**3GPP TSG-RAN-WG1 Meeting #20**
**Busan, Korea, 21-25 May 2001**

***R1-01-0497***

*CR-Form-v4*

# CHANGE REQUEST

| | | | | | | |
|---|---|---|---|---|---|---|
| ⌘ **25.211** | **CR 103** | ⌘ ev | **-** | ⌘ Current version: | **3.6.0** | ⌘ |

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

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

| | | | | |
|---|---|---|---|---|
| ***Title:*** | ⌘ | Correction of the representation of slot format | | |
| ***Source:*** | ⌘ | Panasonic | | |
| ***Work item code:*** | ⌘ | | ***Date:*** ⌘ | 18, May, 2001 |
| ***Category:*** | ⌘ | **F** | ***Release:*** ⌘ | R99 |
| | | *Use one of the following categories:*<br>***F*** *(correction)*<br>***A*** *(corresponds to a correction in an earlier release)*<br>***B*** *(addition of feature),*<br>***C*** *(functional modification of feature)*<br>***D*** *(editorial modification)*<br>Detailed explanations of the above categories can be found in 3GPP TR 21.900. | | *Use one of the following releases:*<br>*2 (GSM Phase 2)*<br>*R96 (Release 1996)*<br>*R97 (Release 1997)*<br>*R98 (Release 1998)*<br>*R99 (Release 1999)*<br>*REL-4 (Release 4)*<br>*REL-5 (Release 5)* |

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | The reference symbol from TS25.212 does not cover the case of P-CCPCH, S-CCPCH and PDSCH |
| ***Summary of change:*** | ⌘ | The number of data bits per downlink slot is always represented by $N_{data1}$ and $N_{data2}$. |
| ***Consequences if not approved:*** | ⌘ | Inconsistency of the number of data bits per downlink slot happens in case of P-CCPCH, S-CCPCH and PDSCH. |

| | | | |
|---|---|---|---|
| ***Clauses affected:*** | ⌘ | 3, 5.3.3.3, 5.3.3.6, | |
| ***Other specs affected:*** | ⌘ | [ ] Other core specifications<br>[ ] Test specifications<br>[ ] O&M Specifications | ⌘ |
| ***Other comments:*** | ⌘ | | |

## How to create CRs using this form:

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

# 3 Symbols and aAbbreviations

## 3.1 Symbols

| | |
|---|---|
| $N_{data1}$ | The number of data bits per downlink slot in Data1 field. |
| $N_{data2}$ | The number of data bits per downlink slot in Data2 field. If the slot format does not contain a Data2 field, $N_{data2} = 0$. |

## 3.2 Abbreviations

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

| | |
|---|---|
| AI | Acquisition Indicator |
| AICH | Acquisition Indicator Channel |
| AP | Access Preamble |
| AP-AICH | Access Preamble Acquisition Indicator Channel |
| API | Access Preamble Indicator |
| BCH | Broadcast Channel |
| CA | Channel Assignment |
| CAI | Channel Assignment Indicator |
| CCC | CPCH Control Command |
| CCPCH | Common Control Physical Channel |
| CCTrCH | Coded Composite Transport Channel |
| CD | Collision Detection |
| CD/CA-ICH | Collision Detection/Channel Assignment Indicator Channel |
| CDI | Collision Detection Indicator |
| CPCH | Common Packet Channel |
| CPICH | Common Pilot Channel |
| CSICH | CPCH Status Indicator Channel |
| DCH | Dedicated Channel |
| DPCCH | Dedicated Physical Control Channel |
| DPCH | Dedicated Physical Channel |
| DPDCH | Dedicated Physical Data Channel |
| DSCH | Downlink Shared Channel |
| DSMA-CD | Digital Sense Multiple Access - Collison Detection |
| DTX | Discontinuous Transmission |
| FACH | Forward Access Channel |
| FBI | Feedback Information |
| FSW | Frame Synchronization Word |
| ICH | Indicator Channel |
| MUI | Mobile User Identifier |
| PCH | Paging Channel |
| P-CCPCH | Primary Common Control Physical Channel |
| PCPCH | Physical Common Packet Channel |
| PDSCH | Physical Downlink Shared Channel |
| PICH | Page Indicator Channel |
| PRACH | Physical Random Access Channel |
| PSC | Primary Synchronisation Code |
| RACH | Random Access Channel |
| RNC | Radio Network Controller |
| S-CCPCH | Secondary Common Control Physical Channel |
| SCH | Synchronisation Channel |
| SF | Spreading Factor |
| SFN | System Frame Number |
| SI | Status Indicator |
| SSC | Secondary Synchronisation Code |
| STTD | Space Time Transmit Diversity |

| | |
|---|---|
| TFCI | Transport Format Combination Indicator |
| TSTD | Time Switched Transmit Diversity |
| TPC | Transmit Power Control |
| UE | User Equipment |
| UTRAN | UMTS Terrestrial Radio Access Network |

#### 5.3.3.3 Primary Common Control Physical Channel (P-CCPCH)

The Primary CCPCH is a fixed rate (30 kbps, SF=256) downlink physical channels used to carry the BCH transport channel.

