

CHANGE REQUEST		Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.
25.211	CR	001r1
GSM (AA.BB) or 3G (AA.BBB) specification number ↑		↑ CR number as allocated by MCC support team
For submission to: TSG-RAN #6	for approval <input checked="" type="checkbox"/>	strategic <input type="checkbox"/>
list expected approval meeting # here ↑	for information <input type="checkbox"/>	non-strategic <input type="checkbox"/> (for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG The latest version of this form is available from: <ftp://ftp.3gpp.org/Information/CR-Form-v2.doc>

Proposed change affects: (U)SIM ME UTRAN / Radio Core Network
(at least one should be marked with an X)

Source: Ericsson **Date:** 1999-11-19

Subject: Removal of superframe notation

Work item: TS25.211

Category:	F Correction <input checked="" type="checkbox"/> A Corresponds to a correction in an earlier release <input type="checkbox"/> B Addition of feature <input type="checkbox"/> C Functional modification of feature <input type="checkbox"/> D Editorial modification <input type="checkbox"/>	Release:	Phase 2 <input type="checkbox"/> Release 96 <input type="checkbox"/> Release 97 <input type="checkbox"/> Release 98 <input type="checkbox"/> Release 99 <input type="checkbox"/> Release 00 <input type="checkbox"/>
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(only one category shall be marked with an X)

Reason for change: From WG1 perspective there is no more need for the superframe concept in the Layer 1 specifications. Also WG2 has expressed no need for this. It is proposed to remove any reference to the superframe from Layer 1 FDD specifications. Note that it is still possible to uniquely identify any frame within a 40.96s window by means of a 12bit SFN (=System Frame Number) encoded on the P-CCPCH channel.

Clauses affected: 5., 5.2.1, 5.3.2, 5.3.3.1, 5.3.3.2, 5.3.3.3 and 5.3.3.5 of TS25.211

Other specs affected:	Other 3G core specifications <input type="checkbox"/> → List of CRs: Other GSM core specifications <input type="checkbox"/> → List of CRs: MS test specifications <input type="checkbox"/> → List of CRs: BSS test specifications <input type="checkbox"/> → List of CRs: O&M specifications <input type="checkbox"/> → List of CRs:	
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Other comments:



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

5 Physical channels

Physical channels typically consist of a ~~three-layered~~ structure of ~~superframes~~, radio frames, and time slots, although this is not true for all physical channels. Depending on the symbol rate of the physical channel, the configuration of radio frames or time slots varies.

~~Superframe: A Superframe has a duration of 720ms and consists of 72 radio frames. The superframe boundaries are defined by the System Frame Number (SFN):~~

~~————— The head radio frame of superframe : $SFN \bmod 72 = 0$.~~

~~————— The tail radio frame of superframe: $SFN \bmod 72 = 71$.~~

Radio frame: A Radio frame is a processing unit which consists of 15 time slots.

Time slot: A Time slot is a unit which consists of fields containing bits. The number of bits per time slot depends on the physical channel.

5.1 The physical resource

The basic physical resource is the code/frequency plane. In addition, on the uplink, different information streams may be transmitted on the I and Q branch. Consequently, a physical channel corresponds to a specific carrier frequency, code, and, on the uplink, relative phase (0 or $\pi/2$).

5.2 Uplink physical channels

5.2.1 Dedicated uplink physical channels

There are two types of uplink dedicated physical channels, the uplink Dedicated Physical Data Channel (uplink DPDCH) and the uplink Dedicated Physical Control Channel (uplink DPCCH).

The DPDCH and the DPCCH are I/Q code multiplexed within each radio frame (see [4]).

The uplink DPDCH is used to carry dedicated data generated at Layer 2 and above, i.e. the dedicated transport channel (DCH). There may be zero, one, or several uplink DPDCHs on each Layer 1 connection.

