TSG-RAN Meeting #11 ***RP-010062***
Palm Springs, CA, U.S.A., 13-16 March 2001

Title: **Agreed CRs to TS 25.221**

Source: **TSG-RAN WG1**

Agenda item: **5.1.3**

No.	R1 T-doc	Spec	CR	Rev	Subject	Cat	V_old	V_new
1	R1-01-0350	25.221	033	2	Correction to SCH section	F	3.5.0	3.6.0
2	R1-01-0019	25.221	037	1	Bit Scrambling for TDD	F	3.5.0	3.6.0
3	R1-01-0111	25.221	039	1	Corrections of PUSCH and PDSCH	F	3.5.0	3.6.0
4	R1-01-0021	25.221	040	-	Alteration of SCH offsets to avoid overlapping Midamble	F	3.5.0	3.6.0
5	R1-01-0022	25.221	041	-	Clarifications & Corrections for TS25.221	F	3.5.0	3.6.0
6	R1-01-0379	25.221	045	1	Corrections on the PRACH and clarifications on the midamble generation and the behaviour in case of an invalid TFI combination on the DCHs	F	3.5.0	3.6.0
7	R1-01-0265	25.221	046	-	Clarification of TFCI transmission	F	3.5.0	3.6.0
8	R1-01-0341	25.221	048	-	Corrections to Table 5.b “Timeslot formats for the Uplink”	F	3.5.0	3.6.0

3GPP TSG RAN Meeting #11
Palm Springs, CA, U.S.A., March 13-16, 2001

R1-01-0350

CR-Form-v3

CHANGE REQUEST

⌘	**25.221**	**CR**	**033**	⌘ rev	**2**	⌘ Current version:	**3.5.0**	⌘

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

Title:	⌘	Correction to SCH section		
Source:	⌘	TSG RAN WG1		
Work item code:	⌘		***Date:*** ⌘	February 20, 2001
Category:	⌘	**F**	***Release:*** ⌘	R99
		Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	The description of SCH codes power distribution is misleading
Summary of change:	⌘	Fig. 14 is redrawn to show correct power distribution of SCH codes. Indexing is added to t_{offset} to indicate that it is cell dependent.
Consequences if not approved:	⌘	Misleading information on SCH power distribution in the specification

Clauses affected:	⌘	5.3.4, 6.2.1		
Other specs affected:	⌘	[ ] Other core specifications	⌘	
		[ ] Test specifications		
		[ ] O&M Specifications		
Other comments:	⌘			

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version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

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

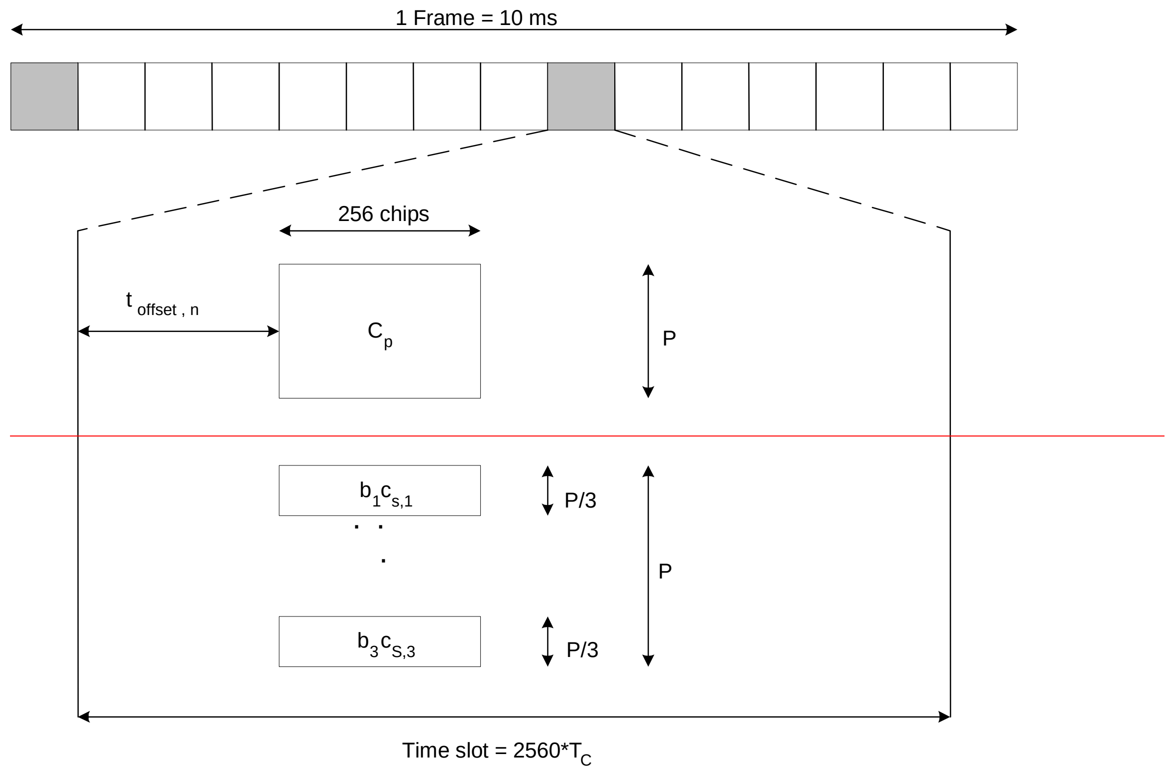
5.3.4 The synchronisation channel (SCH)

In TDD mode code group of a cell can be derived from the synchronisation channel. In order not to limit the uplink/downlink asymmetry the SCH is mapped on one or two downlink slots per frame only.
There are two cases of SCH and P-CCPCH allocation as follows:

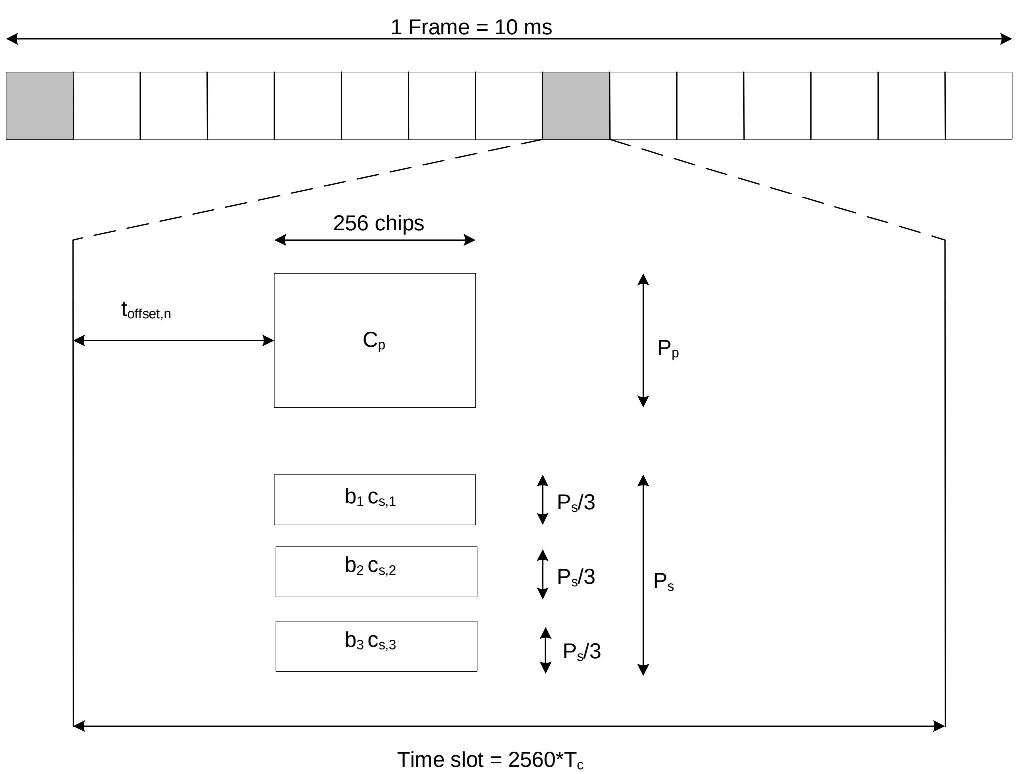
Case 1) SCH and P-CCPCH allocated in TS#k, k=0….14

Case 2) SCH allocated in two TS: TS#k and TS#k+8, k=0…6; P-CCPCH allocated in TS#k.

The position of SCH (value of k) in frame can change on a long term basis in any case.
Due to this SCH scheme, the position of P-CCPCH is known from the SCH.
Figure 14 is an example for transmission of SCH, k=0, of Case 2.



