a compressed mode pattern, the first transmission gap starts in the first frame of the pattern. The gaps have a fixed position in the frames, and start in the slot position defined in [3].

(*) : Optionally, the set of parameters may contain 2 values TGP1 and TGP2, where TGP1 is used for the 1st and the consecutive odd gap periods and TGP2 is used for the even ones. Note if TGP1=TGP2 this is equivalent to using only one TGP value.

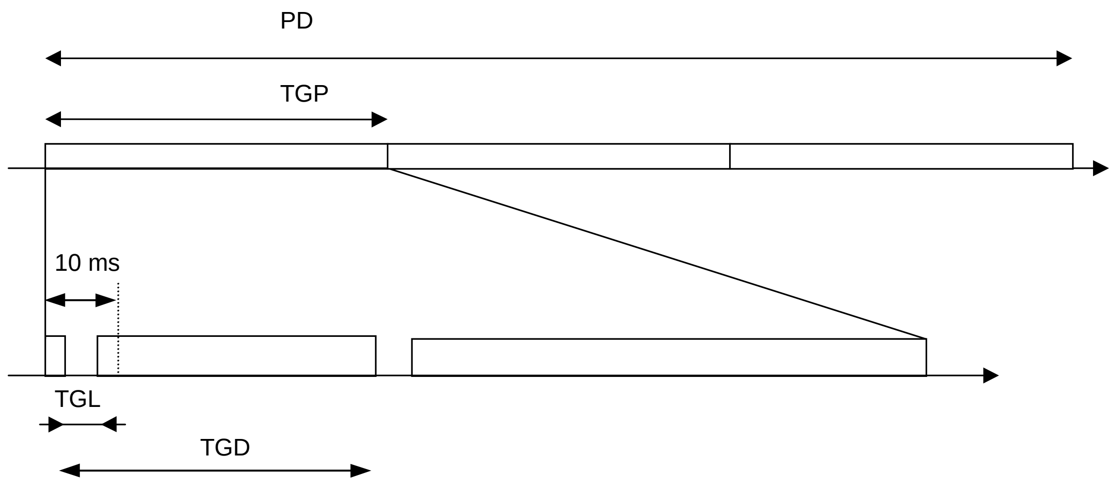


Figure 1. Illustration of compressed mode pattern parameters.

10 Primitives of the physical layer

10.1 Generic names of primitives between layers 1 and 2

The primitives between layer 1 and layer 2 are shown in the Table 1.

Table 1. Primitives between layer 1 and 2

Generic Name	Parameters
PHY-DATA-REQ	TFI, compressed mode type, TBS
PHY-DATA-IND	TFI, ~~compressed mode type,~~ TBS, CRC result
PHY-STATUS-IND	Event value

10.1.1 PHY-Data-REQ

The PHY-DATA primitives are used to request SDUs used for communications passed to and from the physical layer. One PHY-DATA primitive is submitted every Transmission Time Interval for each Transport Channel.
Primitive Type: request.

Parameters:

- TFI
- Type of compressed mode (e.g. uncompressed, compressed~~ with beginning/middle/end of frame~~)
- Transport Block Set
- FN_{CELL}
- Page indicators (PIs) (PCH only)

10.1.2 PHY- Data-IND

The PHY-DATA primitives are used to indicate SDUs used for Layer 2 passed to and from the physical layer. One PHY-DATA primitive is submitted every Transmission Time Interval for each Transport Channel.
Primitive Type: indicate

Parameters:

- TFI
- ~~Type of compressed mode (e.g. uncompressed, compressed with beginning/middle/end of frame)~~
- Transport Block Set
- CRC check result

TS 25.302 V3.0.0

3GPP TSG-RAN meeting #7 **_Document_** ***R2-99c37***

Malmö, Sweden, 20.-24.Sept 1999

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

TS 25.302 CR 014 Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG		for approval	X	*(only one box should*
List TSG meeting no. here ↑		for information		*be marked with an X)*

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf

Proposed change affects: *(at least one should be marked with an X)*	USIM		ME	X	UTRAN	X	Core Network	

Source: Siemens **Date:** 21/09/99

Subject: Change of the model of the UE with respect to shared channel multiplexing

3G Work item:

Category:	F	Correction	
	A	Corresponds to a correction in a 2G specification	
(only one category	B	Addition of feature	
shall be marked	C	Functional modification of feature	
with an X)	D	Editorial modification	X

Reason for change: The model of the UE did not reflect the assumption that several transport channels can be multiplexed in the physical layer for shared channels.