The uplink DPCCH is used to carry control information generated at Layer 1. The Layer 1 control information consists of known pilot bits to support channel estimation for coherent detection, transmit power-control (TPC) commands, feedback information (FBI), and an optional transport-format combination indicator (TFCI). The transport-format combination indicator informs the receiver about the instantaneous parameters of the different transport channels multiplexed on the uplink DPDCH, and corresponds to the data transmitted in the same frame. 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 in the uplink. There is one and only one uplink DPCCH on each Layer 1 connection.

Figure 1 shows the frame structure of the uplink dedicated physical channels. Each frame of length 10 ms is split into 15 slots, each of length $T_{\text{slot}} = 2560$ chips, corresponding to one power-control period. ~~A super frame corresponds to 72 consecutive frames, i.e. the super frame length is 720 ms.~~

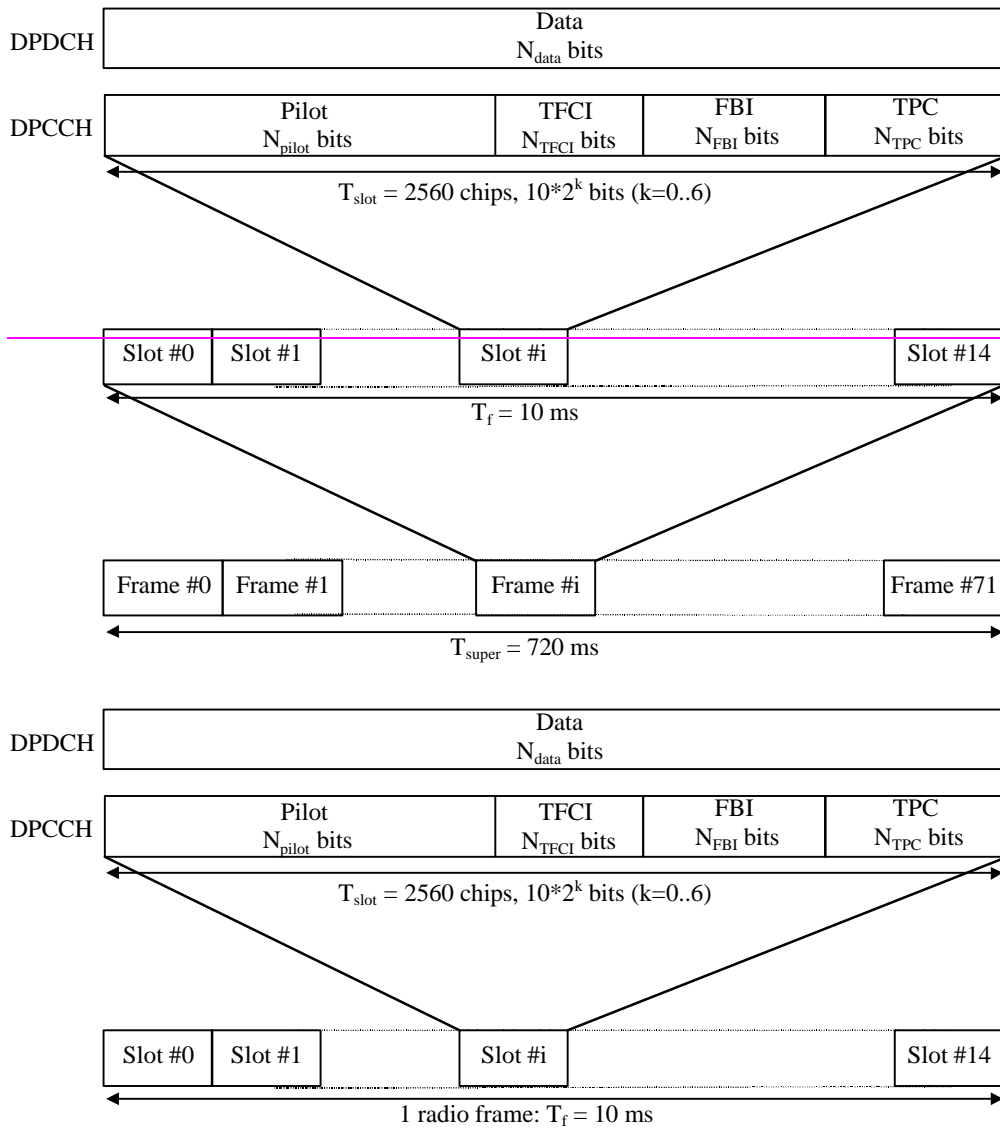


Figure 1: Frame structure for uplink DPDCH/DPCCH

The parameter k in figure 1 determines the number of bits per uplink DPDCH/DPCCH slot. It is related to the spreading factor SF of the physical channel as $SF = 256/2^k$. The DPDCH spreading factor may thus range from 256 down to 4. Note that an uplink DPDCH and uplink DPCCH on the same Layer 1 connection generally are of different rates, i.e. have different spreading factors and different values of k .

