TSG RAN Meeting #28 **RP-050240**
Quebec, Canada, 1 - 3 June 2005

Title **CRs (Rel-4 category F, Rel-5 category A, Rel-6 category A) to TS 25.221 for Correction to Transmission of SS for 1.28 Mcps TDD**
Source **TSG RAN WG1**
Agenda Item **7.2.4**

RAN1 Tdoc	Spec	CR	Rev	Rel	Cat	Current Version	Subject	Work item	Remarks
R1-050515	25.221	122	1	Rel-4	F	4.7.0	Correction to Transmission of SS for 1.28 Mcps TDD	LCRTDD-Phys	
R1-050515	25.221	123	1	Rel-5	A	5.5.0	Correction to Transmission of SS for 1.28 Mcps TDD	LCRTDD-Phys	
R1-050515	25.221	124	1	Rel-6	A	6.3.0	Correction to Transmission of SS for 1.28 Mcps TDD	LCRTDD-Phys	

3GPP TSG-RAN WG1 Meeting #41 ***Tdoc ⌘R1-050515***

Athens, Greece, May 9th-13rd, 2005

CR-Form-v7

CHANGE REQUEST

⌘ **TS25.221** **CR** **122** ⌘ **rev** **1** ⌘ Current version: **4.7.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Correction to Transmission of SS for 1.28 Mcps TDD
Source:	⌘	RAN WG1
Work item code:	⌘	LCRTDD-Phys
Date:	⌘	09/05/2005
Category:	⌘	**F**
Release:	⌘	Rel-4

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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Incorrect definition of parameters: $N_{SSsymbols}$ and N_{ULslot}. They should be defined based on sub-frame rather than frame. In TS25.221, the mapping rule of one SS symbol to a certain UL timeslot is defined through an equation. The variable $N_{SSsymbols}$ and N_{Ulslot} are defined based on frame as follows: N_{Ulslot} is the number of UL slots in a frame. $N_{SSsymbols}$ is the number of SS symbols in a frame. However, for every user the Uplink Synchronization control information SS shall be transmitted at least once per transmitted sub-frame. Therefore, the variable $N_{SSsymbols}$ and N_{Ulslot} should be defined based on sub-frame. Also, this can be verified by the examples in the annex CC of TS25.221.
Summary of change:	⌘	Change the definition of $N_{SSsymbols}$ and N_{Ulslot} as follows: N_{Ulslot} is the number of UL slots in a sub-frame. $N_{SSsymbols}$ is the number of SS symbols in a sub-frame. Isolated Impact Analysis: The only impact is on SS command's association to its controlled timeslots(s).based on the previous specification, the association is not understandable.
Consequences if not approved:	⌘	Cause misunderstanding on the mapping rule underlying in the equation.

Clauses affected:	⌘	5A.2.2.3

Y | N

Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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5A.2.2.3 Transmission of SS

The burst type for dedicated channels provides the possibility for transmission of uplink synchronisation control (ULSC).
The transmission of ULSC is done in the data parts of the traffic burst. Hence the midamble structure and length is not changed. The ULSC information is to be transmitted directly after the midamble. Figure 18H shows the position of the SS command in a traffic burst.
For every user the ULSC information shall be transmitted at least once per transmitted sub-frame.
For each allocated timeslot it is signalled individually whether that timeslot carries ULSC information or not. If applied in a time slot, transmission of SS symbols is done in the data parts of the traffic burst and they are transmitted using the physical channel with the lowest physical channel sequence number (p) in that timeslot. Physical channel sequence numbering is determined by the rate matching function and is described in [7].
SS symbols may also be transmitted on more than one physical channel in a time slot. For this purpose, higher layers allocate an additional number of N_{SS} physical channels, individually for each time slot. The SS symbols shall then be transmitted using the physical channels with the $N_{SS}+1$ lowest physical channel sequence numbers (p) in that time slot. Physical channel sequence numbering is determined by the rate matching function and is described in [7]. If the rate matching function results in $N_{RM} < N_{SS}+1$ remaining physical channels in this time slot, SS symbols shall be transmitted only on the N_{RM} remaining physical channels.
The SS symbols are spread with the same spreading factor (SF) and spreading code as the data parts of the respective physical channel.
The SS is utilised to command a timing adjustment by (k/8) Tc each M sub-frames, where Tc is the chip period. The k and M values are signalled by the network. The SS, as one of L1 signals, is to be transmitted once per 5ms sub-frame.
M (1-8) and k (1-8) can be adjusted during call setup or readjusted during the call.

