

January 18 – 21, 2000, Beijing, China

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**Agenda item:**

**Source:** Philips

**Title:** Clarification of synchronisation procedure

**Document for:** Decision

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## **Introduction**

The DPCCH/DPDCH synchronisation procedure in section 4.3 of 25.214 makes use of a parameter  $S_R$  to specify the number of frames which must be found to be synchronised before frame synchronisation can be confirmed.

However, the parameter  $S_R$  is not defined, nor is the behaviour defined if  $S_R = 0$ .

It also seems to provide a useful flexibility if  $S_R$  is a higher layer parameters which can have different values for the UE and network.

Therefore the attached CR25214-052 specifies two higher-layer parameters,  $S_{RU}$  and  $S_{RN}$ , for frame synchronisation at the UE and at the Network respectively. The range of  $S_{RU}$  is set so as to avoid inconsistency with the timing section in 25.211. A separate liaison statement to WG2 should be drafted to ensure that  $S_{RU}$ ,  $S_{RN}$  and other timing parameters are fully specified at higher layers.

The CR specifies that frame synchronisation shall be reported to higher layers in any case if  $S_{RU}$  or  $S_{RN}$  have been set to zero, to ensure consistency of behaviour. The effect of this change is that transmission can continue without the need for synchronisation to be explicitly confirmed at the physical layer. This would be particularly useful where the most rapid possible initialisation is required for packet transmission.

Some of the language of section 4.3 is also made more “specification-like”.

## CHANGE REQUEST

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

**25.214 CR 052**

Current Version: **3.1.0**

GSM (AA.BB) or 3G (AA.BBB) specification number ↑

↑ CR number as allocated by MCC support team

For submission to: **TSG-RAN #7**  
list expected approval meeting # here ↑

for approval   
for information

strategic   
non-strategic  (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:**

(at least one should be marked with an X)

(U)SIM  ME  UTRAN / Radio  Core Network

**Source:**

Philips

**Date:** 2000-01-11

**Subject:**

Synchronisation procedure

**Work item:**

**Category:**

(only one category shall be marked with an X)

F Correction   
A Corresponds to a correction in an earlier release   
B Addition of feature   
C Functional modification of feature   
D Editorial modification

**Release:**

Phase 2   
Release 96   
Release 97   
Release 98   
Release 99   
Release 00

**Reason for change:**

Clarification of details relating to undefined S<sub>r</sub> parameter.

**Clauses affected:**

4.3.2 "No existing uplink dedicated channel"  
4.3.3 "With existing uplink dedicated channel"

**Other specs affected:**

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

**Other comments:**



help.doc

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

## 4 Synchronisation procedures

### 4.1 Cell search

During the cell search, the UE searches for a cell and determines the downlink scrambling code and common channel frame synchronisation of that cell. How cell search is typically done is described in Annex C.

### 4.2 Common physical channel synchronisation

The radio frame timing of all common physical channels can be determined after cell search. The P-CCPCH radio frame timing is found during cell search and the radio frame timing of all common physical channel are related to that timing as described in 25.211.

### 4.3 DPCCH/DPDCH synchronisation

#### 4.3.1 General

The synchronisation of the dedicated physical channels can be divided into two cases:

- when a downlink dedicated physical channel and uplink dedicated physical channel shall be set up at the same time;
- or when a downlink dedicated physical channel shall be set up and there already exist an uplink dedicated physical channel.

The two cases are described in subclauses 4.3.2 and 4.3.3 respectively.