The exact number of bits of the different uplink DPCCH fields (N_{pilot} , N_{TFCI} , N_{FBI} , and N_{TPC}) is determined in table 2. The field order and total number of bits/slot are fixed, though the number of bits per field may vary during a connection.

The values for the number of bits per field are given in table 1 and table 2. The channel bit and symbol rates given in table 1 are the rates immediately before spreading. The pilot patterns are given in table 3 and table 4, the TPC bit pattern is given in table 5.

The N_{FBI} bits are used to support techniques requiring feedback between the UE and the UTRAN Access Point (=cell transceiver), including closed loop mode transmit diversity and site selection diversity (SSDT). The exact details of the FBI field are shown in figure 2 and described below.

5.3.2 Dedicated downlink physical channels

There is only one type of downlink dedicated physical channel, the Downlink Dedicated Physical Channel (downlink DPCH).

Within one downlink DPCH, dedicated data generated at Layer 2 and above, i.e. the dedicated transport channel (DCH), is transmitted in time-multiplex with control information generated at Layer 1 (known pilot bits, TPC commands, and an optional TFCI). The downlink DPCH can thus be seen as a time multiplex of a downlink DPDCH and a downlink DPCCH, compare section 5.2.1. 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 in the downlink.

Figure 10 shows the frame structure of the downlink DPCH. Each frame of length 10 ms is split into 15 slots, each of length $T_{slot} = 2560$ chips, corresponding to one power-control period. *A super frame corresponds to 72 consecutive frames, i.e. the super frame length is 720 ms.*