Clauses affected: 6.1, 6.2

Other specs affected:	Other 3G core specifications		→ List of CRs:
	Other 2G core specifications		→ List of CRs:
	MS test specifications		→ List of CRs:
	BSS test specifications		→ List of CRs:
	O&M specifications		→ List of CRs:

Other comments:

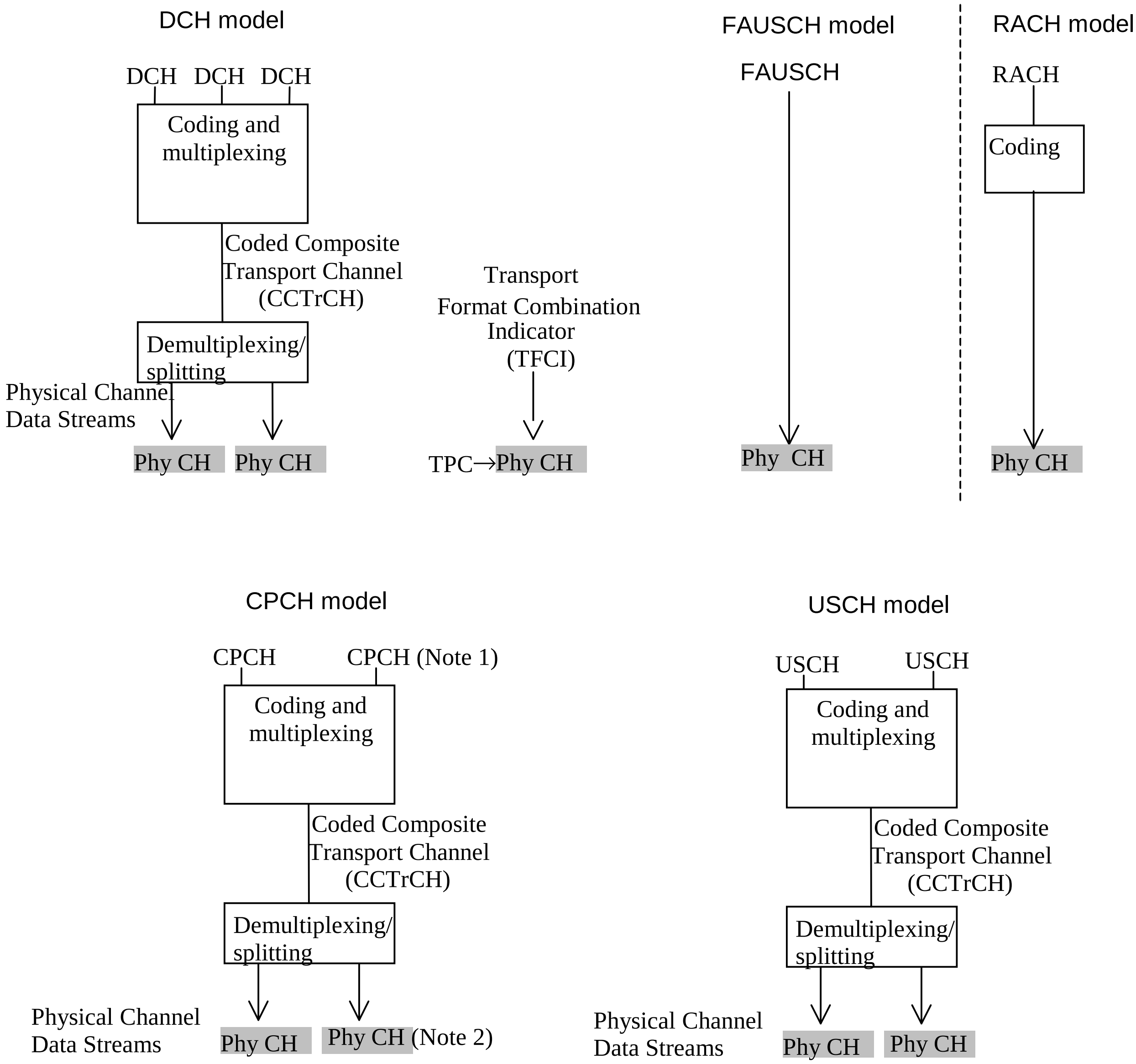
help.doc

<--------- double-click here for help and instructions on how to create a CR.