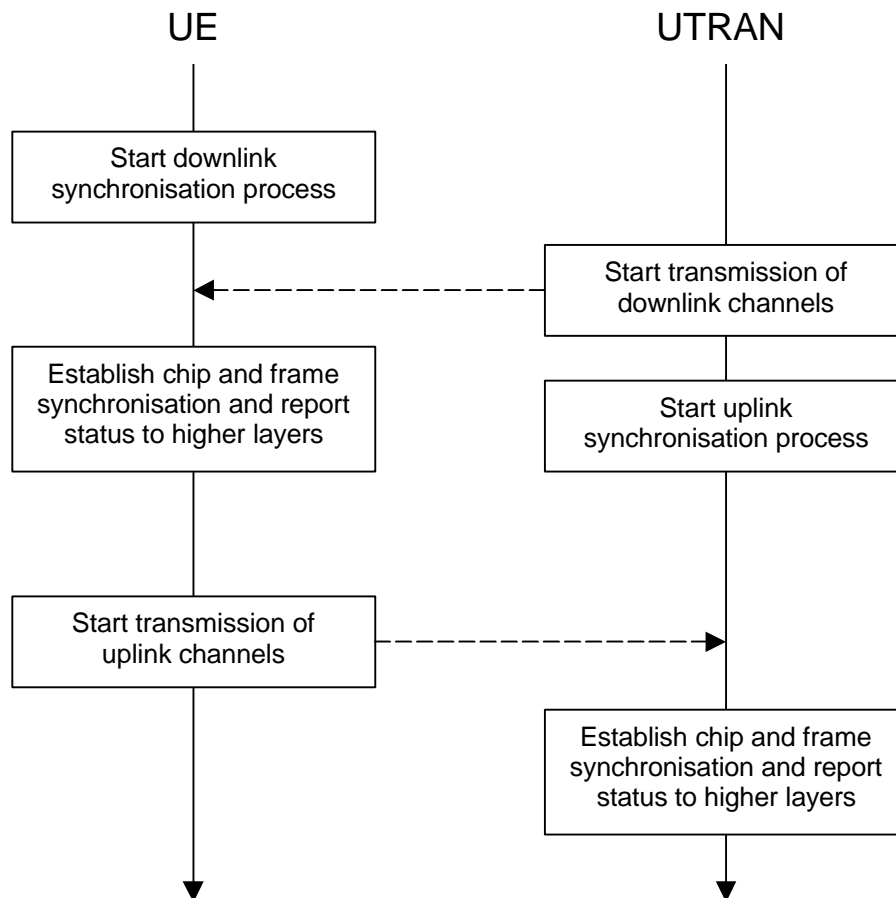
#### 4.3.2 No existing uplink dedicated channel

The assumption for this case is that a DPCCH/DPDCH pair shall be set up in both uplink and downlink, and that there exist no uplink DPCCH/DPDCH already. This corresponds to the case when a dedicated physical channel is initially set up on a frequency.

The synchronization establishment procedures of the dedicated physical channel are described below. The synchronization establishment flow is shown in figure 1.

- a) UTRAN starts the transmission of downlink DPCCH/DPDCHs. The DPDCH is transmitted only when there is data to be transmitted to the UE.
- b) The UE establishes downlink chip synchronization and frame synchronization based on the CPICH timing and timing offset information notified from UTRAN. Frame synchronization can be confirmed using the Frame Synchronization Word. Successful frame synchronization ~~is shall be~~ confirmed and reported to the higher layers when-if the first  $S_{RU}$  successive frames have been are confirmed to be frame synchronized, where  $S_{RU}$  is a higher-layer parameter and  $S_{RU} \leq N_{offset,2}$  (see subclause 7.7 in [1]). Frame synchronisation shall also be reported to higher layers in any case if  $S_{RU} = 0$ . Otherwise, frame synchronization failure ~~is shall be~~ reported to the higher layers.
- c) The UE starts the transmission of the uplink DPCCH/DPDCHs at a frame timing exactly  $T_0$  chips after the frame timing of the received downlink DPCCH/DPDCH. The DPDCH is transmitted only when there is data to be transmitted. The UE immediately starts inner-loop power control as described in sections 5.1.2 and 5.2.1, i.e. the transmission power of the uplink DPCCH/DPDCH follows the TPC commands generated by UTRAN, and the UE performs SIR estimation to generate TPC commands transmitted to UTRAN.
- d) UTRAN establishes uplink channel chip synchronization and frame synchronization. Frame synchronization can be confirmed using the Frame Synchronization Word. Successful frame synchronization ~~is shall be~~ confirmed and reported to the higher layers when-if the first  $S_{RN}$  successive frames have been are confirmed to be frame

synchronized, where  $S_{RN}$  is a higher-layer parameter. Frame synchronisation shall also be reported to higher layers in any case if  $S_{RN} = 0$ . Otherwise, frame synchronization failure ~~is shall be~~ reported to the higher layers.