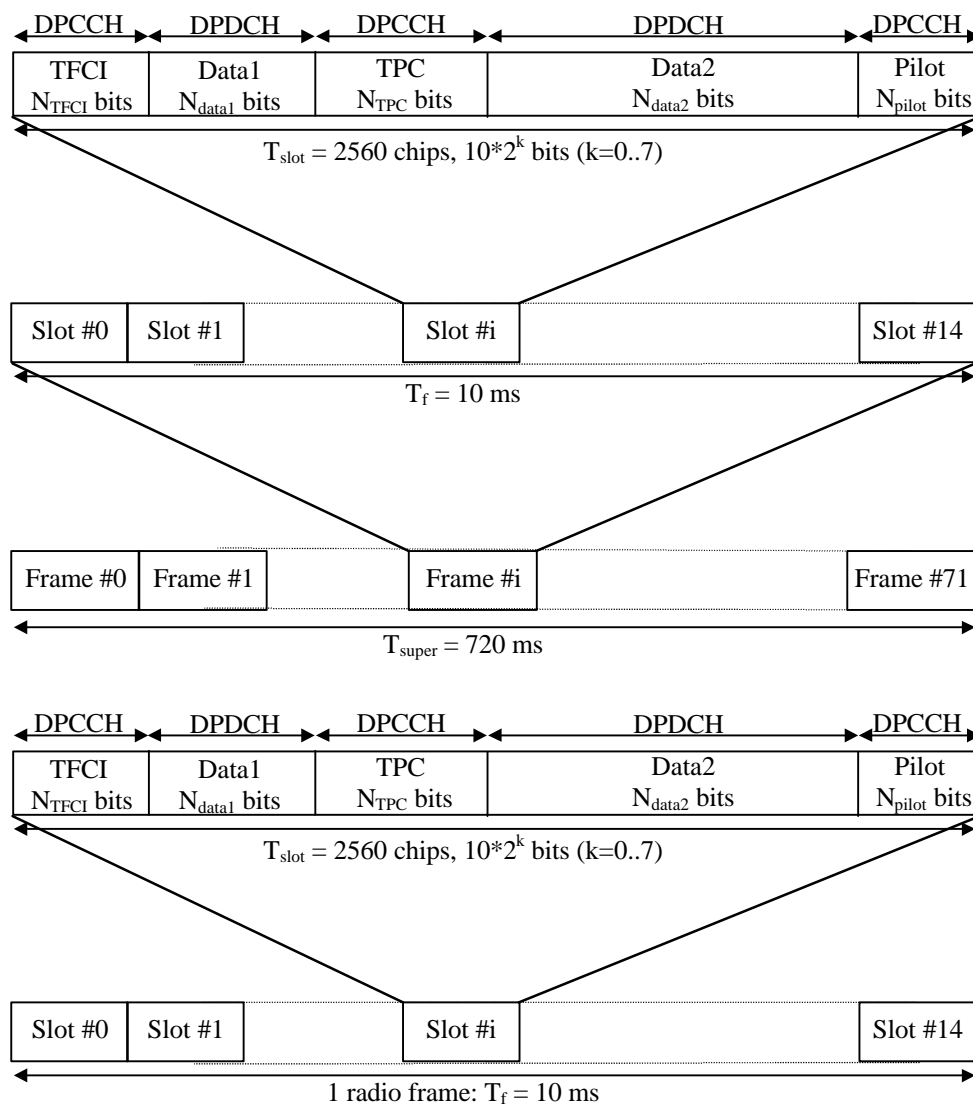


Figure 10: Frame structure for downlink DPCH

The parameter k in figure 10 determines the total number of bits per downlink DPCH slot. It is related to the spreading factor SF of the physical channel as $SF = 512/2^k$. The spreading factor may thus range from 512 down to 4.

The exact number of bits of the different downlink DPCH fields (N_{pilot} , N_{TPC} , N_{TFCI} , N_{data1} and N_{data2}) is determined in table 11. The overhead due to the DPCCH transmission has to be negotiated at the connection set-up and can be re-negotiated during the communication, in order to match particular propagation conditions.

5.3.3 Common downlink physical channels

5.3.3.1 Common Pilot Channel (CPICH)

The CPICH is a fixed rate (30 kbps, SF=256) downlink physical channel that carries a pre-defined bit/symbol sequence. Figure 13 shows the frame structure of the CPICH.