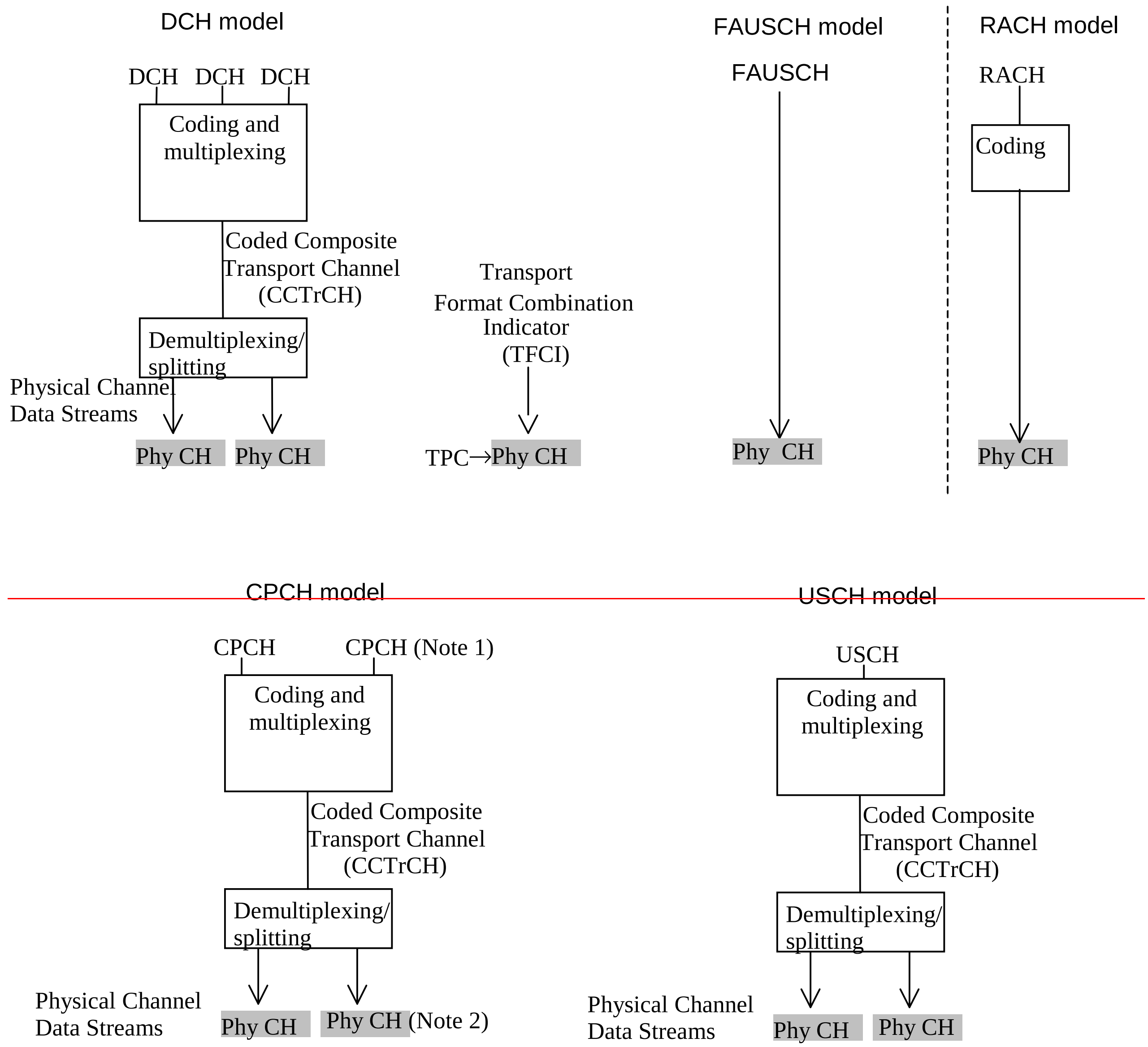
6.1 Uplink models

Figure 1 shows models of the UE's physical layer in the uplink for both FDD and TDD mode. It shows two models: DCH model and RACH model. Some restriction exist for the use of different types of transport channel at the same time, these restrictions are described in the chapter "UE Simultaneous Physical Channel combinations". More details can be found in [3] and [4].

Editors note: Models for uplink transport channels currently marked ffs will be necessary if these channels are included in the description.



Note 1: The need to multiplex several CPCH transport channels is FFS
Note 2: Only the data part of the CPCH can be mapped on multiple physical channels
Note 3: FAUSCH and CPCH are for FDD only.
Note 4: USCH is for TDD only.



Note 1: The need to multiplex several CPCH transport channels is FFS
Note 2: Only the data part of the CPCH can be mapped on multiple physical channels
Note 3: FAUSCH and CPCH are for FDD only.
Note 4: USCH is for TDD only.