Figure 15 shows the frame structure of the Primary CCPCH. The frame structure differs from the downlink DPCH in that no TPC commands, no TFCI and no pilot bits are transmitted. The Primary CCPCH is not transmitted during the first 256 chips of each slot. Instead, Primary SCH and Secondary SCH are transmitted during this period (see subclause 5.3.3.4).

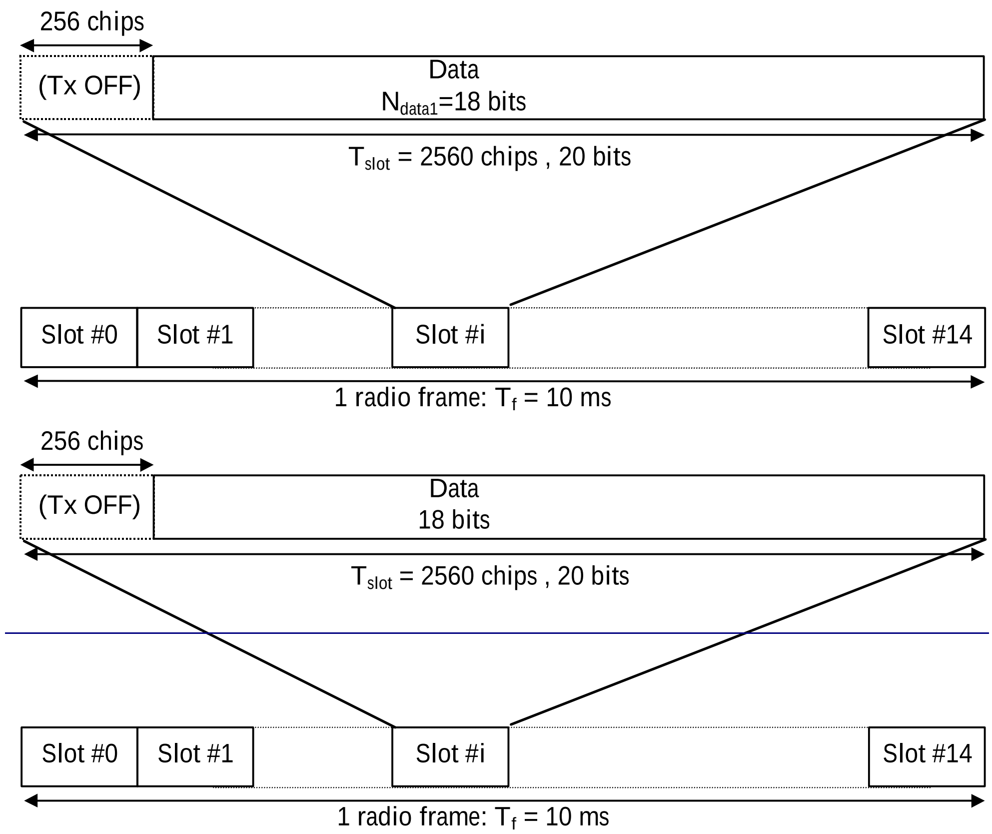


**Figure 15: Frame structure for Primary Common Control Physical Channel**

#### 5.3.3.4 Secondary Common Control Physical Channel (S-CCPCH)

The Secondary CCPCH is used to carry the FACH and PCH. There are two types of Secondary CCPCH: those that include TFCI and those that do not include TFCI. It is the UTRAN that determines if a TFCI should be transmitted, hence making it mandatory for all UEs to support the use of TFCI. The set of possible rates for the Secondary CCPCH is the same as for the downlink DPCH, see subclause 5.3.2. The frame structure of the Secondary CCPCH is shown in figure 17.