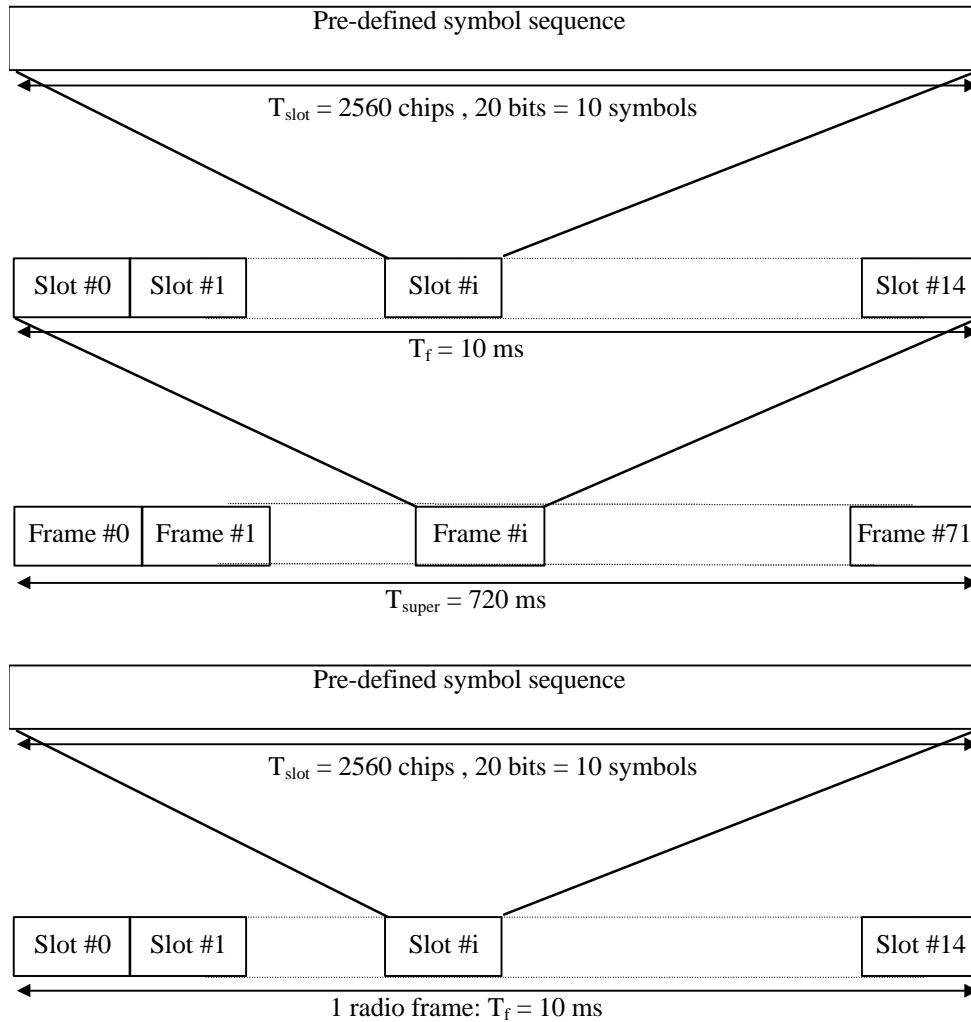


Figure 13: Frame structure for Common Pilot Channel

In case of Transmit Diversity (open or closed loop), the CPICH should be transmitted from both antennas using the same channelization and scrambling code. In this case, the pre-defined symbol sequence of the CPICH is different for Antenna 1 and Antenna 2, see figure 14. In case of no Transmit Diversity, the symbol sequence of Antenna 1 in figure 14 is used.

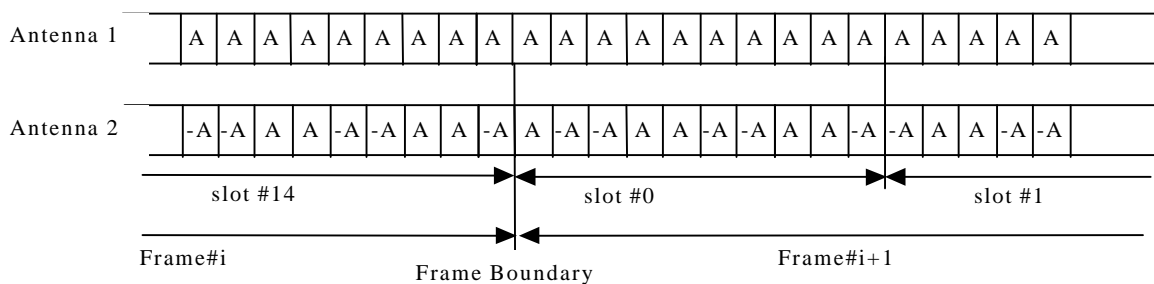


Figure 14: Modulation pattern for Common Pilot Channel (with $A = 1+j$)

5.3.3.2 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.

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 section 5.3.3.4).