Figure 1: Model of the UE's physical layer – uplink

The DCH model shows that one or several DCHs can be processed and multiplexed together by the same coding and multiplexing unit. The detailed functions of the coding and multiplexing unit are not defined in this document but in [3] and [4]. The single output data stream from the coding and multiplexing unit is denoted *Coded Composite Transport Channel (CCTrCH).*
The bits on a CCTrCH Data Stream can be mapped on the same Physical Channel and should have the same C/I requirement.
On the downlink, multiple CCTrCH can be used simultaneously with one UE. In the case of FDD, only one fast power control loop is necessary for these different CCtrCH, but the different CCtrCH can have different C/I requirements to provide different QoS on the mapped Transport Channels. In the case of TDD, different power control loops can be applied for different CCTrCH. One physical channel can only have bits coming from the same CCTrCH.
On the uplink and in the case of FDD, only one CCTrCH can be used simultaneously. On the uplink and in the case of TDD, multiple CCTrCH can be used simultaneously.
When multiple CCTrCH are used by one UE, one or several TFCI can be used, but each CCTrCH has only zero or one corresponding TFCI. In the case of FDD, these different words are mapped on the same DPCCH. In the case of TDD, these different TFCI can be mapped on different DPCH.
The data stream of the CCTrCH is fed to a data demultiplexing/splitting unit that demultiplexes/splits the CCTrCH's data stream

onto one or several *Physical Channel Data Streams*.

Editors's note: The term "splitting" used for above function in FDD mode has been replaced by "demultiplexing/splitting". The intention of using the term splitting is to express that this function is performed on bit level not on some block level. The term demultiplexing/splitting shall cover both cases, block or bit level demultiplexing, where block lengths larger than 1 bit may be applied in the TDD mode. This needs to be confirmed by the L1 group

The current configuration of the coding and multiplexing unit is either signalled to, or optionally blindly detected by, the network for each 10 ms frame. If the configuration is signalled, it is represented by the *Transport Format Combination Indicator (TFCI)* bits. Note that the TFCI signalling only consists of pointing out the current transport format combination within the already configured transport format combination set. In the uplink there is only one TFCI representing the current transport formats on all DCHs of one CCTrCH simultaneously. In FDD mode, the physical channel data stream carrying the TFCI is mapped onto the physical channel carrying the power control bits and the pilot.

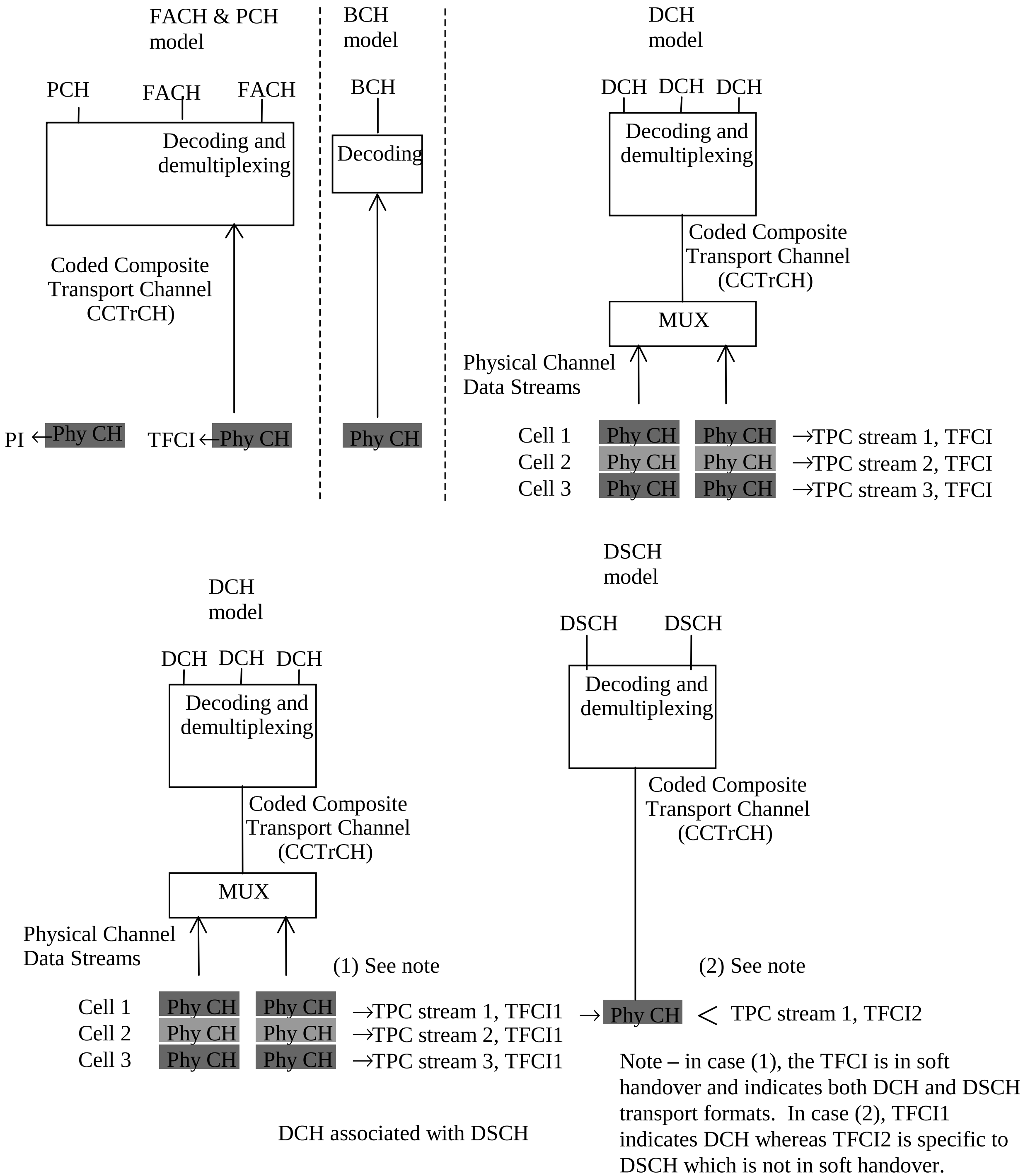
For the FAUSCH, there is no coding, since the FAUSCH is only used for the transmission of a reservation request by sending an up-link signalling code (USC) at the time-offset allocated for the specific UE during the 10 ms frame. Due to the fixed time-offset allotted to a specific UE, the FAUSCH is a dedicated control channel.