$C_{s,i} \in \{C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15}\}$, i=1,2,3; see [8]



$b_i \in \{\pm 1, \pm j\}$, $C_{s,i} \in \{C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15}\}$, i=1,2,3; see [8]

Figure 14: Scheme for Synchronisation channel SCH consisting of one primary sequence C_p and 3 parallel secondary sequences $C_{s,i}$ in slot k and k+8 (example for k=0 in Case 2)

As depicted in figure 14, the SCH consists of a primary and three secondary code sequences ~~with~~ each 256 chips ~~length~~long. The primary and secondary code sequences are defined in [8] clause 7 'Synchronisation codes'.

Due to mobile to mobile interference, it is mandatory for public TDD systems to keep synchronisation between base stations. As a consequence of this, a capture effect concerning SCH can arise. The time offset $t_{offset,n}$ enables the system to overcome the capture effect.

The time offset $t_{offset,n}$ is one of 32 values, depending on the ~~cell parameter, thus on the~~ code group of the cell, n, cf. 'table 6 Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and t_{offset}' in [8]. Note that the cell parameter will change from frame to frame, cf. 'Table 7 Alignment of cell parameter cycling and system frame number' in [8], but the cell will belong to only one code group and thus have one time offset $t_{offset,n}$.The exact value for $t_{offset,n}$, regarding column 'Associated t_{offset}' in table 6 in [8] is given by:

$$t_{offset,n} = n \cdot T_c \left\lfloor \frac{2560-96-256}{31} \right\rfloor$$
$$= n \cdot 71T_c \ ; \quad n = 0,\ldots,31$$

Please note that $\lfloor x \rfloor$ denotes the largest integer number less or equal to x and that T_c denotes the chip duration.

6.2.1 The Broadcast Channel (BCH)

The BCH is mapped onto the P-CCPCH. The secondary SCH codes indicates in which timeslot a mobile can find the P-CCPCH containing BCH.

3GPP TSG RAN Meeting #11
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R1-01-0019

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CHANGE REQUEST

⌘	**TS25.221**	**CR 037**	⌘	rev	**1**	⌘	Current version:	**3.5.0** ⌘

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

Title:	⌘	Bit Scrambling for TDD		
Source:	⌘	TSG RAN WG1		
Work item code:	⌘		***Date:*** ⌘	10.1.01
Category:	⌘	**F**	***Release:*** ⌘	R99
		Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	In specific situations, when the transmitted data contain a lot of the same symbols the data bursts will contain a DC offset that leads to not acceptable degradations in the link level performance if it is discarded.
Summary of change:	⌘	Bit Scrambling is used to avoid possible DC offsets. This affects the PICH section which has been redrafted.
Consequences if not approved:	⌘	Not tolerable restrictions in implementation or not acceptable degradations in the link level performance.

Clauses affected:	⌘	5.3.7		
Other specs affected:	⌘	[X] Other core specifications	⌘	CR222-051r1
		[ ] Test specifications		
		[ ] O&M Specifications		
Other comments:	⌘			

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

5.3.7 The Paging Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

5.3.7.1 Mapping of Paging Indicators to the PICH bits

Figure 15 depicts the structure of a PICH burst and the numbering of the bits within the burst. The same burst type is used for the PICH in every cell. N_{PIB} bits in a normal burst of type 1 or 2 are used to carry the paging indicators, where N_{PIB} depends on the burst type: N_{PIB}=240 for burst type 1 and N_{PIB}=272 for burst type 2. The bits $b_{NPIB}$$s_{NPIB+1}$,…, $b_{NPIB}$$s_{NPIB+4+3}$ adjacent to the midamble are reserved for possible future use. They shall be set to 0 and transmitted with the same power as the paging indicator carrying bits.

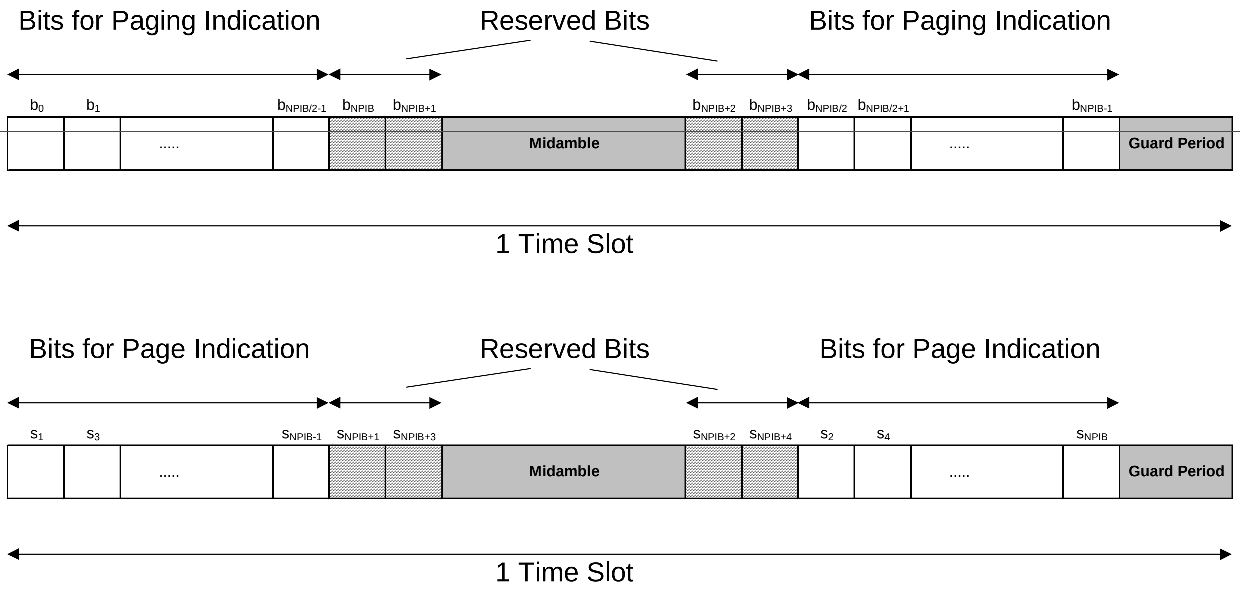


Figure 15: Transmission and numbering of paging indicator carrying bits in a PICH burst

Each paging indicator P_q in one time slot is mapped to the bits $\{s_{2L_{pi}*q+1},\ldots,s_{2L_{pi}*(q+1)}\}$ within this time slot. Thus, due to the interleaved transmission of the bits half of the symbols used for each paging indicator are transmitted in the first data part, and the other half of the symbols are transmitted in the second data part, as exemplary shown in figure 17 for a paging indicator length L_{PI} of 4 symbols.

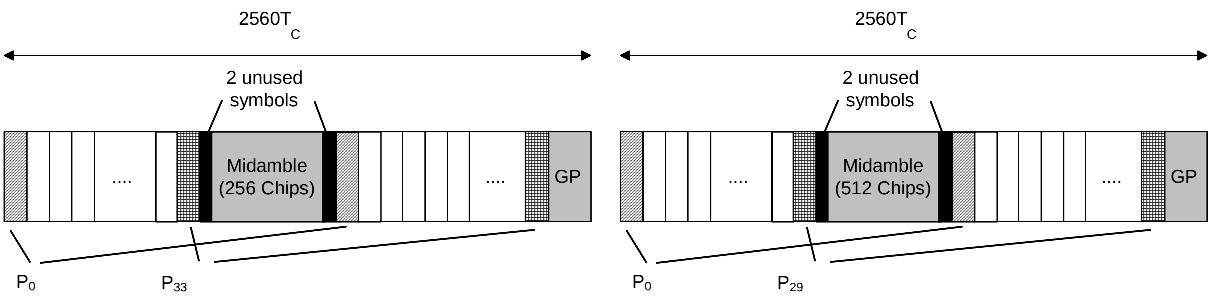


Figure 16: Example of mapping of paging indicators on PICH bits for L_{PI}=4

The setting of the paging indicators and the corresponding PICH bits (including the reserved ones) is described in [7].

In each radio frametime slot, N_{PI} paging indicators are transmitted, using L_{PI}=2, L_{PI}=4 or L_{PI}=8 symbols. L_{PI} is called the paging indicator length. The number of paging indicators N_{PI} per time slotradio frame is given by the paging indicator length and the burst type, which are both known by higher layer signalling. In table 8 this number is shown for the different possibilities of burst types and paging indicator lengths.

Table 8: Number N_{PI} of paging indicators per time slot for the different burst types and paging indicator lengths L_{PI}

	L_{PI}=2	L_{PI}=4	L_{PI}=8
Burst Type 1	N_{PI}=60	N_{PI}=30	N_{PI}=15
Burst Type 2	N_{PI}=68	N_{PI}=34	N_{PI}=17

5.3.7.2 Structure of the PICH over multiple radio frames

As shown in figure 16, the paging indicators of N_{PICH} consecutive frames form a PICH block, N_{PICH} is configured by higher layers. Thus, $N_P=N_{PICH}*N_{PI}$ paging indicators are transmitted in each PICH block.