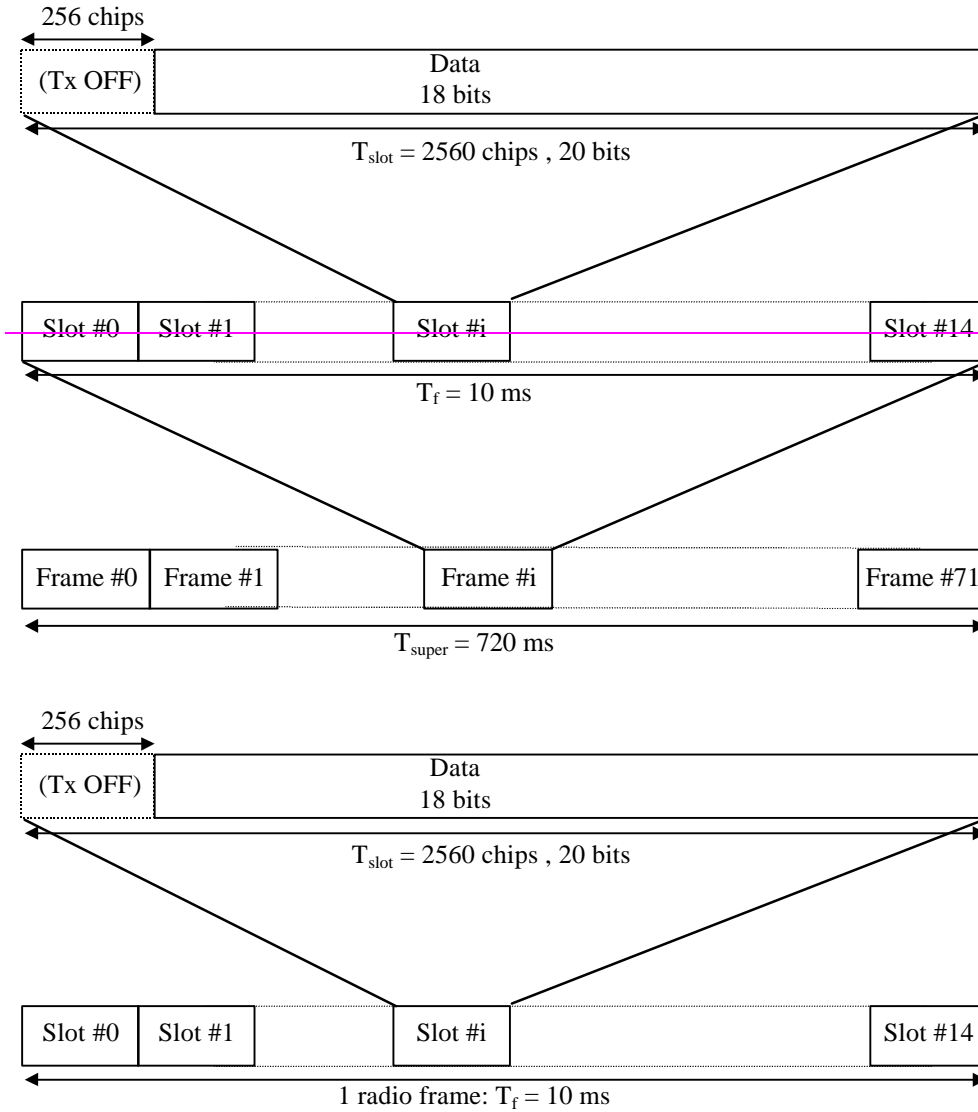


Figure 15: Frame structure for Primary Common Control Physical Channel

5.3.3.3 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 is the same as for the downlink DPCCH, see section 5.3.2. The frame structure of the Secondary CCPCH is shown in figure 17.