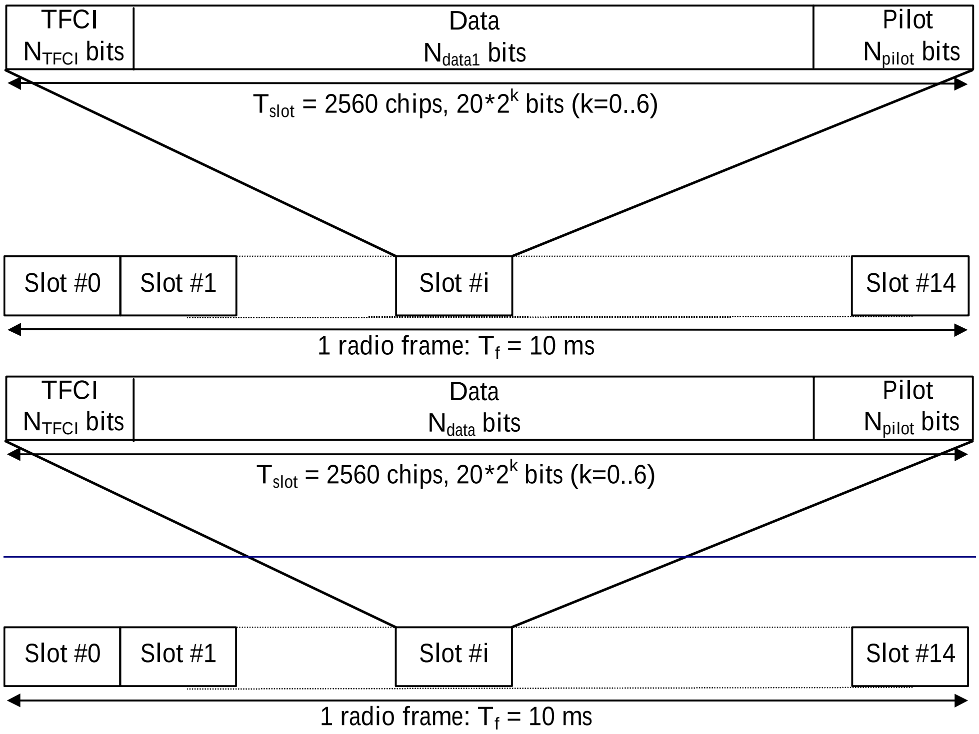


**Figure 17: Frame structure for Secondary Common Control Physical Channel**

The parameter k in figure 17 determines the total number of bits per downlink Secondary CCPCH slot. It is related to the spreading factor SF of the physical channel as $SF = 256/2^k$. The spreading factor range is from 256 down to 4.

The values for the number of bits per field are given in table 17. The channel bit and symbol rates given in table 17 are the rates immediately before spreading. The pilot patterns are given in table 18.

The FACH and PCH can be mapped to the same or to separate Secondary CCPCHs. If FACH and PCH are mapped to the same Secondary CCPCH, they can be mapped to the same frame. The main difference between a CCPCH and a downlink dedicated physical channel is that a CCPCH is not inner-loop power controlled. The main difference between the Primary and Secondary CCPCH is that the transport channel mapped to the Primary CCPCH (BCH) can only have a fixed predefined transport format combination, while the Secondary CCPCH support multiple transport format combinations using TFCI. Furthermore, a Primary CCPCH is transmitted over the entire cell while a Secondary CCPCH may be transmitted in a narrow lobe in the same way as a dedicated physical channel (only valid for a Secondary CCPCH carrying the FACH).

**Table 17: Secondary CCPCH fields**

| Slot Format #i | Channel Bit Rate (kbps) | Channel Symbol Rate (ksps) | SF | Bits/ Frame | Bits/ Slot | $N_{data1}$ | $N_{pilot}$ | $N_{TFCI}$ |
|---|---|---|---|---|---|---|---|---|
| 0 | 30 | 15 | 256 | 300 | 20 | 20 | 0 | 0 |
| 1 | 30 | 15 | 256 | 300 | 20 | 12 | 8 | 0 |
| 2 | 30 | 15 | 256 | 300 | 20 | 18 | 0 | 2 |
| 3 | 30 | 15 | 256 | 300 | 20 | 10 | 8 | 2 |
| 4 | 60 | 30 | 128 | 600 | 40 | 40 | 0 | 0 |
| 5 | 60 | 30 | 128 | 600 | 40 | 32 | 8 | 0 |
| 6 | 60 | 30 | 128 | 600 | 40 | 38 | 0 | 2 |
| 7 | 60 | 30 | 128 | 600 | 40 | 30 | 8 | 2 |
| 8 | 120 | 60 | 64 | 1200 | 80 | 72 | 0 | 8* |
| 9 | 120 | 60 | 64 | 1200 | 80 | 64 | 8 | 8* |
| 10 | 240 | 120 | 32 | 2400 | 160 | 152 | 0 | 8* |
| 11 | 240 | 120 | 32 | 2400 | 160 | 144 | 8 | 8* |
| 12 | 480 | 240 | 16 | 4800 | 320 | 312 | 0 | 8* |
| 13 | 480 | 240 | 16 | 4800 | 320 | 296 | 16 | 8* |
| 14 | 960 | 480 | 8 | 9600 | 640 | 632 | 0 | 8* |
| 15 | 960 | 480 | 8 | 9600 | 640 | 616 | 16 | 8* |
| 16 | 1920 | 960 | 4 | 19200 | 1280 | 1272 | 0 | 8* |
| 17 | 1920 | 960 | 4 | 19200 | 1280 | 1256 | 16 | 8* |

* If TFCI bits are not used, then DTX shall be used in TFCI field.

The pilot symbol pattern is described in table 18. The shadowed part can be used as frame synchronization words. (The symbol pattern of pilot symbols other than the frame synchronization word shall be "11"). In table 18, the transmission order is from left to right. (Each two-bit pair represents an I/Q pair of QPSK modulation.)

**Table 18: Pilot Symbol Pattern**

| | $N_{pilot}$ = 8 | | | | $N_{pilot}$ = 16 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol # | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Slot #0 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 10 |
| 1 | 11 | 00 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 11 | 11 | 00 |
| 2 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 10 | 11 | 00 |
| 3 | 11 | 00 | 11 | 00 | 11 | 00 | 11 | 00 | 11 | 01 | 11 | 10 |
| 4 | 11 | 10 | 11 | 01 | 11 | 10 | 11 | 01 | 11 | 11 | 11 | 11 |
| 5 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 10 | 11 | 01 | 11 | 01 |
| 6 | 11 | 11 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 10 | 11 | 11 |
| 7 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 00 |
| 8 | 11 | 01 | 11 | 10 | 11 | 01 | 11 | 10 | 11 | 00 | 11 | 11 |
| 9 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 00 | 11 | 11 |
| 10 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 11 | 11 | 10 |
| 11 | 11 | 10 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 00 | 11 | 10 |
| 12 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 00 | 11 | 01 | 11 | 01 |
| 13 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 00 |
| 14 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 11 | 11 | 10 | 11 | 01 |

For slot formats using TFCI, the TFCI value in each radio frame corresponds to a certain transport format combination of the FACHs and/or PCHs currently in use. This correspondence is (re-)negotiated at each FACH/PCH addition/removal. The mapping of the TFCI bits onto slots is described in [3].