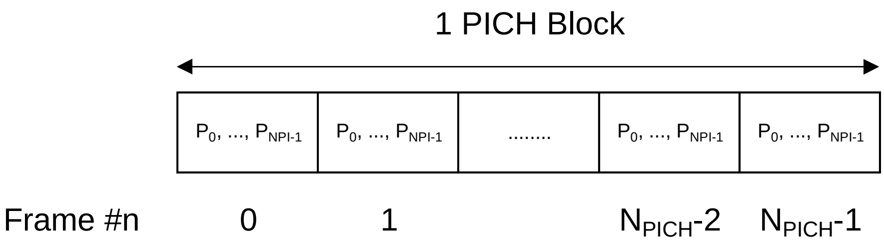


Figure 176: Structure of a PICH block

The value PI (PI = 0, ..., N_P-1) calculated by higher layers for use for a certain UE, see [15], is associated to the paging indicator P_q in the nth frame of one PICH block, where q is given by

$$q = PI \bmod N_{PI}$$

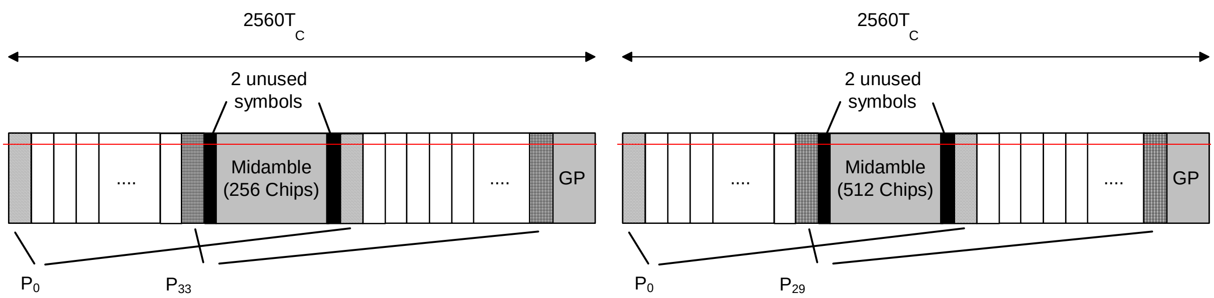
and n is given by

$$n = PI \operatorname{div} N_{PI}.$$

The PI bitmap in the PCH data frames over Iub contains indication values for all possible higher layer PI values, see [16]. Each bit in the bitmap indicates if the paging indicator P_q associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formulas above is to be performed in Node B to make the association between PI and P_q.

~~The paging indicator P_q in one time slot is mapped to the bits $\{b_{Lpi*q},\dots,b_{Lpi*q+Lpi-1},b_{NPIB/2+Lpi*q},\dots,b_{NPIB/2+Lpi*q+Lpi-1}\}$ within this time slot, as exemplary shown in figure 17. Thus, half of the L_{PI} symbols used for each paging indicator are transmitted in the first data part, and the other half of the L_{PI} symbols are transmitted in the second data part.~~

~~The coding of the paging indicator P_q is given in [7].~~



~~Figure 17: Example of mapping of paging indicators on PICH bits for L_{PI}=4~~

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Palm Springs, CA, U.S.A., March 13-16, 2001

R1-01-0111

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CHANGE REQUEST

⌘	**25.221**	**CR**	**039**	⌘ rev	**1**	⌘ Current version:	**3.5.0** ⌘

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

Title: ⌘	Corrections of PUSCH and PDSCH			
Source: ⌘	TSG RAN WG1			
Work item code: ⌘		***Date:*** ⌘	17 Jan. 2001	
Category: ⌘	**F**	***Release:*** ⌘	R99	
	Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*	

Reason for change: ⌘	The actual specification is incomplete with respect to the description of the PUSCH and PDSCH in TDD. More specifically, spreading, burst types and training sequences are not specified. Also, it is not clear wheather Tx diversity may be applied to the PDSCH or not.
Summary of change: ⌘	The CR defines the spreading to be applied to PUSCH and PDSCH. It also describes the burst types and training sequences to be used for these channels.
Consequences if not approved: ⌘	Based on the actual specification it is not possible to implement the PUSCH and PDSCH.

Clauses affected: ⌘	5.3.5, 5.3.6, 5.4	
Other specs affected: ⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications	
Other comments: ⌘		

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5.3.5 Physical Uplink Shared Channel (PUSCH)

The USCH as desribed in subclause 4.1.2 is mapped onto one or more physical uplink shared channels (PUSCH). Timing advance, as described in [9], subclause 4.3, is applied to the PUSCH.

~~For Physical Uplink Shared Channel (PUSCH) the burst structure of DPCH as described in subclause 5.2 shall be used. User specific physical layer parameters like power control, timing advance or directive antenna settings are derived from the associated channel (FACH or DCH). PUSCH provides the possibility for transmission of TFCI in uplink.~~

5.3.5.1 PUSCH Spreading

The spreading factors that can be applied to the PUSCH are SF = 1, 2, 4, 8, 16 as described in subclause 5.2.1.2.

5.3.5.2 PUSCH Burst Types

Burst types 1, 2 or 3 as described in subclause 5.2.2 can be used for PUSCH. TFCI and TPC can be transmitted on the PUSCH.

5.3.5.3 PUSCH Training Sequences

The training sequences as desribed in subclause 5.2.3 are used for the PUSCH.

5.3.5.4 UE Selection

The UE that shall transmit on the PUSCH is selected by higher layer signalling.

5.3.6 Physical Downlink Shared Channel (PDSCH)

The DSCH as desribed in subclause 4.1.2 is mapped onto one or more physical downlink shared channels (PDSCH).

~~For Physical Downlink Shared Channel (PDSCH) the burst structure of DPCH as described in subclause 5.2 shall be used. User specific physical layer parameters like power control or directive antenna settings are derived from the associated channel (FACH or DCH). PDSCH provides the possibility for transmission of TFCI in downlink.~~

5.3.6.1 PDSCH Spreading

The PDSCH uses either spreading factor SF = 16 or SF = 1 as described in subclause 5.2.1.1.

5.3.6.2 PDSCH Burst Types

Burst types 1 or 2 as described in subclause 5.2.2 can be used for PDSCH. TFCI can be transmitted on the PDSCH.

5.3.6.3 PDSCH Training Sequences

The training sequences as described in subclause 5.2.3 are used for the PDSCH.

5.3.6.4 UE Selection

To indicate to the UE that there is data to decode on the DSCH, three signalling methods are available:

1) using the TFCI field of the associated channel or PDSCH;

2) using on the DSCH user specific midamble derived from the set of midambles used for that cell;

3) using higher layer signalling.

When the midamble based method is used, the UE specific midamble allocation method shall be employed (see subclause 5.6), and the UE shall decode the PDSCH if the PDSCH was transmitted with the midamble assigned to the

UE by UTRAN~~, see 5.5.1.1.2~~. For this method no other physical channels may use the same time slot as the PDSCH and only one UE may share the PDSCH time slot within one TTI~~at the same time~~.

Note: From the above mentioned signalling methods, only the higher layer signalling method is supported by higher layers in R99.

5.3.7 The Paging Indicator Channel (PICH)

The Paging Indicator Channel (PICH) is a physical channel used to carry the paging indicators.

Figure 15 depicts the structure of a PICH burst and the numbering of the bits within the burst. The same burst type is used for the PICH in every cell. N_{PIB} bits in a normal burst of type 1 or 2 are used to carry the paging indicators, where N_{PIB} depends on the burst type: N_{PIB}=240 for burst type 1 and N_{PIB}=272 for burst type 2. The bits b_{NPIB},..., b_{NPIB+3} adjacent to the midamble are reserved for possible future use. They shall be set to 0 and transmitted with the same power as the paging indicator carrying bits.

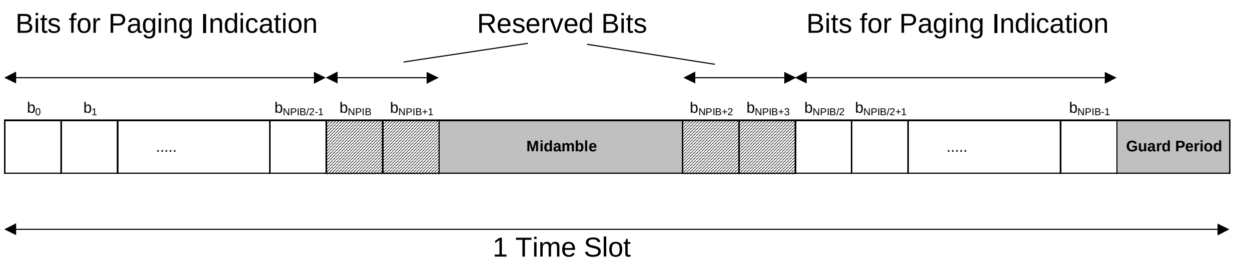

Figure 15: Transmission and numbering of paging indicator carrying bits in a PICH burst

In each time slot, N_{PI} paging indicators are transmitted, using L_{PI}=2, L_{PI}=4 or L_{PI}=8 symbols. L_{PI} is called the paging indicator length. The number of paging indicators N_{PI} per time slot is given by the paging indicator length and the burst type, which are both known by higher layer signalling. In table 8 this number is shown for the different possibilities of burst types and paging indicator lengths.