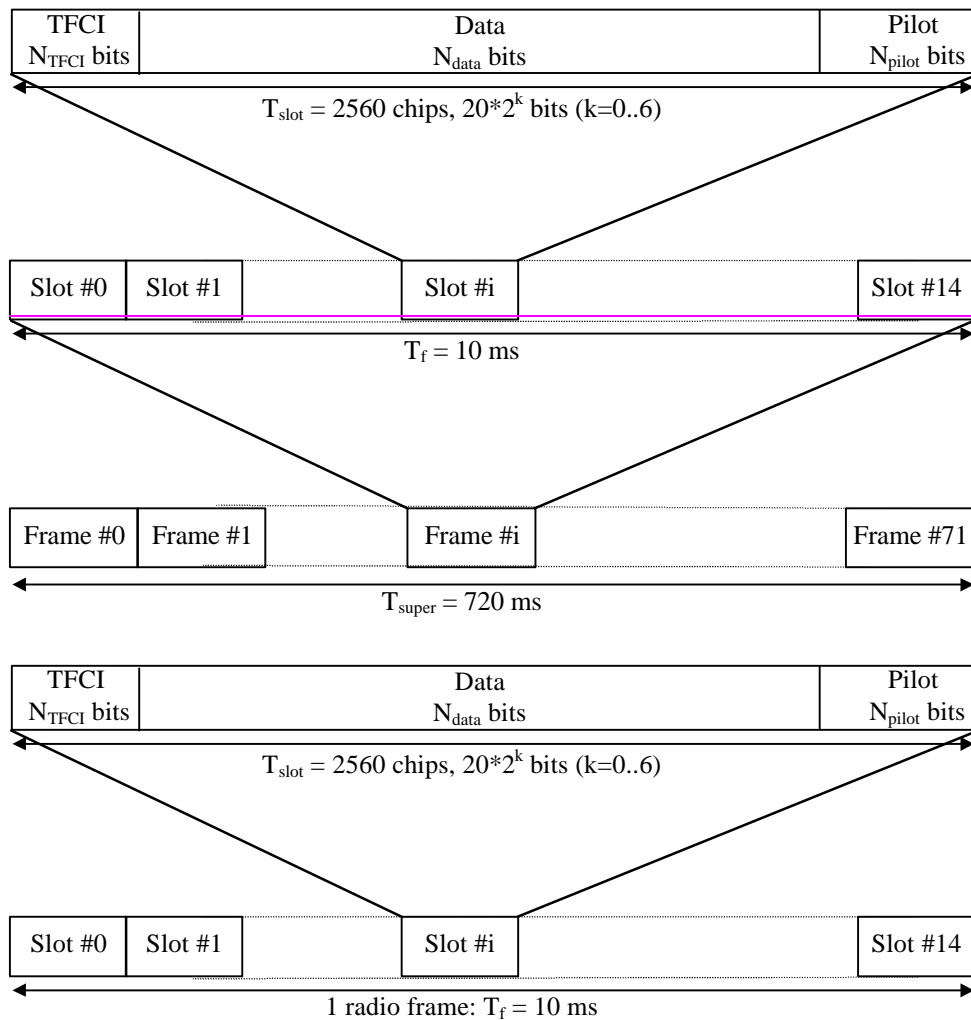


Figure 17: Frame structure for Secondary Common Control Physical Channel

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 16 and table 17. The channel bit and symbol rates given in table 16 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 Primary CCPCH has a fixed predefined rate while the Secondary CCPCH can support variable rate with the help of the TFCI field included. Furthermore, a Primary CCPCH is continuously transmitted over the entire cell while a Secondary CCPCH is only transmitted when there is data available and 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).

5.3.3.5 Physical Downlink Shared Channel (PDSCH)

The Physical Downlink Shared Channel (PDSCH), used to carry the Downlink Shared Channel (DSCH), is shared by users based on code multiplexing. As the DSCH is always associated with a DCH, the PDSCH is always associated with a downlink DPCH.