### 5.3.3.6 Physical Downlink Shared Channel (PDSCH)

The Physical Downlink Shared Channel (PDSCH) is used to carry the Downlink Shared Channel (DSCH).

A PDSCH corresponds to a channelisation code below or at a PDSCH root channelisation code. A PDSCH is allocated on a radio frame basis to a single UE. Within one radio frame, UTRAN may allocate different PDSCHs under the same PDSCH root channelisation code to different UEs based on code multiplexing. Within the same radio frame, multiple parallel PDSCHs, with the same spreading factor, may be allocated to a single UE. This is a special case of multicode transmission. All the PDSCHs under the same PDSCH root channelisation code are operated with radio frame synchronisation.

PDSCHs allocated to the same UE on different radio frames may have different spreading factors.

The frame and slot structure of the PDSCH are shown on figure 20.

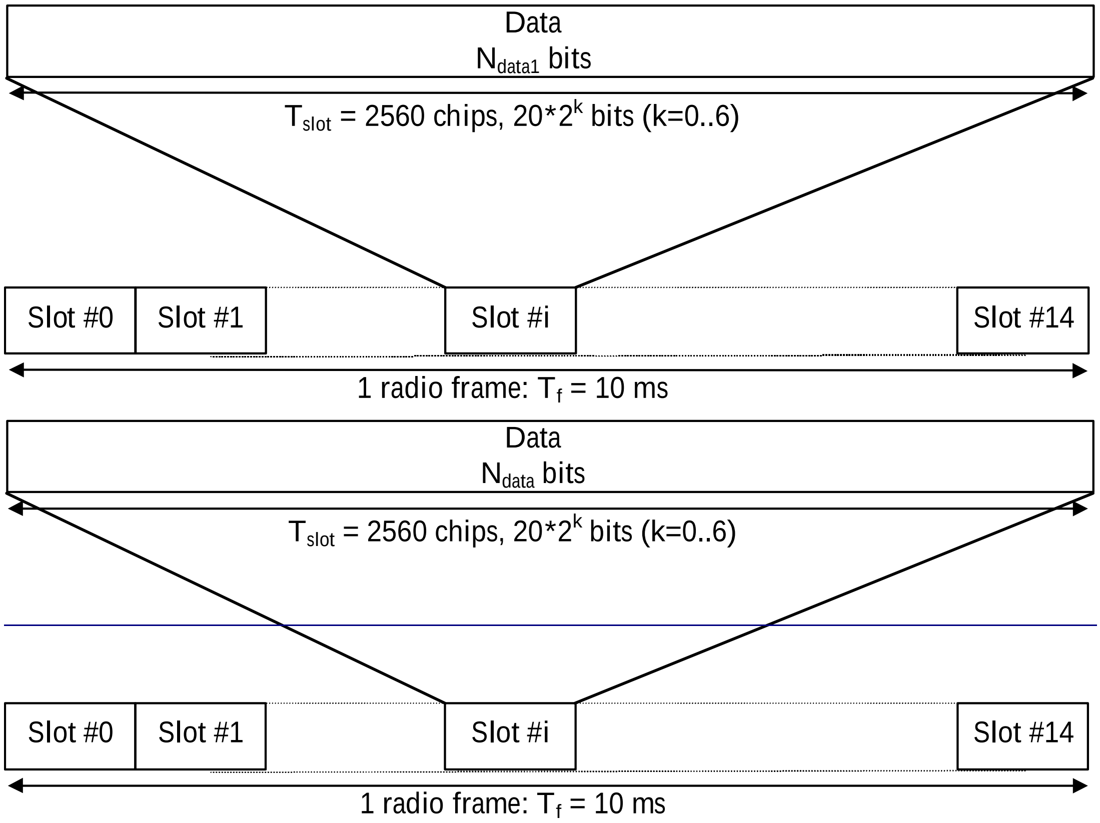


**Figure 20: Frame structure for the PDSCH**

For each radio frame, each PDSCH is associated with one downlink DPCH. The PDSCH and associated DPCH do not necessarily have the same spreading factors and are not necessarily frame aligned.

All relevant Layer 1 control information is transmitted on the DPCCH part of the associated DPCH, i.e. the PDSCH does not carry Layer 1 information. To indicate for UE that there is data to decode on the DSCH, the TFCI field of the associated DPCH shall be used.

The TFCI informs the UE of the instantaneous transport format parameters related to the PDSCH as well as the channelisation code of the PDSCH.

The channel bit rates and symbol rates for PDSCH are given in table 20.

For PDSCH the allowed spreading factors may vary from 256 to 4.