The model for the RACH case shows that RACH is a common type transport channel in the uplink. RACHs are always mapped one-to-one onto physical channels, i.e. there is no physical layer multiplexing of RACH. Service multiplexing is handled by the MAC layer. The CPCH which is another common type transport channel has a physical layer model as shown in the above figure.

6.2 Downlink models

Figure 2 and Figure 3 show the model of the UE's physical layer for the downlink in FDD and TDD mode, respectively. Note that there is a different model for each transport channel type.

Editors note: Models for downlink transport channels currently marked ffs will be necessary if these channels are included in the description.


FACH & PCH model
PCH
FACH
FACH
Decoding and demultiplexing
Coded Composite Transport Channel CCTrCH)
PI
Phy CH
TFCI
Phy CH
BCH model
BCH
Decoding
Phy CH
DCH model
DCH
DCH
DCH
Decoding and demultiplexing
Coded Composite Transport Channel (CCTrCH)
MUX
Physical Channel Data Streams
Cell 1
Cell 2
Cell 3
Phy CH
→TPC stream 1, TFCI
→TPC stream 2, TFCI
→TPC stream 3, TFCI
DCH model
DCH
DCH
DCH
Decoding and demultiplexing
Coded Composite Transport Channel (CCTrCH)
MUX
Physical Channel Data Streams
(1) See note
Cell 1
Cell 2
Cell 3
Phy CH
→TPC stream 1, TFCI1
→TPC stream 2, TFCI1
→TPC stream 3, TFCI1
DCH associated with DSCH
DSCH model
DSCH
DSCH
Decoding and demultiplexing
Coded Composite Transport Channel (CCTrCH)
(2) See note
Phy CH
TPC stream 1, TFCI2
Note – in case (1), the TFCI is in soft handover and indicates both DCH and DSCH transport formats. In case (2), TFCI1 indicates DCH whereas TFCI2 is specific to DSCH which is not in soft handover.