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

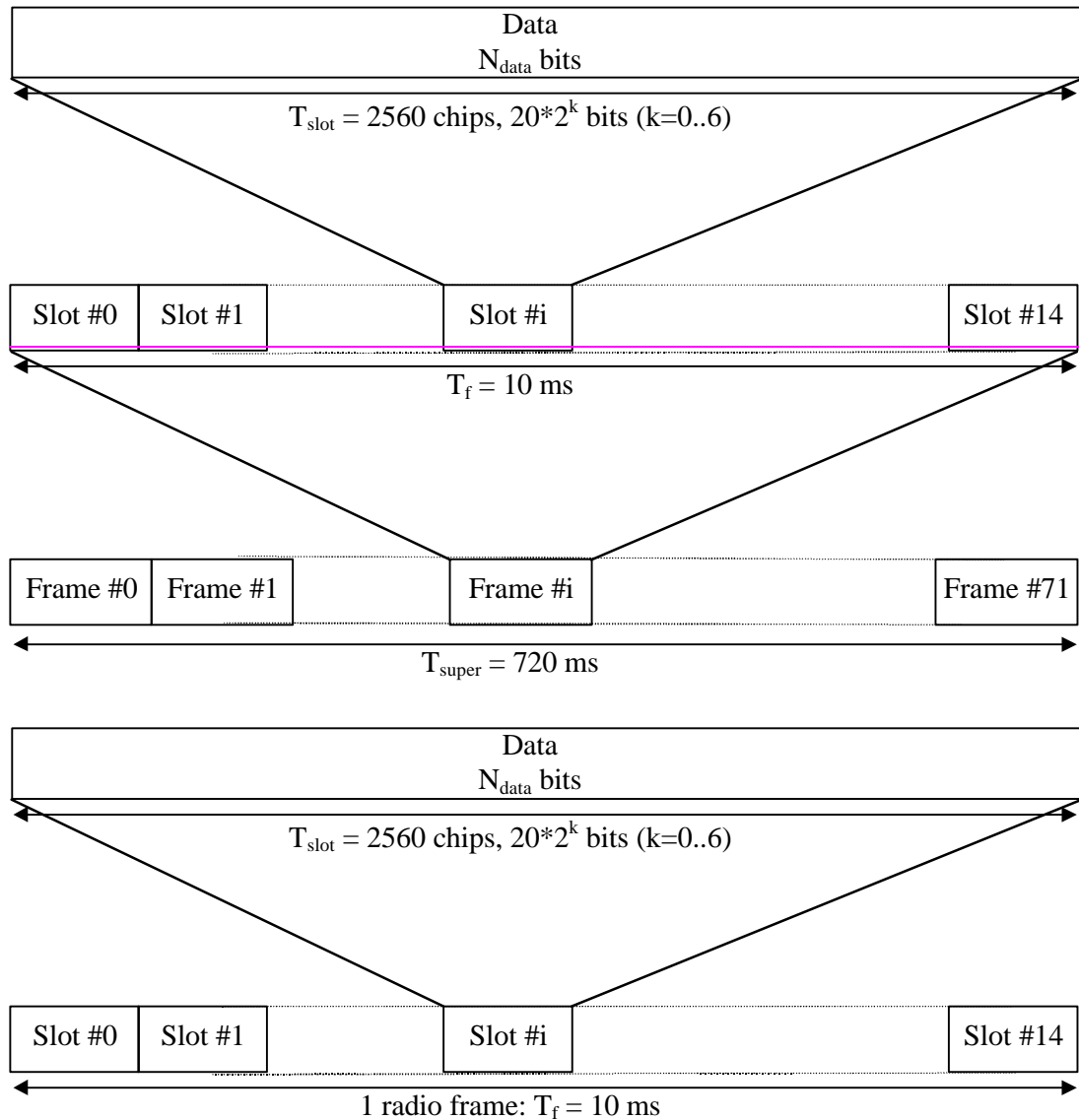


Figure 20: Frame structure for the PDSCH

To indicate for UE that there is data to decode on the DSCH, two signalling methods are possible, either using the TFCI field, or higher layer signalling.

The PDSCH transmission with associated DPCH is a special case of multicode transmission. The PDSCH and DPCH do not have necessarily the same spreading factors and for PDSCH the spreading factor may vary from frame to frame. The relevant Layer 1 control information is transmitted on the DPCCCH part of the associated DPCH, the PDSCH does not contain physical layer information. The channel bit and symbol rates for PDSCH are given in table 20.

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

If the spreading factor and other physical layer parameters can vary on a frame-by-frame basis, the TFCI shall be used to inform the UE what are the instantaneous parameters of PDSCH including the channelisation code from the PDSCH OVSF code tree.