Note: The smallest step for the SS signalled by the UTRAN is 1/8 Tc. For the UE capabilities regarding the SS adjustment of the UE it is suggested to set the tolerance for the executed command to be [1/9;1/7] Tc.

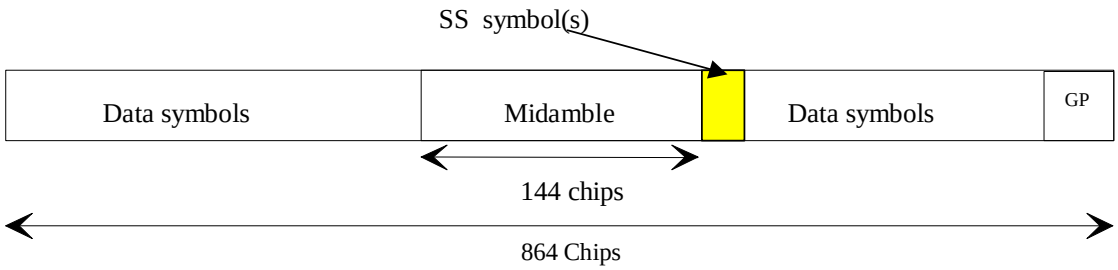

Figure 18H: Position of ULSC information in the traffic burst (downlink and uplink)

Note that for the uplink where there is no SS symbol used, the SS symbol space is reserved for future use. This can keep UL and DL slots the same structure.
For the number of SS symbols per time slot there are 3 possibilities, that can be configured by higher layers individually for each time slot:

- one SS symbol
- no SS symbol
- 16/SF SS symbols

So, in case 3, when SF=1, there are 16 SS symbols which correspond to 32 bits (for QPSK) and 48 bits (for 8PSK).
Each of the SS symbols in the DL will be associated with an UL time slot depending on the allocated UL time slots and the allocated SS symbols in the DL.
Note: Even though the different time slots of the UE are controlled with independent SS commands, the UE is not in need to execute SS commands leading to a deviation of more than [3] chip with respect to the average timing advance applied by the UE.

The synchronisation shift commands for each UL time slot (all channelisation codes on that time slot have the same SS command) will be distributed to the following rules:

1. The UL time slots the SS commands are intended for will be numbered from the first to the last UL time slot occupied by the regarded UE (starting with 0) considering all CCTrCHs allocated to that UE.

2. The commanding SS symbols on all downlink CCTrCHs allocated to one UE are numbered consecutively starting with zero according to the following rules:

   a) The numbers of the SS commands of a regarded DL time slot are lower than those of DL time slots being transmitted after that time slot

   b) Within a DL time slot the numbers of the SS commands of a regarded channelisation code are lower than those of channelisation codes having a bigger spreading code number

      The spreading code number is defined by the following table: (see TS 25.223)

Spreading code number	SF (Q)	Walsh code number (k)
0	16	$\mathbf{c}_{Q=16}^{(k=1)}$
	...	
15	16	$\mathbf{c}_{Q=16}^{(k=16)}$
	Spreading factors 2-8 are nor used in DL	
30	1	$\mathbf{c}_{Q=1}^{(k=1)}$

   c) Within a channelisation code numbers of the SS commands are lower than those of SS commands being transmitted after that time

The following equation is used to determine the UL time slot which is controlled by the regarded SS symbol:

$$UL_{pos} = \left(SFN' \cdot N_{SSsymbols} + SS_{pos} + \left(\left(SFN' \cdot N_{SSsymbols} + SS_{pos}\right) \mathrm{div} \left(N_{ULslot}\right)\right)\right) \mathrm{mod} \left(N_{ULslot}\right),$$

where

UL_{pos} is the number of the controlled uplink time slot.

SFN' is the system frame number counting the sub-frames. The system frame number of the radio frames (SFN) can be derived from SFN' by

SFN=SFN' div 2, where div is the remainder free division operation.

$N_{SSsymbols}$ is the number of SS symbols in a ~~frame~~sub-frame.

SS_{pos} is the number of the regarded SS symbol within the sub-frame.

N_{ULslot} is the number of UL slots in a ~~frame~~sub-frame.