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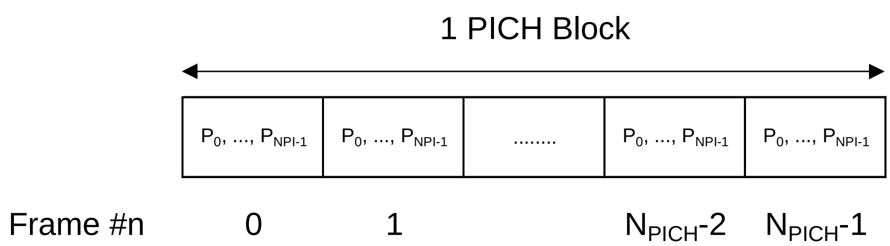

Figure 16: Structure of a PICH block

The value PI (PI = 0, ..., N_P-1) calculated by higher layers for use for a certain UE, see [15], is associated to the paging indicator P_q in the nth frame of one PICH block, where q is given by

$$q = PI \bmod N_{PI}$$

and n is given by

$n = PI \text{ div } N_{PI}$.

The PI bitmap in the PCH data frames over Iub contains indication values for all possible higher layer PI values, see [16]. Each bit in the bitmap indicates if the paging indicator P_q associated with that particular PI shall be set to 0 or 1. Hence, the calculation in the formulas above is to be performed in Node B to make the association between PI and P_q.

The paging indicator P_q in one time slot is mapped to the bits $\{b_{Lpi*q},...,b_{Lpi*q+Lpi-1},b_{NPIB/2+Lpi*q},...,b_{NPIB/2+Lpi*q+Lpi-1}\}$ within this time slot, as exemplary shown in figure 17. Thus, half of the L_{PI} symbols used for each paging indicator are transmitted in the first data part, and the other half of the L_{PI} symbols are transmitted in the second data part.

The coding of the paging indicator P_q is given in [7].

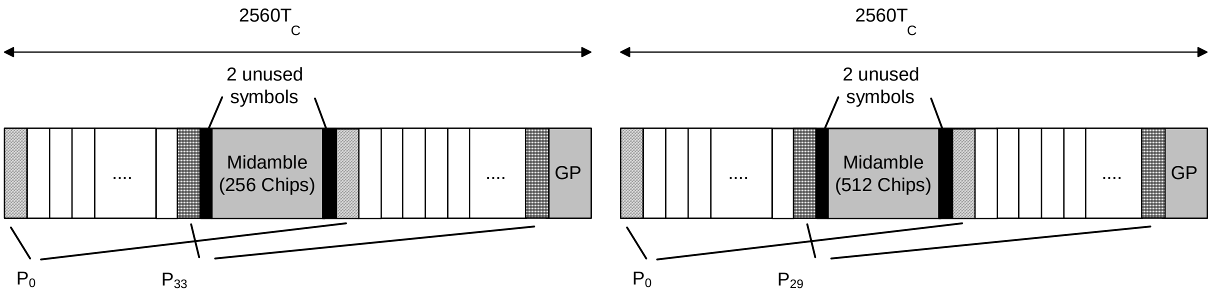

Figure 17: Example of mapping of paging indicators on PICH bits for L_{PI}=4

5.4 Transmit Diversity for DL Physical Channels

Table 9 summarizes the different transmit diversity schemes for different downlink physical channel types that are described in [9].

Table 9: Application of Tx diversity schemes on downlink physical channel types "X" – can be applied, "–" – must not be applied

Physical channel type	Open loop TxDiversity		Closed loop TxDiversity
	TSTD	Block STTD	
P-CCPCH	–	X	–
SCH	X	–	–
DPCH	–	–	X
PDSCH	–	–	X

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Palm Springs, CA, U.S.A., March 13-16, 2001

R1-01-0021

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CHANGE REQUEST

⌘ **TS25.221**	**CR 040**	⌘ rev	⌘ Current version: **3.5.0** ⌘

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

Title: ⌘	Alteration of SCH Offsets to Avoid Overlapping Midamble		
Source: ⌘	TSG RAN WG1		
Work item code: ⌘		***Date:*** ⌘	11.1.01
Category: ⌘	**F**	***Release:*** ⌘	R99
	Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	According to the current definition the SCH codes overlap with the midambles that will lead to inconsistent inter-cell power measurements due to crosscorrelations between midambles and SCH codes.
Summary of change: ⌘	The T_offsets for the SCH codes are slightly changed.
Consequences if not approved: ⌘	Non consistent measurements

Clauses affected: ⌘	5.3.4	
Other specs affected: ⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘
Other comments: ⌘		

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

5.3.4 The synchronisation channel (SCH)

In TDD mode code group of a cell can be derived from the synchronisation channel. In order not to limit the uplink/downlink asymmetry the SCH is mapped on one or two downlink slots per frame only.

There are two cases of SCH and P-CCPCH allocation as follows:

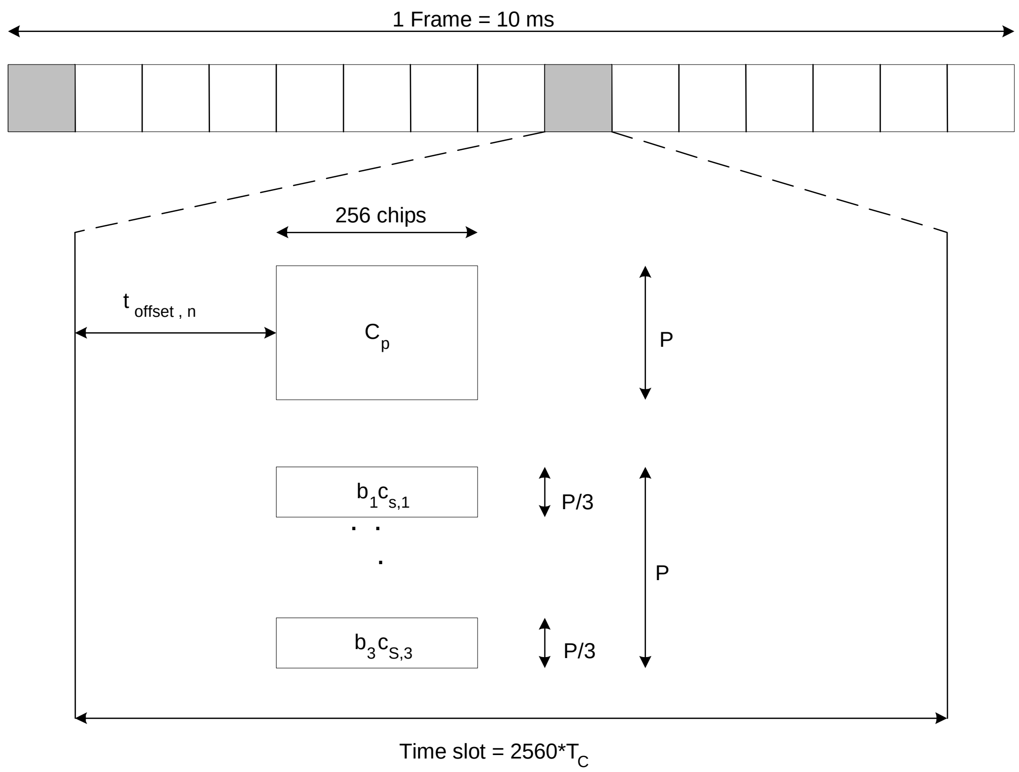
Case 1) SCH and P-CCPCH allocated in TS#k, k=0….14

Case 2) SCH allocated in two TS: TS#k and TS#k+8, k=0…6; P-CCPCH allocated in TS#k.

The position of SCH (value of k) in frame can change on a long term basis in any case.

Due to this SCH scheme, the position of P-CCPCH is known from the SCH.

Figure 14 is an example for transmission of SCH, k=0, of Case 2.



$C_{s,i} \in \{C_0, C_1, C_3, C_4, C_5, C_6, C_8, C_{10}, C_{12}, C_{13}, C_{14}, C_{15}\}$, i=1,2,3; see [8]

Figure 14: Scheme for Synchronisation channel SCH consisting of one primary sequence C_p and 3 parallel secondary sequences $C_{s,i}$ in slot k and k+8 (example for k=0 in Case 2)

As depicted in figure 14, the SCH consists of a primary and three secondary code sequences with 256 chips length. The primary and secondary code sequences are defined in [8] clause 7 'Synchronisation codes'.