**Figure 1: Synchronisation establishment flow for dedicated channels: uplink dedicated channel not existing**

### 4.3.3 With existing uplink dedicated channel

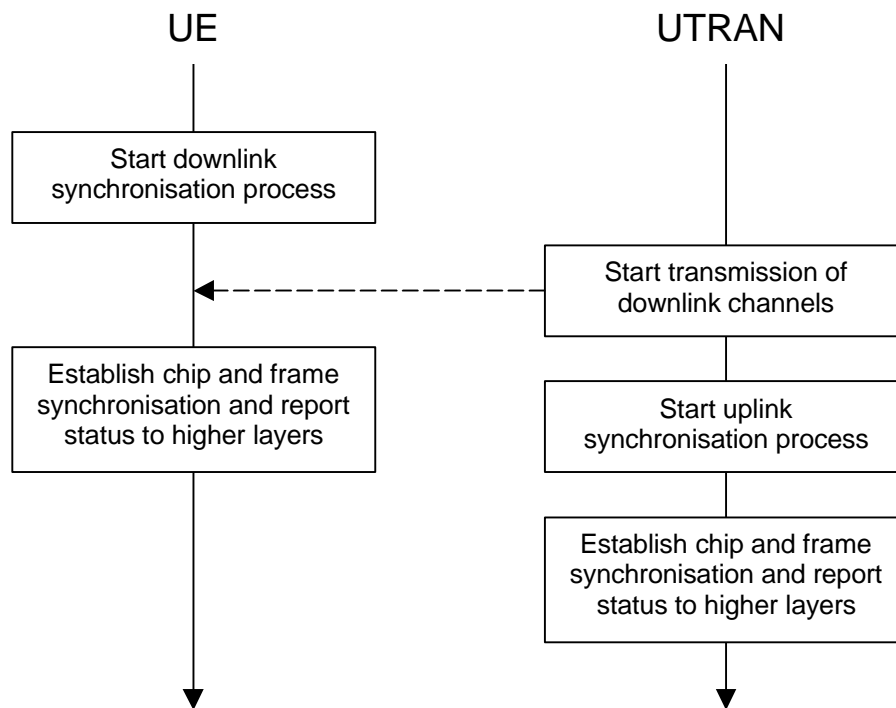
The assumption for this case is that there already exist DPCCH/DPDCHs in the uplink, and a corresponding dedicated physical channel shall be set up in the downlink. This corresponds to the case when a new cell has been added to the active set in soft handover and shall begin its downlink transmission.

At the start of soft handover, the uplink dedicated physical channel transmitted by the UE, and the downlink dedicated physical channel transmitted by the soft handover source cell continues transmitting as usual.

The synchronisation establishment flow is described in figure 2.

- The UE starts the chip synchronisation establishment process of downlink channels from the handover destination. The uplink channels being transmitted shall continue transmission as before.
- UTRAN starts the transmission of the downlink DPCCH/DPDCH at a frame timing such that the frame timing received at the UE will be within  $T_0 \pm 148$  chips prior to the frame timing of the uplink DPCCH/DPDCH at the UE. UTRAN then starts the synchronization establishment process of the uplink DPCCH/DPDCH transmitted by the UE. Frame synchronization can be confirmed using the Frame Synchronization Word. Successful frame synchronization ~~is shall be~~ confirmed and reported to the higher layers ~~when-if the first~~  $S_{RN}$  successive frames ~~have been are~~ confirmed to be frame synchronized, where  $S_{RN}$  is a higher-layer parameter. Frame synchronisation shall also be reported to higher layers in any case if  $S_{RN} = 0$ . Otherwise, frame synchronization failure ~~is shall be~~ reported to the higher layers.
- Based on the handover destination CPICH reception timing, the UE establishes chip synchronisation of downlink channels from handover destination cell. Frame synchronization can be confirmed using the Frame

Synchronization Word. Successful frame synchronization ~~is shall be~~ confirmed and reported to the higher layers ~~when if the first~~  $S_{RU}$  successive frames ~~have been are~~ confirmed to be frame synchronized, ~~where~~  $S_{RU}$  is a higher-layer parameter and  $S_{RU}$  (see subclause 7.7 in [1]). ~~Frame synchronisation shall also be reported to higher layers in any case if~~  $S_{RU} = 0$ . Otherwise, frame synchronization failure ~~is shall be~~ reported to the higher layers.



**Figure 2: Synchronisation establishment flow for dedicated channels: uplink dedicated channel already existing**

#### 4.3.4 Transmission timing adjustments

During a connection the UE may adjust its DPDCH/DPCCH transmission time instant.

If the receive timing for any downlink DPCCH/DPDCH in the current active set has drifted, so the time between reception of the downlink DPCCH/DPDCH in question and transmission of uplink DPCCH/DPDCH lies outside the valid range, L1 shall inform higher layers of this, so that the network can be informed of this and downlink timing can be adjusted by the network.

NOTE: The maximum rate of uplink TX time adjustment, and the valid range for the time between downlink DPCCH/DPDCH reception and uplink DPCCH/DPDCH transmission in the UE is to be specified by RAN WG4.

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## 5 Power control

### 5.1 Uplink power control

#### 5.1.1 PRACH

##### 5.1.1.1 General

The power control during the physical random access procedure is described in clause 6. The setting of power of the message control and data parts is described in the next sub-clause.