When one of the above parameters is changed due to higher layer reconfiguration, the new relationship between SS symbols and controlled UL time slots shall be valid, beginning with the radio frame, for which the new parameters are set.

The relationship between the SS Bits and the SS command for QPSK is the given in table 8D:

Table 8D: Coding of the SS for QPSK

SS Bits	SS command	Meaning
00	'Down'	Decrease synchronisation shift by k/8 Tc
11	'Up'	Increase synchronisation shift by k/8 Tc
01	'Do nothing'	No change

The relationship between the SS Bits and the SS command for 8PSK is given in table 8E:

Table 8E: Coding of the SS for 8PSK

SS Bits	SS command	Meaning
000	'Down'	Decrease synchronisation shift by k/8 Tc
110	'Up'	Increase synchronisation shift by k/8 Tc
011	'Do nothing'	No change

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CR-Form-v7

CHANGE REQUEST

⌘ **TS25.221** **CR** **123** ⌘ **rev** **1** ⌘ Current version: **5.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Correction to Transmission of SS for 1.28 Mcps TDD
Source:	⌘	RAN WG1
Work item code:	⌘	LCRTDD-Phys
Date:	⌘	09/05/2005
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
- ***F*** *(correction)*
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Rel-6	*(Release 6)*

Reason for change:	⌘	Incorrect definition of parameters: $N_{SSsymbols}$ and N_{ULslot}. They should be defined based on sub-frame rather than frame. In TS25.221, the mapping rule of one SS symbol to a certain UL timeslot is defined through an equation. The variable $N_{SSsymbols}$ and N_{Ulslot} are defined based on frame as follows: N_{Ulslot} is the number of UL slots in a frame. $N_{SSsymbols}$ is the number of SS symbols in a frame. However, for every user the Uplink Synchronization control information SS shall be transmitted at least once per transmitted sub-frame. Therefore, the variable $N_{SSsymbols}$ and N_{Ulslot} should be defined based on sub-frame. Also, this can be verified by the examples in the annex CC of TS25.221.
Summary of change:	⌘	Change the definition of $N_{SSsymbols}$ and N_{Ulslot} as follows: N_{Ulslot} is the number of UL slots in a sub-frame. $N_{SSsymbols}$ is the number of SS symbols in a sub-frame. Isolated Impact Analysis: The only impact is on SS command's association to its controlled timeslots(s).based on the previous specification, the association is not understandable.
Consequences if not approved:	⌘	Cause misunderstanding on the mapping rule underlying in the equation.

Clauses affected:	⌘	5A.2.2.3

Y | N

Other specs affected:	⌘		X	Other core specifications	⌘
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Other comments:	⌘				

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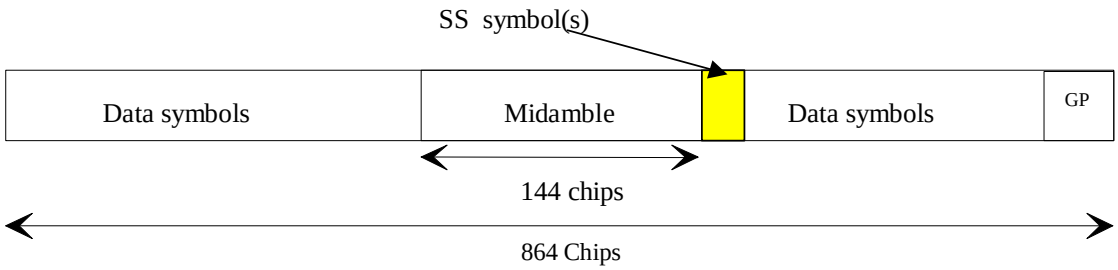

Figure 18H: Position of ULSC information in the traffic burst (downlink and uplink)

Note that for the uplink where there is no SS symbol used, the SS symbol space is reserved for future use. This can keep UL and DL slots the same structure.
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   a) The numbers of the SS commands of a regarded DL time slot are lower than those of DL time slots being transmitted after that time slot

   b) Within a DL time slot the numbers of the SS commands of a regarded channelisation code are lower than those of channelisation codes having a bigger spreading code number

      The spreading code number is defined by the following table: (see TS 25.223)

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0	16	$\mathbf{c}_{Q=16}^{(k=1)}$
	...	
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30	1	$\mathbf{c}_{Q=1}^{(k=1)}$

   c) Within a channelisation code numbers of the SS commands are lower than those of SS commands being transmitted after that time

The following equation is used to determine the UL time slot which is controlled by the regarded SS symbol:

$$UL_{pos} = \left(SFN' \cdot N_{SSsymbols} + SS_{pos} + \left(\left(SFN' \cdot N_{SSsymbols} + SS_{pos}\right) \mathrm{div} \left(N_{ULslot}\right)\right)\right) \mathrm{mod} \left(N_{ULslot}\right),$$

where

UL_{pos} is the number of the controlled uplink time slot.