Due to mobile to mobile interference, it is mandatory for public TDD systems to keep synchronisation between base stations. As a consequence of this, a capture effect concerning SCH can arise. The time offset t_{offset} enables the system to overcome the capture effect.

The time offset t_{offset} is one of 32 values, depending on the cell parameter, thus on the code group of the cell, cf. 'table 6 Mapping scheme for Cell Parameters, Code Groups, Scrambling Codes, Midambles and t_{offset}' in [8]. Note that the cell parameter will change from frame to frame, cf. 'Table 7 Alignment of cell parameter cycling and system frame number' in [8], but the cell will belong to only one code group and thus have one time offset t_{offset}. The exact value for t_{offset}, regarding column 'Associated t_{offset}' in table 6 in [8] is given by:

$$t_{offset,n} = n \cdot T_c \left\lfloor \frac{2560-96-256}{31} \right\rfloor t_{offset,n} = \begin{cases} n \cdot 48 \cdot T_c & n < 16 \\ (720 + n \cdot 48) T_c & n \geq 16 \end{cases}; \quad n = 0,...., 31$$

$$= n \cdot 71 T_c \; ; \quad n = 0, \ldots, 31$$

Please note that $\lfloor x \rfloor$ denotes the largest integer number less or equal to x and that T_c denotes the chip duration.

3GPP TSG RAN Meeting #11
Palm Springs, CA, U.S.A., March 13-16, 2001

R1-01-0022

CR-Form-v3

CHANGE REQUEST

⌘	TS25.221	CR	041	⌘	rev		⌘	Current version:	3.5.0	⌘

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

Title: ⌘	Clarifications & Corrections for TS25.221			
Source: ⌘	TSG RAN WG1			
Work item code: ⌘			***Date:*** ⌘	9. 1. 01
Category: ⌘	**F**		***Release:*** ⌘	R99
	Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*	

Reason for change: ⌘	Following recent discussions the TPC coding section should be moved from TS25.222 to TS25.221 to be in line with the corresponding FDD specifications.
Summary of change: ⌘	TPC coding section moved from TS25.222 to TS25.221
Consequences if not approved: ⌘	Inconsistent descriptions & specifications

Clauses affected: ⌘	5.2.2.5		
Other specs affected: ⌘	[X] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	CR25.222-054
Other comments: ⌘			

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

5.2.2.5 Transmission of TPC

All burst types 1, 2 and 3 for dedicated channels provide the possibility for transmission of TPC in uplink.

The transmission of TPC is done in the data parts of the traffic burst. Independent of the SF that is applied to the data symbols in the burst, the data in the TPC field are always spread with SF=16 using the channelisation code in the lowest branch of the allowed OVSF sub tree, as depicted in [8]. Hence the midamble structure and length is not changed. The TPC information is to be transmitted directly after the midamble. Figure 10 shows the position of the TPC in a traffic burst.

For every user the TPC information shall be transmitted at least once per transmitted frame. If TFCI is applied for a CCTrCH, TPC shall be transmitted with the same channelization codes and in the same timeslots as TFCI. If no TFCI is applied for a CCTrCH, TPC shall be transmitted using the first allocated channelisation code and the first allocated timeslot, according to the order in the higher layer allocation message.

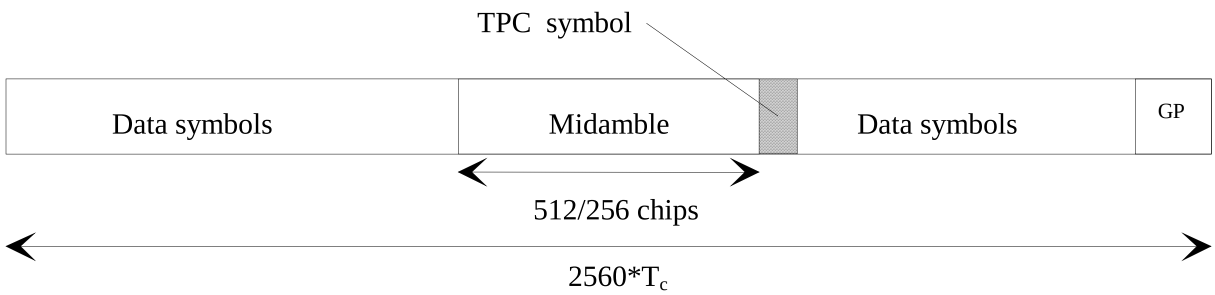

Figure 11: Position of TPC information in the traffic burst

The length of the TPC command is one symbol. The relationship between the TPC symbol and the TPC command is shown in table 4a.

Table 4a: TPC bit pattern

TPC Bits	TPC command	Meaning
00	'Down'	Decrease Tx Power
11	'Up'	Increase Tx Power

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CHANGE REQUEST

⌘	**25.221**	**CR**	**045**	⌘ rev	**1**	⌘ Current version:	**3.5.0**	⌘

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

Title:	⌘	Corrections on the PRACH and clarifications on the midamble generation and the behaviour in case of an invalid TFI combination on the DCHs
Source:	⌘	TSG RAN WG1
Work item code:	⌘	
Date:	⌘	28 February 2001
Category:	⌘	F
Release:	⌘	R99

Use one of the following categories:
- ***F*** *(essential correction)*
- ***A*** *(corresponds to a correction in an earlier release)*
- ***B*** *(Addition of feature),*
- ***C*** *(Functional modification of feature)*
- ***D*** *(Editorial modification)*

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

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

Reason for change:	⌘	The physical properties of channels mapped to the same timslot as a PRACH are restricted without reason. In addition to this, the mapping of the RACH to PRACH is not aligned with higher layer specs. Also, the description of the midamble generation is not clear and there is no hint to the behaviour in case of an invalid TFI combination on the DCHs.
Summary of change:	⌘	The mapping of a RACH is limited to one PRACH and an restriction on the physical layer structure of physical channels mapped to the same timeslot as the PRACH is removed. Furthermore the description of the midamble generation is clarified and a reference to 25.427 is introduced, where the behaviour in case of an invalid TFI combination on the DCHs is described. In addition to this some minor changes are proposed.
Consequences if not approved:	⌘	The mapping of the RACH to PRACH is not aligned with higher layer specs. The physical properties of channels sharing the same timeslot as the PRACH is unnecessarily limited. The midamble generation might not be implemented correctly.

Clauses affected:	⌘	5, 5.2.2.4, 5.2.3, 5.3.3, 5.3.3.1, 5.5.1
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] O&M Specifications
Other comments:	⌘	

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5 Physical channels

All physical channels take three-layer structure with respect to timeslots, radio frames and system frame numbering (SFN), see [14]. Depending on the resource allocation, the configuration of radio frames or timeslots becomes different. All physical channels need a guard period~~symbols~~ in every timeslot. The time slots are used in the sense of a TDMA component to separate different user signals in the time~~ and the code~~ domain. The physical channel signal format is presented in figure 1.

A physical channel in TDD is a burst, which is transmitted in a particular timeslot within allocated Radio Frames. The allocation can be continuous, i.e. the time slot in every frame is allocated to the physical channel or discontinuous, i.e. the time slot in a subset of all frames is allocated only. A burst is the combination of two~~a~~ data parts, a midamble part and a guard period. The duration of a burst is one time slot. Several bursts can be transmitted at the same time from one transmitter. In this case, the data parts must use different OVSF channelisation codes, but the same scrambling code. The midamble parts ~~has to use the same basic midamble code, but can use different midambles~~are either identicaly or differently shifted versions of a cell-specific basic midamble code, see section 5.2.3.

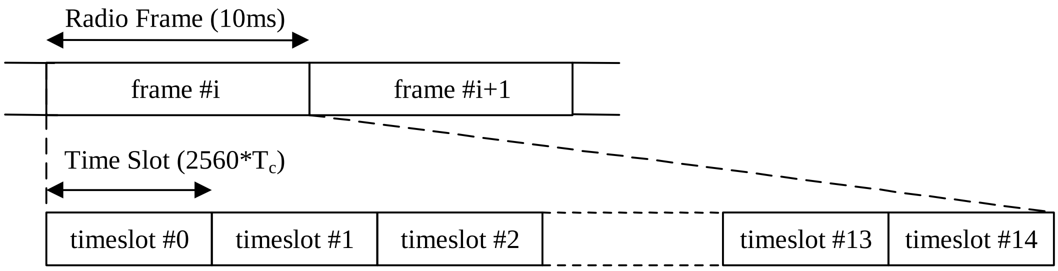

Figure 1: Physical channel signal format

The data part of the burst is spread with a combination of channelisation code and scrambling code. The channelisation code is a OVSF code, that can have a spreading factor of 1, 2, 4, 8, or 16. The data rate of the physical channel is depending on the used spreading factor of the used OVSF code.

The midamble part of the burst can contain two different types of midambles: a short one of length 256 chips, or a long one of 512 chips. The data rate of the physical channel is depending on the used midamble length.