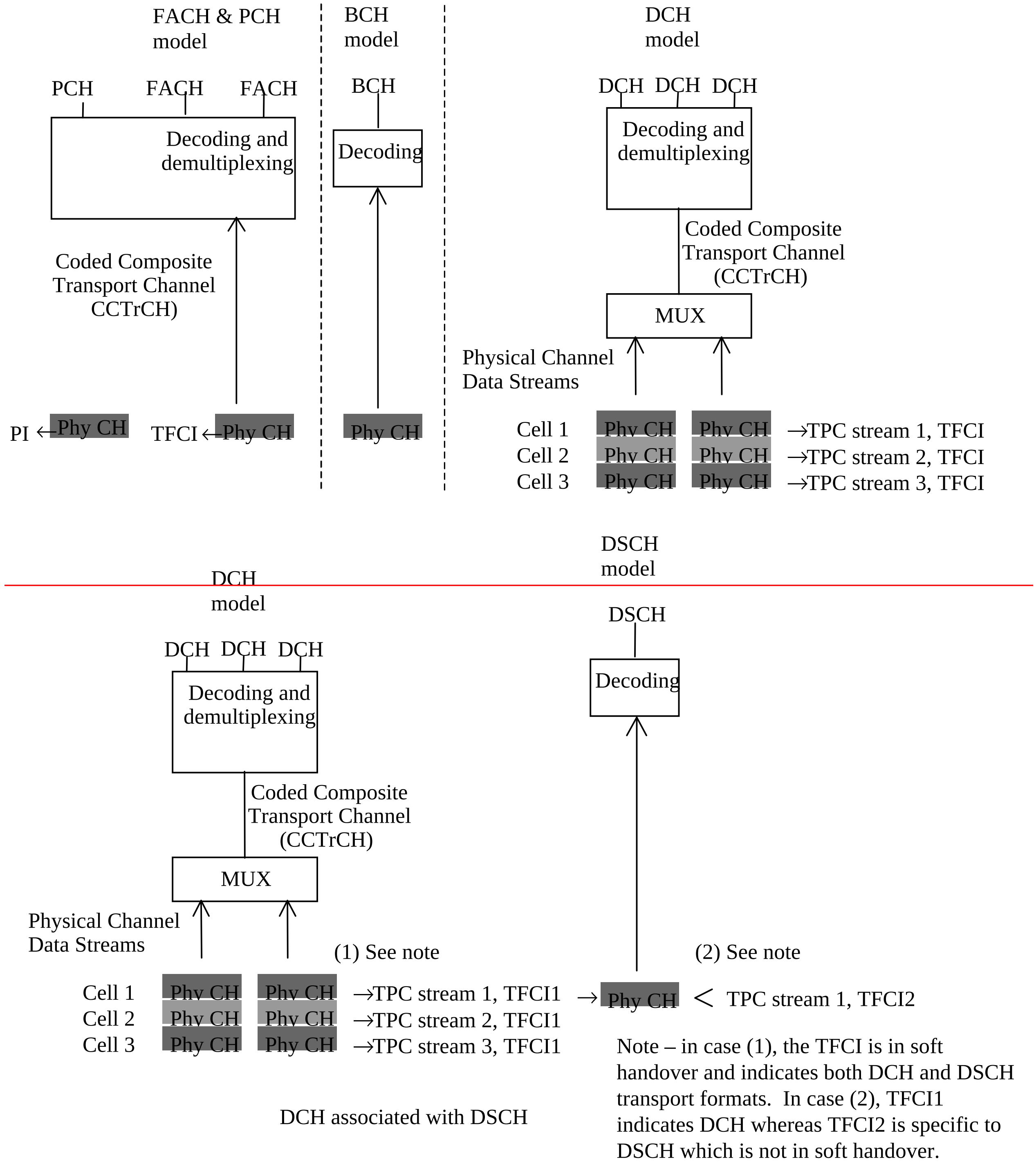