SFN' is the system frame number counting the sub-frames. The system frame number of the radio frames (SFN) can be derived from SFN' by

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3GPP TSG-RAN WG1 Meeting #41 ***Tdoc ⌘R1-050515***

Athens, Greece, May 9th-13rd, 2005

CR-Form-v7

CHANGE REQUEST

⌘ **TS25.221** **CR** **124** ⌘ **rev** **1** ⌘ Current version: **6.3.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Correction to Transmission of SS for 1.28 Mcps TDD
Source:	⌘	RAN WG1
Work item code:	⌘	LCRTDD-Phys
Date:	⌘	09/05/2005
Category:	⌘	**A**
Release:	⌘	Rel-6

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Consequences if not approved:	⌘	Cause misunderstanding on the mapping rule underlying in the equation.

Clauses affected:	⌘	5A.2.2.3

Y N

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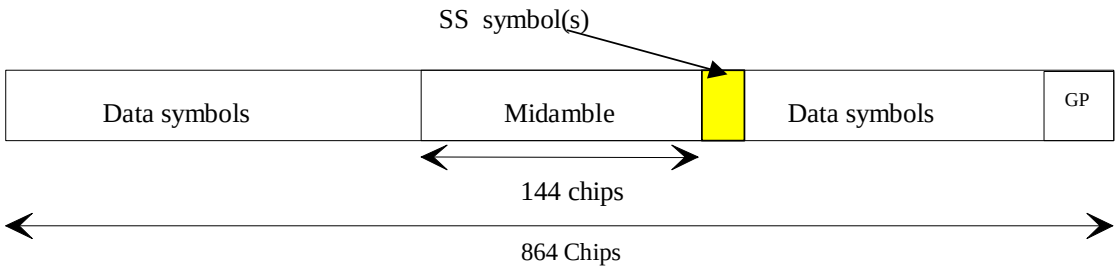

Figure 18H: Position of ULSC information in the traffic burst (downlink and uplink)

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   c) Within a channelisation code numbers of the SS commands are lower than those of SS commands being transmitted after that time

The following equation is used to determine the UL time slot which is controlled by the regarded SS symbol:

$$UL_{pos} = \left(SFN' \cdot N_{SSsymbols} + SS_{pos} + \left(\left(SFN' \cdot N_{SSsymbols} + SS_{pos}\right) \mathrm{div} \left(N_{ULslot}\right)\right)\right) \mathrm{mod} \left(N_{ULslot}\right),$$

where

UL_{pos} is the number of the controlled uplink time slot.

SFN' is the system frame number counting the sub-frames. The system frame number of the radio frames (SFN) can be derived from SFN' by

SFN=SFN' div 2, where div is the remainder free division operation.

$N_{SSsymbols}$ is the number of SS symbols in a ~~frame~~sub-frame.

SS_{pos} is the number of the regarded SS symbol within the sub-frame.

N_{ULslot} is the number of UL slots in a ~~frame~~sub-frame.

When one of the above parameters is changed due to higher layer reconfiguration, the new relationship between SS symbols and controlled UL time slots shall be valid, beginning with the radio frame, for which the new parameters are set.

The relationship between the SS Bits and the SS command for QPSK is the given in table 8D:

Table 8D: Coding of the SS for QPSK

SS Bits	SS command	Meaning
00	'Down'	Decrease synchronisation shift by k/8 Tc
11	'Up'	Increase synchronisation shift by k/8 Tc
01	'Do nothing'	No change

The relationship between the SS Bits and the SS command for 8PSK is given in table 8E:

Table 8E: Coding of the SS for 8PSK

SS Bits	SS command	Meaning
000	'Down'	Decrease synchronisation shift by k/8 Tc
110	'Up'	Increase synchronisation shift by k/8 Tc
011	'Do nothing'	No change