So a physical channel is defined by frequency, timeslot, channelisation code, burst type and Radio Frame allocation. The scrambling code and the basic midamble code are broadcast and may be constant within a cell. When a physical channel is established, a start frame is given. The physical channels can either be of infinite duration, or a duration for the allocation can be defined.

5.2.2.4 Transmission of TFCI

All burst types 1, 2 and 3 provide the possibility for transmission of TFCI.

The transmission of TFCI is negotiated at call setup and can be re-negotiated during the call. For each CCTrCH it is indicated by higher layer signalling, which TFCI format is applied. Additionally for each allocated timeslot it is signalled individually whether that timeslot carries the TFCI or not. If a time slot contains the TFCI, then it is always transmitted using the first allocated channelisation code in the timeslot, according to the order in the higher layer allocation message.

The transmission of TFCI is done in the data parts of the respective physical channel. Independent of the SF that is applied to the data symbols in the burst, the data in the TFCI field are always spread with SF=16 using the channelisation code in the lowest branch of the allowed OVSF sub tree, as depicted in [8]. Hence the midamble structure and length is not changed. The TFCI information is to be transmitted directly adjacent to the midamble, possibly after the TPC. Figure 6 shows the position of the TFCI in a traffic burst in downlink. Figure 7 shows the position of the TFCI in a traffic burst in uplink.

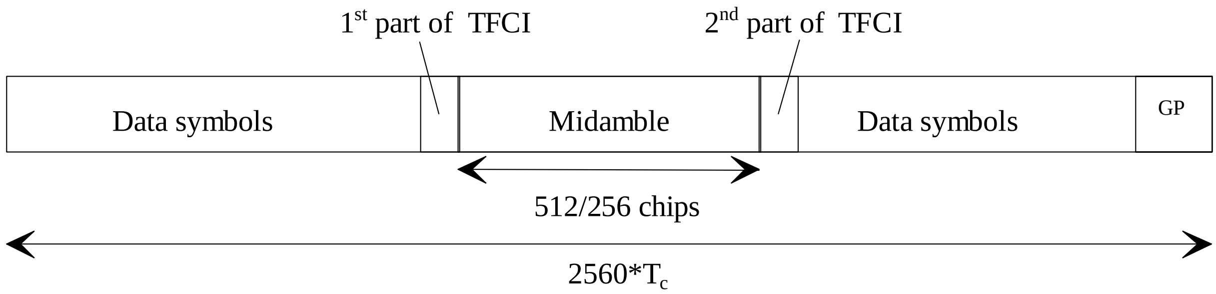

Figure 7: Position of TFCI information in the traffic burst in case of downlink

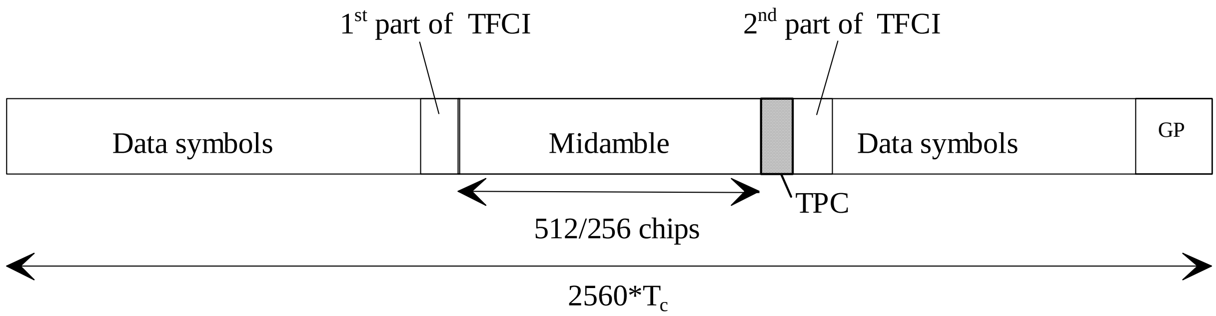

Figure 8: Position of TFCI information in the traffic burst in case of uplink

Two examples of TFCI transmission in the case of multiple DPCHs used for a connection are given in the Figure 8 and Figure 9 below. Combinations of the two schemes shown are also applicable.

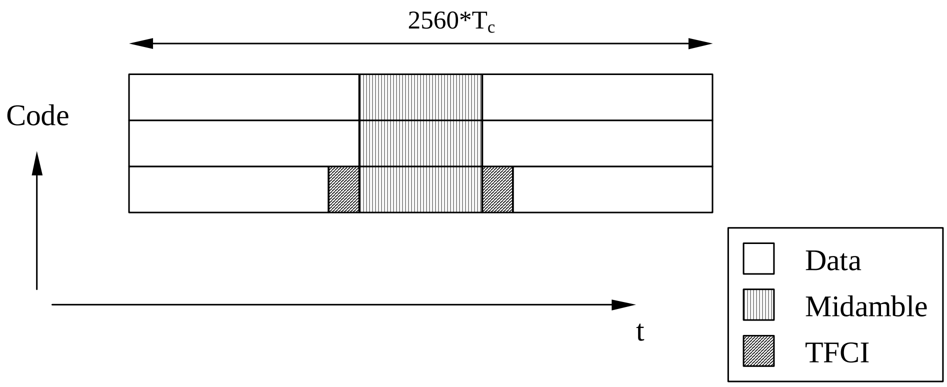

Figure 9: Example of TFCI transmission with physical channels multiplexed in code domain

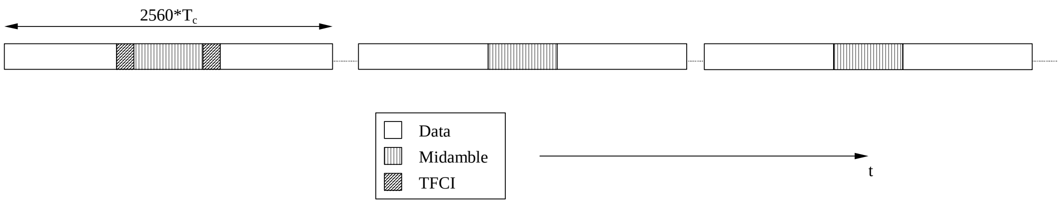

Figure 10: Example of TFCI transmission with physical channels multiplexed in time domain

In case the Node B receives an invalid TFI combination on the DCHs mapped to one CCTrCH the procedure described in [16] shall be applied. According to this procedure DTX shall be applied to all DPCHs to which the CCTrCH is mapped to.

5.2.3 Training sequences for spread bursts

In this subclause, the training sequences for usage as midambles in burst type 1, 2 and 3 (see subclause 5.2.2) are defined. The training sequences, i.e. midambles, of different users active in the same cell and same time slot are cyclically shifted versions of one cell-specific single basic midamble code. The applicable basic midamble codes are given in Annex A.1 and A.2. As different basic midamble codes are required for different burst formats, the Annex A.1 shows the basic midamble codes $\mathbf{m}_{PL}$ for burst type 1 and 3, and Annex and A.2 shows $\mathbf{m}_{PS}$ for burst type 2. It should be noted that burst type 2 must not be mixed with burst type 1 or 3 in the same timeslot of one cell.

The basic midamble codes in Annex A.1 and A.2 are listed in hexadecimal notation. The binary form of the basic midamble code shall be derived according to table 5 below.

Table 6: Mapping of 4 binary elements m_i on a single hexadecimal digit

4 binary elements m_i	Mapped on hexadecimal digit
-1 -1 -1 -1	0
-1 -1 -1 1	1
-1 -1 1 –1	2
-1 -1 1 1	3
-1 1 -1 –1	4
-1 1 -1 1	5
-1 1 1 –1	6
-1 1 1 1	7
1 -1 -1 –1	8
1 -1 -1 1	9
1 -1 1 –1	A
1 -1 1 1	B
1 1 -1 –1	C
1 1 -1 1	D
1 1 1 –1	E
1 1 1 1	F

For each particular basic midamble code, its binary representation can be written as a vector $\mathbf{m}_P$:

$$\mathbf{m}_P = (m_1, m_2, ..., m_P) \quad (1)$$

According to Annex A.1, the size of this vector $\mathbf{m}_P$ is P=456 for burst type 1 and 3. Annex A.2 is setting P=192 for burst type 2. As QPSK modulation is used, the training sequences are transformed into a complex form, denoted as the complex vector $\underline{\mathbf{m}}_P$:

$$\underline{\mathbf{m}}_P = (\underline{m}_1, \underline{m}_2, ..., \underline{m}_P) \quad (2)$$

The elements $\underline{m}_i$ of $\underline{\mathbf{m}}_P$ are derived from elements m_i of $\mathbf{m}_P$ using equation (3):

$$\underline{m}_i = (\mathrm{j})^i \cdot m_i \text{ for all } i = 1,...,P \quad (3)$$

Hence, the elements $\underline{m}_i$ of the complex basic midamble code are alternating real and imaginary.