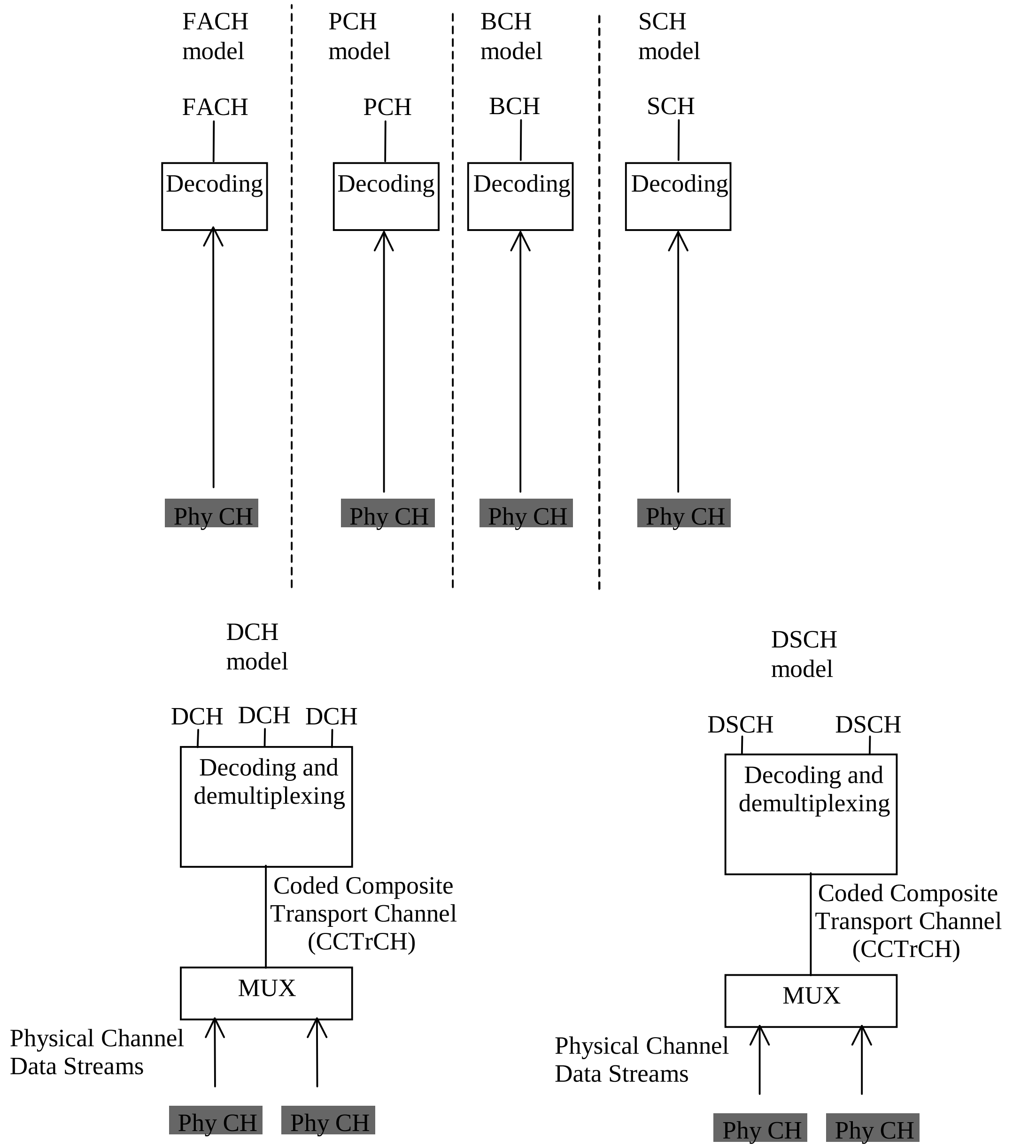