**Table 20: PDSCH fields**

| Slot format #i | Channel Bit Rate (kbps) | Channel Symbol Rate (ksps) | SF | Bits/ Frame | Bits/ Slot | $N_{data1}$ |
|---|---|---|---|---|---|---|
| 0 | 30 | 15 | 256 | 300 | 20 | 20 |
| 1 | 60 | 30 | 128 | 600 | 40 | 40 |
| 2 | 120 | 60 | 64 | 1200 | 80 | 80 |
| 3 | 240 | 120 | 32 | 2400 | 160 | 160 |
| 4 | 480 | 240 | 16 | 4800 | 320 | 320 |
| 5 | 960 | 480 | 8 | 9600 | 640 | 640 |
| 6 | 1920 | 960 | 4 | 19200 | 1280 | 1280 |

When open loop transmit diversity is employed for the PDSCH, STTD encoding is used on the data bits as described in subclause 5.3.1.1.1.

**3GPP TSG-RAN-WG1 Meeting #20**
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***R1-01-0497***

*CR-Form-v4*

# CHANGE REQUEST

| ⌘ 25.211 | CR 104 | ⌘ ev - ⌘ | Current version: 3.6.0 ⌘ |
|---|---|---|---|

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

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

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Correction of the representation of slot format |
| ***Source:*** | ⌘ | Panasonic |
| ***Work item code:*** | ⌘ | |
| ***Date:*** | ⌘ | 18, May, 2001 |
| ***Category:*** | ⌘ | **F** |
| ***Release:*** | ⌘ | REL-99 |

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

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

| | | |
|---|---|---|
| ***Reason for change:*** | ⌘ | The reference symbol from TS25.212 does not cover the case of P-CCPCH, S-CCPCH and PDSCH |
| ***Summary of change:*** | ⌘ | The number of data bits per downlink slot is always represented by $N_{data1}$ and $N_{data2}$. |
| ***Consequences if not approved:*** | ⌘ | Inconsistency of the number of data bits per downlink slot happens in case of P-CCPCH, S-CCPCH and PDSCH. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | 3, 5.3.3.3, 5.3.3.6, |
| ***Other specs affected:*** | ⌘ | [ ] Other core specifications ⌘<br>[ ] Test specifications<br>[ ] O&M Specifications |
| ***Other comments:*** | ⌘ | |

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# 3 Symbols and aAbbreviations

## 3.1 Symbols

$N_{data1}$ The number of data bits per downlink slot in Data1 field.

$N_{data2}$ The number of data bits per downlink slot in Data2 field. If the slot format does not contain a Data2 field, $N_{data2} = 0$.

## 3.2 Abbreviations

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

| | |
|---|---|
| AI | Acquisition Indicator |
| AICH | Acquisition Indicator Channel |
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| AP-AICH | Access Preamble Acquisition Indicator Channel |
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| CCPCH | Common Control Physical Channel |
| CCTrCH | Coded Composite Transport Channel |
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| PCH | Paging Channel |
| P-CCPCH | Primary Common Control Physical Channel |
| PCPCH | Physical Common Packet Channel |
| PDSCH | Physical Downlink Shared Channel |
| PICH | Page Indicator Channel |
| PRACH | Physical Random Access Channel |
| PSC | Primary Synchronisation Code |
| RACH | Random Access Channel |
| RNC | Radio Network Controller |
| S-CCPCH | Secondary Common Control Physical Channel |
| SCH | Synchronisation Channel |
| SF | Spreading Factor |
| SFN | System Frame Number |
| SI | Status Indicator |
| SSC | Secondary Synchronisation Code |
| STTD | Space Time Transmit Diversity |

| | |
|---|---|
| TFCI | Transport Format Combination Indicator |
| TSTD | Time Switched Transmit Diversity |
| TPC | Transmit Power Control |
| UE | User Equipment |
| UTRAN | UMTS Terrestrial Radio Access Network |

### 5.3.3.3 Primary Common Control Physical Channel (P-CCPCH)

The Primary CCPCH is a fixed rate (30 kbps, SF=256) downlink physical channels used to carry the BCH transport channel.

Figure 15 shows the frame structure of the Primary CCPCH. The frame structure differs from the downlink DPCH in that no TPC commands, no TFCI and no pilot bits are transmitted. The Primary CCPCH is not transmitted during the first 256 chips of each slot. Instead, Primary SCH and Secondary SCH are transmitted during this period (see subclause 5.3.3.4).