To derive the required training sequences (different shifts), this vector $\underline{\mathbf{m}}_P$ is periodically extended to the size:

$$i_{max} = L_m + (K' - 1)W + \lfloor P / K \rfloor \quad (4)$$

Notes on equation (4):

- L_m : Midamble length

- K' : Maximum number of different midamble shifts in a cell, when no intermediate shifts are used. This value depends on the midamble length.
- K : Maximum number of different midamble shifts in a cell, when intermediate shifts are used, K=2K'. This value depends on the midamble length.
- W : Shift between the midambles, when the number of midambles is K'.
- ~~K', W and P taken from Annex A.1 or A.2 according to burst type and thus to length of midamble L_m~~
- ~~K=2K'~~
- $\lfloor x \rfloor$ denotes the largest integer smaller or equal to x

Allowed values for L_m, K' and W are given in Annex A.1 and A.2.

So we obtain a new vector $\underline{\mathbf{m}}$ containing the periodic basic midamble sequence:

$$\underline{\mathbf{m}} = \left(\underline{m}_1, \underline{m}_2, ..., \underline{m}_{i_{\max}}\right) = \left(\underline{m}_1, \underline{m}_2, ..., \underline{m}_{L_m + (K'-1)W + \lfloor P/K \rfloor}\right) \quad (5)$$

The first P elements of this vector $\underline{\mathbf{m}}$ are the same ones as in vector $\underline{\mathbf{m}}_P$, the following elements repeat the beginning:

$$\underline{m}_i = \underline{m}_{i-P} \text{ for the subset } i = (P+1), ..., i_{\max} \quad (6)$$

Using this periodic basic midamble sequence $\underline{\mathbf{m}}$ for each shift~~user~~ k a midamble $\underline{\mathbf{m}}^{(k)}$ of length L_m is derived, which can be written as a shift~~user~~ specific vector:

$$\underline{\mathbf{m}}^{(k)} = \left(\underline{m}_1^{(k)}, \underline{m}_2^{(k)}, ..., \underline{m}_{L_m}^{(k)}\right) \quad (7)$$

The L_m midamble elements $\underline{m}_i^{(k)}$ are generated for each midamble of the first K' shifts~~users~~ (k = 1,...,K') based on:

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K'-k)W} \text{ with } i = 1, ..., L_m \text{ and } k = 1, ..., K' \quad (8)$$

The elements of midambles for the second K' shifts~~users~~ (k = (K'+1),...,K = (K'+1),...,2K') are generated based on a slight modification of this formula introducing intermediate shifts:

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K-k-1)W + \lfloor P/K \rfloor} \text{ with } i = 1, ..., L_m \text{ and } k = K'+1, ..., K-1 \quad (9)$$

$$\underline{m}_i^{(k)} = \underline{m}_{i+(K'-1)W + \lfloor P/K \rfloor} \text{ with } i = 1, ..., L_m \text{ and } k = K \quad (10)$$

Whether intermediate shifts are allowed in a cell is signalled by higher layers~~broadcast on the BCH~~.

The midamble sequences derived according to equations (7) to (10) have complex values and are not subject to channelisation or scrambling process, i.e. the elements $\underline{m}_i^{(k)}$ represent complex chips for usage in the pulse shaping process at modulation.

The term 'a midamble code set' or 'a midamble code family' denotes K specific midamble codes $\underline{\mathbf{m}}^{(k)}$; k=1,...,K, based on a single basic midamble code $\underline{\mathbf{m}}_P$ according to (1).

5.3.3 The physical random access channel (PRACH)

The RACH as described in subclause 4.1.2 is mapped onto one ~~or more~~ uplink physical random access channels (PRACH). ~~In such a way the capacity of RACH can be flexibly scaled depending on the operators need.~~

~~This description of the physical properties of the PRACH also applies to bursts carrying other signaling or user traffic if they are scheduled on a time slot which is (partly) allocated to the RACH.~~

5.3.3.1 PRACH Spreading

The uplink PRACH uses either spreading factor SF=16 or SF=8 as described in subclause 5.2.1.2~~1~~. The set of admissible spreading codes for use on the PRACH and the associated spreading factors are broadcast on the BCH (within the RACH configuration parameters on the BCH).

5.5.1 Location of beacon channels

The beacon locations are determined by the SCH and depend on the SCH allocation case, see subclause 5.3.4:

Case 1) The beacon function shall be provided by the physical channels that are allocated to channelisation code $c_{Q=16}^{(k=1)}$ and to TS#k, k=0,…,14.

Case 2) The beacon function shall be provided by the physical channels that are allocated to channelisation code $c_{Q=16}^{(k=1)}$ and to TS#k and TS#k+8, k=0,…,6.

Note that by this definition the P-CCPCH always has beacon characteristics.

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Palm Springs, CA, U.S.A., March 13-16, 2001

R1-01-0265

CR-Form-v3

CHANGE REQUEST

⌘	**25.221**	**CR**	**046**	⌘ rev	**-**	⌘ Current version:	**3.5.0**	⌘

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

Title:	⌘	Clarification of TFCI transmission		
Source:	⌘	TSG RAN WG1		
Work item code:	⌘		***Date:*** ⌘	17/02/01
Category:	⌘	**F**	***Release:*** ⌘	R99
		Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change:	⌘	In order to reduce processing delays TFCI should be transmitted in 1st available timeslot. For DL, there is a mismatch between the section defining the spreading of TFCI and the time slot formats.
Summary of change:	⌘	TFCI to be transmitted in 1st available timeslot. It is clarified that the SF for TFCI in DL is the same as for the TFCI.
Consequences if not approved:	⌘	Introduces not acceptable processing delays. Inconsistent Specification

Clauses affected:	⌘	5.2.2.4		
Other specs affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	
Other comments:	⌘			

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

5.2.2.4 Transmission of TFCI

All burst types 1, 2 and 3 provide the possibility for transmission of TFCI.

The transmission of TFCI is negotiated at call setup and can be re-negotiated during the call. For each CCTrCH it is indicated by higher layer signalling, which TFCI format is applied. Additionally for each allocated timeslot it is signalled individually whether that timeslot carries the TFCI or not. The TFCI is always present in the first timeslot in a radio frame for each CCTrCH. If a time slot contains the TFCI, then it is always transmitted using the first allocated channelisation code in the timeslot, according to the order in the higher layer allocation message.

The transmission of TFCI is done in the data parts of the respective physical channel. In DL the TFCI and data bits are subject to the same spreading procedure as depicted in [8]. In UL, iIndependent of the SF that is applied to the data symbols in the burst, the data in the TFCI field are always spread with SF=16 using the channelisation code in the lowest branch of the allowed OVSF sub tree, as depicted in [8]. Hence the midamble structure and length is not changed. The TFCI information is to be transmitted directly adjacent to the midamble, possibly after the TPC. Figure 6 shows the position of the TFCI in a traffic burst in downlink. Figure 7 shows the position of the TFCI in a traffic burst in uplink.

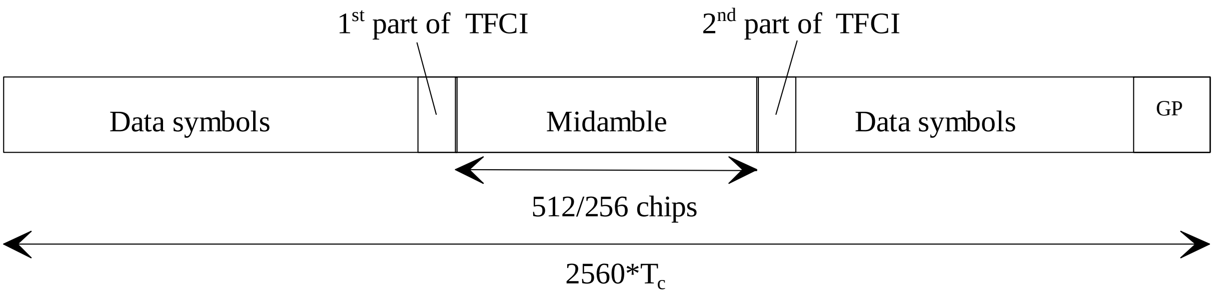

Figure 7: Position of TFCI information in the traffic burst in case of downlink

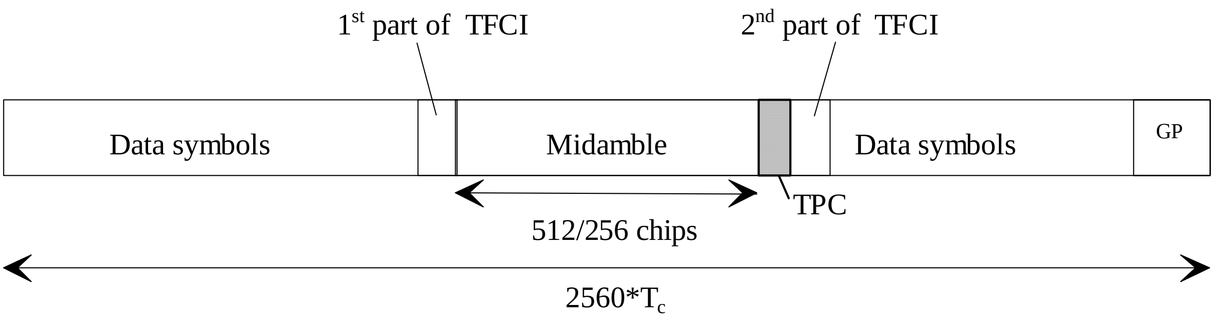

Figure 8: Position of TFCI information in the traffic burst in case of uplink

3GPP TSG RAN Meeting #11 **R1-01-0341**
Palm Springs, CA, U.S.A., March 13-16, 2001