Figure 2: Model of the UE's physical layer – downlink FDD mode


FACH model
PCH model
BCH model
SCH model
FACH
PCH
BCH
SCH
Decoding
Decoding
Decoding
Decoding
Phy CH
Phy CH
Phy CH
Phy CH
DCH model
DSCH model
DCH
DCH
DCH
DSCH
DSCH
Decoding and demultiplexing
Decoding and demultiplexing
Coded Composite Transport Channel (CCTrCH)
Coded Composite Transport Channel (CCTrCH)
MUX
MUX
Physical Channel Data Streams
Physical Channel Data Streams
Phy CH
Phy CH
Phy CH
Phy CH

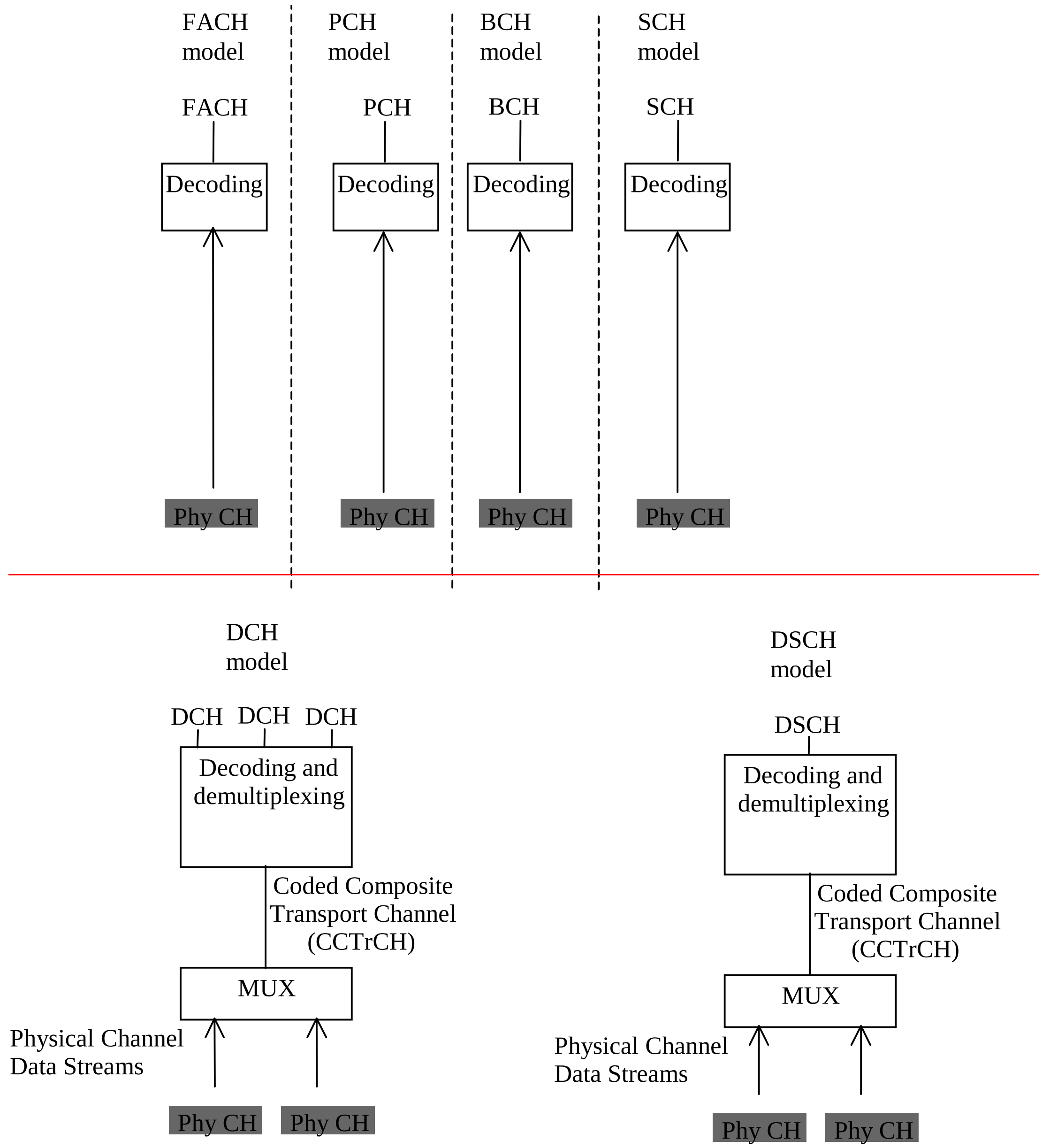


Figure 3: Model of the UE's physical layer – downlink TDD mode

For the DCH case, the mapping between DCHs and physical channel data streams works in the same way as for the uplink. Note however, that the number of DCHs, the coding and multiplexing etc. may be different in uplink and downlink.

In the FDD mode, the differences are mainly due to the soft and softer handover. Further, the pilot, TPC bits and TFCI are time multiplexed onto the same physical channel(s) as the DCHs. Further, the definition of physical channel data stream is somewhat different from the uplink.

Note that it is logically one and the same physical data stream in the active set of cells, even though physically there is one stream for each cell. The same processing and multiplexing is done in each cell. The only difference between the cells is the actual codes, and these codes correspond to the same spreading factor.

The physical channels carrying the same physical channel data stream are combined in the UE receiver, excluding the pilot, and in some cases the TPC bits. TPC bits received on certain physical channels may be combined provided that UTRAN has informed the UE that the TPC information on these channels is identical.

In the TDD mode, the downlink models for the BCH, PCH and FACH show that BCH, PCH and FACH are always mapped one-to-one onto physical channels, i.e. there is no physical layer multiplexing of BCH, PCH and FACH. Service multiplexing is handled by the MAC layer. Note, in the TDD mode there is the SCH in addition (not shown in Figure 3).

In the FDD mode, a PCH and one or several FACH can be encoded and multiplexed together forming a CCTrCH. Similarly as in the DCH model there is one TFCI for each CCTrCH for indication of the transport formats used on each PCH and FACH. The PCH is associated with a separate physical channel carrying page indicators (PIs) which are used to trigger UE reception of the physical channel that carries PCH. A FACH or a PCH can also be individually mapped onto a separate physical channel. The BCH is, as for TDD, always mapped onto one physical channel without any multiplexing with other transport channels.