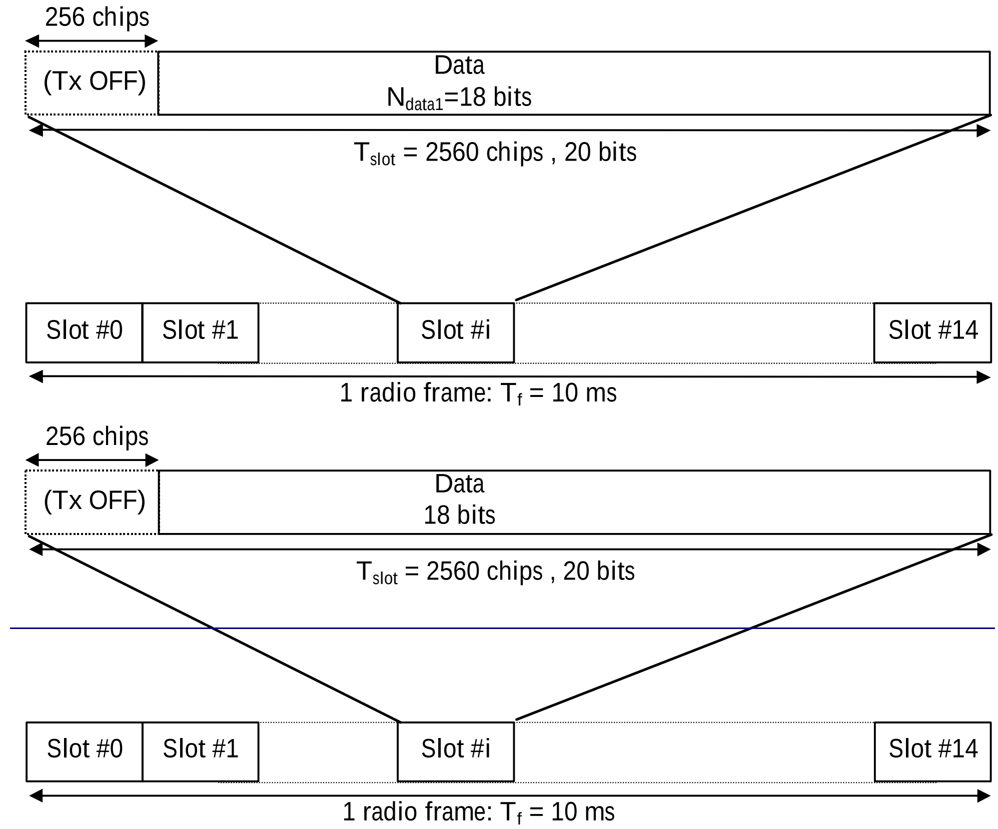


**Figure 15: Frame structure for Primary Common Control Physical Channel**

### 5.3.3.4 Secondary Common Control Physical Channel (S-CCPCH)

The Secondary CCPCH is used to carry the FACH and PCH. There are two types of Secondary CCPCH: those that include TFCI and those that do not include TFCI. It is the UTRAN that determines if a TFCI should be transmitted, hence making it mandatory for all UEs to support the use of TFCI. The set of possible rates for the Secondary CCPCH is the same as for the downlink DPCH, see subclause 5.3.2. The frame structure of the Secondary CCPCH is shown in figure 17.

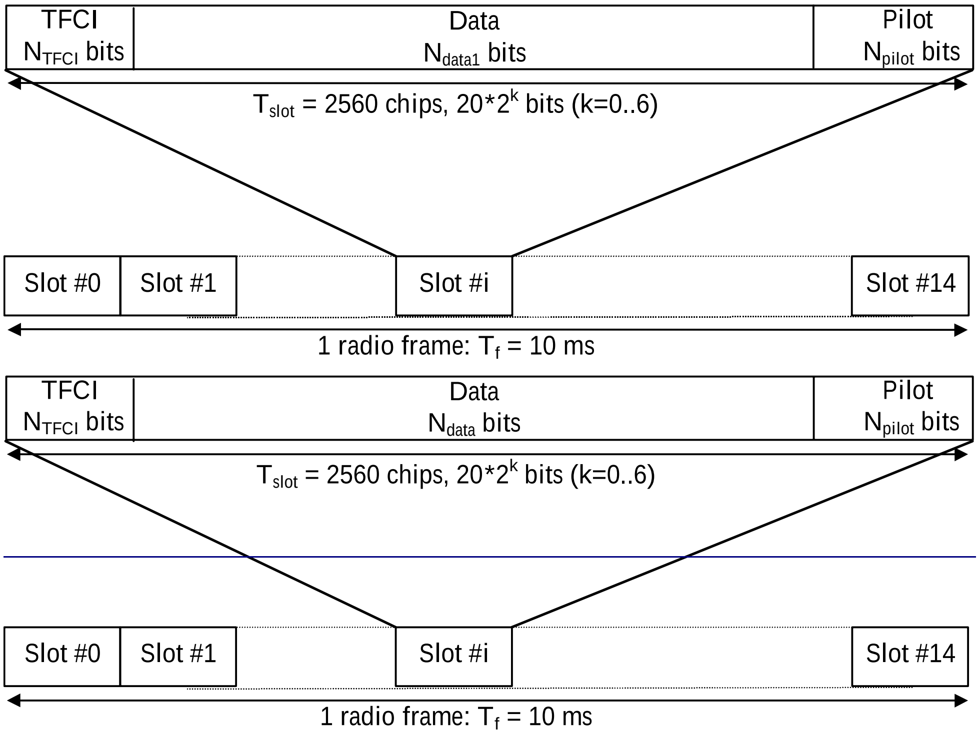


**Figure 17: Frame structure for Secondary Common Control Physical Channel**

The parameter k in figure 17 determines the total number of bits per downlink Secondary CCPCH slot. It is related to the spreading factor SF of the physical channel as $SF = 256/2^k$. The spreading factor range is from 256 down to 4.

The values for the number of bits per field are given in table 17. The channel bit and symbol rates given in table 17 are the rates immediately before spreading. The pilot patterns are given in table 18.