CR-Form-v3

CHANGE REQUEST

⌘	25.221	CR	048	⌘	rev		⌘	Current version:	3.5.0	⌘

*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: ⌘	Corrections to Table 5.b "Timeslot formats for the Uplink"		
Source: ⌘	TSG RAN WG1		
Work item code: ⌘		***Date:*** ⌘	February 27, 2001
Category: ⌘	**F**	***Release:*** ⌘	R99
	Use one of the following categories: ***F*** *(essential correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(Addition of feature),* ***C*** *(Functional modification of feature)* ***D*** *(Editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.		*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	The numbers of bit for "$N_{data/data\ field(1)}$ (bits)" and "$N_{data/data\ field(2)}$ (bits)" from line 66 to line 89 in Table 5b "Timeslot formats for the Uplink" of are incorrect.
Summary of change: ⌘	The numbers for $N_{data/data\ field(1)}$ (bits) and $N_{data/data\ field(2)}$ (bits) in Table 5.b are corrected
Consequences if not approved: ⌘	. Incorrect information in the specification.

Clauses affected: ⌘	5.2.2.6.2		
Other specs affected: ⌘	[ ]	Other core specifications ⌘	
	[ ]	Test specifications	
	[ ]	O&M Specifications	
Other comments: ⌘			

How to create CRs using this form:

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

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

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

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

5.2.2.6.2 Uplink timeslot formats

The uplink timeslot format depends on the spreading factor, midamble length, guard period length and on the number of the TFCI bits. Due to TPC, different amount of bits are mapped to the two data fields. The timeslot formats are depicted in the table 4b.

Table 5b: Timeslot formats for the Uplink

Slot Format #	Spreading Factor	Midamble length (chips)	Guard Period (chips)	N_{TFCI} (bits)	N_{TPC} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data\ field(1)}$ (bits)	$N_{data/data\ field(2)}$ (bits)
0	16	512	96	0	0	244	244	122	122
1	16	512	96	0	2	244	242	122	120
2	16	512	96	4	2	244	238	120	118
3	16	512	96	8	2	244	234	118	116
4	16	512	96	16	2	244	226	114	112
5	16	512	96	32	2	244	210	106	104
6	16	256	96	0	0	276	276	138	138
7	16	256	96	0	2	276	274	138	136
8	16	256	96	4	2	276	270	136	134
9	16	256	96	8	2	276	266	134	132
10	16	256	96	16	2	276	258	130	128
11	16	256	96	32	2	276	242	122	120
12	8	512	96	0	0	488	488	244	244
13	8	512	96	0	2	486	484	244	240
14	8	512	96	4	2	482	476	240	236
15	8	512	96	8	2	478	468	236	232
16	8	512	96	16	2	470	452	228	224
17	8	512	96	32	2	454	420	212	208
18	8	256	96	0	0	552	552	276	276
19	8	256	96	0	2	550	548	276	272
20	8	256	96	4	2	546	540	272	268
21	8	256	96	8	2	542	532	268	264
22	8	256	96	16	2	534	516	260	256
23	8	256	96	32	2	518	484	244	240
24	4	512	96	0	0	976	976	488	488
25	4	512	96	0	2	970	968	488	480
26	4	512	96	4	2	958	952	480	472
27	4	512	96	8	2	946	936	472	464
28	4	512	96	16	2	922	904	456	448
29	4	512	96	32	2	874	840	424	416
30	4	256	96	0	0	1104	1104	552	552
31	4	256	96	0	2	1098	1096	552	544
32	4	256	96	4	2	1086	1080	544	536
33	4	256	96	8	2	1074	1064	536	528
34	4	256	96	16	2	1050	1032	520	512
35	4	256	96	32	2	1002	968	488	480
36	2	512	96	0	0	1952	1952	976	976
37	2	512	96	0	2	1938	1936	976	960
38	2	512	96	4	2	1910	1904	960	944
39	2	512	96	8	2	1882	1872	944	928
40	2	512	96	16	2	1826	1808	912	896
41	2	512	96	32	2	1714	1680	848	832
42	2	256	96	0	0	2208	2208	1104	1104
43	2	256	96	0	2	2194	2192	1104	1088
44	2	256	96	4	2	2166	2160	1088	1072
45	2	256	96	8	2	2138	2128	1072	1056
46	2	256	96	16	2	2082	2064	1040	1024
47	2	256	96	32	2	1970	1936	976	960

Slot Format #	Spreading Factor	Midamble length (chips)	Guard Period (chips)	N_{TFCI} (bits)	N_{TPC} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data\ field(1)}$ (bits)	$N_{data/data\ field(2)}$ (bits)
48	1	512	96	0	0	3904	3904	1952	1952
49	1	512	96	0	2	3874	3872	1952	1920
50	1	512	96	4	2	3814	3808	1920	1888
51	1	512	96	8	2	3754	3744	1888	1856
52	1	512	96	16	2	3634	3616	1824	1792
53	1	512	96	32	2	3394	3360	1696	1664
54	1	256	96	0	0	4416	4416	2208	2208
55	1	256	96	0	2	4386	4384	2208	2176
56	1	256	96	4	2	4326	4320	2176	2144
57	1	256	96	8	2	4266	4256	2144	2112
58	1	256	96	16	2	4146	4128	2080	2048
59	1	256	96	32	2	3906	3872	1952	1920
60	16	512	192	0	0	232	232	122	110
61	16	512	192	0	2	232	230	122	108
62	16	512	192	4	2	232	226	120	106
63	16	512	192	8	2	232	222	118	104
64	16	512	192	16	2	232	214	114	100
65	16	512	192	32	2	232	198	106	92
66	8	512	192	0	0	464	464	244 ~~232~~	220 ~~232~~
67	8	512	192	0	2	462	460	244 ~~232~~	216 ~~228~~
68	8	512	192	4	2	458	452	240 ~~228~~	212 ~~224~~
69	8	512	192	8	2	454	444	236 ~~224~~	208 ~~220~~
70	8	512	192	16	2	446	428	228 ~~216~~	200 ~~212~~
71	8	512	192	32	2	430	396	212 ~~200~~	184 ~~196~~
72	4	512	192	0	0	928	928	488 ~~464~~	440 ~~464~~
73	4	512	192	0	2	922	920	488 ~~464~~	432 ~~456~~
74	4	512	192	4	2	910	904	480 ~~456~~	424 ~~448~~
75	4	512	192	8	2	898	888	472 ~~448~~	416 ~~440~~
76	4	512	192	16	2	874	856	456 ~~432~~	400 ~~424~~
77	4	512	192	32	2	826	792	424 ~~400~~	368 ~~392~~
78	2	512	192	0	0	1856	1856	976 ~~928~~	880 ~~928~~
79	2	512	192	0	2	1842	1840	976 ~~928~~	864 ~~912~~
80	2	512	192	4	2	1814	1808	960 ~~912~~	848 ~~896~~
81	2	512	192	8	2	1786	1776	944 ~~896~~	832 ~~880~~
82	2	512	192	16	2	1730	1712	912 ~~864~~	800 ~~848~~
83	2	512	192	32	2	1618	1584	848	736

Slot Format #	Spreading Factor	Midamble length (chips)	Guard Period (chips)	N_{TFCI} (bits)	N_{TPC} (bits)	Bits/slot	$N_{Data/Slot}$ (bits)	$N_{data/data\ field(1)}$ (bits)	$N_{data/data\ field(2)}$ (bits)
								~~800~~	~~784~~
84	1	512	192	0	0	3712	3712	1952 ~~1856~~	1760 ~~1856~~
85	1	512	192	0	2	3682	3680	1952 ~~1856~~	1728 ~~1824~~
86	1	512	192	4	2	3622	3616	1920 ~~1824~~	1696 ~~1792~~
87	1	512	192	8	2	3562	3552	1888 ~~1792~~	1664 ~~1760~~
88	1	512	192	16	2	3442	3424	1824 ~~1728~~	1600 ~~1696~~
89	1	512	192	32	2	3202	3168	1696 ~~1600~~	1472 ~~1568~~