The FACH and PCH can be mapped to the same or to separate Secondary CCPCHs. If FACH and PCH are mapped to the same Secondary CCPCH, they can be mapped to the same frame. The main difference between a CCPCH and a downlink dedicated physical channel is that a CCPCH is not inner-loop power controlled. The main difference between the Primary and Secondary CCPCH is that the transport channel mapped to the Primary CCPCH (BCH) can only have a fixed predefined transport format combination, while the Secondary CCPCH support multiple transport format combinations using TFCI. Furthermore, a Primary CCPCH is transmitted over the entire cell while a Secondary CCPCH may be transmitted in a narrow lobe in the same way as a dedicated physical channel (only valid for a Secondary CCPCH carrying the FACH).

**Table 17: Secondary CCPCH fields**

| Slot Format #i | Channel Bit Rate (kbps) | Channel Symbol Rate (ksps) | SF | Bits/ Frame | Bits/ Slot | $N_{data1}$ | $N_{pilot}$ | $N_{TFCI}$ |
|---|---|---|---|---|---|---|---|---|
| 0 | 30 | 15 | 256 | 300 | 20 | 20 | 0 | 0 |
| 1 | 30 | 15 | 256 | 300 | 20 | 12 | 8 | 0 |
| 2 | 30 | 15 | 256 | 300 | 20 | 18 | 0 | 2 |
| 3 | 30 | 15 | 256 | 300 | 20 | 10 | 8 | 2 |
| 4 | 60 | 30 | 128 | 600 | 40 | 40 | 0 | 0 |
| 5 | 60 | 30 | 128 | 600 | 40 | 32 | 8 | 0 |
| 6 | 60 | 30 | 128 | 600 | 40 | 38 | 0 | 2 |
| 7 | 60 | 30 | 128 | 600 | 40 | 30 | 8 | 2 |
| 8 | 120 | 60 | 64 | 1200 | 80 | 72 | 0 | 8* |
| 9 | 120 | 60 | 64 | 1200 | 80 | 64 | 8 | 8* |
| 10 | 240 | 120 | 32 | 2400 | 160 | 152 | 0 | 8* |
| 11 | 240 | 120 | 32 | 2400 | 160 | 144 | 8 | 8* |
| 12 | 480 | 240 | 16 | 4800 | 320 | 312 | 0 | 8* |
| 13 | 480 | 240 | 16 | 4800 | 320 | 296 | 16 | 8* |
| 14 | 960 | 480 | 8 | 9600 | 640 | 632 | 0 | 8* |
| 15 | 960 | 480 | 8 | 9600 | 640 | 616 | 16 | 8* |
| 16 | 1920 | 960 | 4 | 19200 | 1280 | 1272 | 0 | 8* |
| 17 | 1920 | 960 | 4 | 19200 | 1280 | 1256 | 16 | 8* |

* If TFCI bits are not used, then DTX shall be used in TFCI field.

The pilot symbol pattern is described in table 18. The shadowed part can be used as frame synchronization words. (The symbol pattern of pilot symbols other than the frame synchronization word shall be "11"). In table 18, the transmission order is from left to right. (Each two-bit pair represents an I/Q pair of QPSK modulation.)

**Table 18: Pilot Symbol Pattern**

| | $N_{pilot}$ = 8 | | | | $N_{pilot}$ = 16 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Symbol # | 0 | 1 | 2 | 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Slot #0 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 10 |
| 1 | 11 | 00 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 11 | 11 | 00 |
| 2 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 10 | 11 | 00 |
| 3 | 11 | 00 | 11 | 00 | 11 | 00 | 11 | 00 | 11 | 01 | 11 | 10 |
| 4 | 11 | 10 | 11 | 01 | 11 | 10 | 11 | 01 | 11 | 11 | 11 | 11 |
| 5 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 10 | 11 | 01 | 11 | 01 |
| 6 | 11 | 11 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 10 | 11 | 11 |
| 7 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 00 |
| 8 | 11 | 01 | 11 | 10 | 11 | 01 | 11 | 10 | 11 | 00 | 11 | 11 |
| 9 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 00 | 11 | 11 |
| 10 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 01 | 11 | 11 | 11 | 10 |
| 11 | 11 | 10 | 11 | 11 | 11 | 10 | 11 | 11 | 11 | 00 | 11 | 10 |
| 12 | 11 | 10 | 11 | 00 | 11 | 10 | 11 | 00 | 11 | 01 | 11 | 01 |
| 13 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 00 |
| 14 | 11 | 00 | 11 | 11 | 11 | 00 | 11 | 11 | 11 | 10 | 11 | 01 |

For slot formats using TFCI, the TFCI value in each radio frame corresponds to a certain transport format combination of the FACHs and/or PCHs currently in use. This correspondence is (re-)negotiated at each FACH/PCH addition/removal. The mapping of the TFCI bits onto slots is described in [3].

## 5.3.3.6 Physical Downlink Shared Channel (PDSCH)

The Physical Downlink Shared Channel (PDSCH) is used to carry the Downlink Shared Channel (DSCH).

A PDSCH corresponds to a channelisation code below or at a PDSCH root channelisation code. A PDSCH is allocated on a radio frame basis to a single UE. Within one radio frame, UTRAN may allocate different PDSCHs under the same PDSCH root channelisation code to different UEs based on code multiplexing. Within the same radio frame, multiple parallel PDSCHs, with the same spreading factor, may be allocated to a single UE. This is a special case of multicode transmission. All the PDSCHs under the same PDSCH root channelisation code are operated with radio frame synchronisation.

PDSCHs allocated to the same UE on different radio frames may have different spreading factors.

The frame and slot structure of the PDSCH are shown on figure 20.

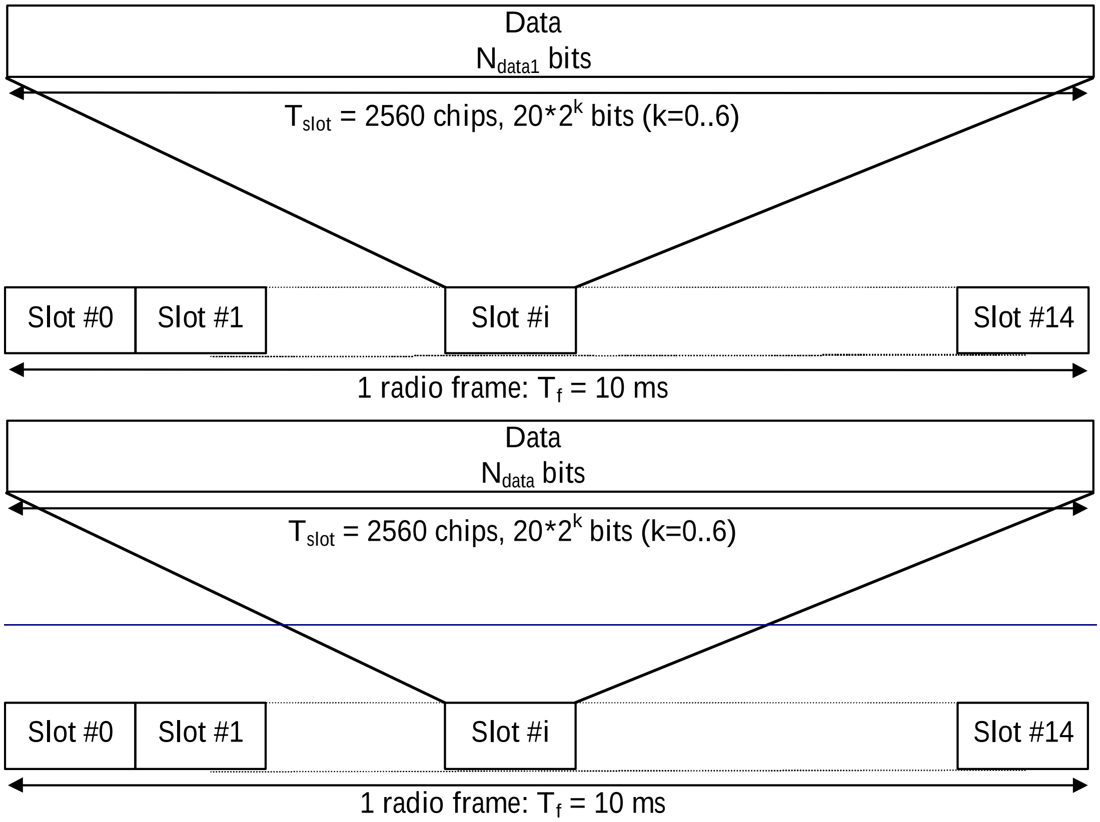


**Figure 20: Frame structure for the PDSCH**

For each radio frame, each PDSCH is associated with one downlink DPCH. The PDSCH and associated DPCH do not necessarily have the same spreading factors and are not necessarily frame aligned.

All relevant Layer 1 control information is transmitted on the DPCCH part of the associated DPCH, i.e. the PDSCH does not carry Layer 1 information. To indicate for UE that there is data to decode on the DSCH, the TFCI field of the associated DPCH shall be used.

The TFCI informs the UE of the instantaneous transport format parameters related to the PDSCH as well as the channelisation code of the PDSCH.

The channel bit rates and symbol rates for PDSCH are given in table 20.

For PDSCH the allowed spreading factors may vary from 256 to 4.

**Table 20: PDSCH fields**

| Slot format #i | Channel Bit Rate (kbps) | Channel Symbol Rate (ksps) | SF | Bits/ Frame | Bits/ Slot | $N_{data1}$ |
|---|---|---|---|---|---|---|
| 0 | 30 | 15 | 256 | 300 | 20 | 20 |
| 1 | 60 | 30 | 128 | 600 | 40 | 40 |
| 2 | 120 | 60 | 64 | 1200 | 80 | 80 |
| 3 | 240 | 120 | 32 | 2400 | 160 | 160 |
| 4 | 480 | 240 | 16 | 4800 | 320 | 320 |
| 5 | 960 | 480 | 8 | 9600 | 640 | 640 |
| 6 | 1920 | 960 | 4 | 19200 | 1280 | 1280 |

When open loop transmit diversity is employed for the PDSCH, STTD encoding is used on the data bits as described in subclause 5.3.1.1.1.