TSG-RAN Meeting #15
Cheju, Korea, 5 - 8 March 2002

TSGRP#15(02) 0191

Title: **Change Requests for WI "Node B Synchronisation for 1.28 Mcps TDD"**

Source: **TSG-RAN WG3**

RP_Num	Tdoc_Num	Specification	CR_Num	Revision_Num	3G_Release	CR_Subject	CR_Category	Cur_Ver_Num	Workitem
RP-020191	R3-020451	25.402	032		Rel-5	Node B synchronisation for 1.28Mcps TDD	B	4.3.0	RANimp-NBSLCR
RP-020191	R3-020888	25.433	608	2	Rel-5	Node B synchronisation for 1.28Mcps TDD	B	4.3.0	RANimp-NBSLCR

3GPP TSG-RAN3 Meeting #27
Orlando, USA, 18th–22th February 2002

Tdoc R3-020451

CR-Form-v5

CHANGE REQUEST

⌘ **25.402** **CR** **032** ⌘ **rev** **-** ⌘ Current version: **4.3.0** ⌘

*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 ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	Node B Synchronisation for 1.28Mcps TDD
Source:	⌘	R-WG3
Work item code:	⌘	RANimp-NBSLCR
Date:	⌘	February 2002
Category:	⌘	**B**
Release:	⌘	REL-5

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

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

Reason for change:	⌘	The current text does not include Node B Synchronisation over the air interface for 1.28Mcps TDD.
Summary of change:	⌘	1. In section 6.1.2, it is clarified that subclause 6.1.2.2 is for 3.84Mcps TDD and 6.1.2.X is for 1.28Mcps TDD separately. 2. In section 6.1.2.2, it is clarified that this section only introduces Inter Node B Node Synchronisation for 3.84Mcps TDD mode . 3. Inter NodeB synchronisation for 1.28Mcps TDD is introduced in the new section 6.1.2.X.
Consequences if not approved:	⌘	If this CR is not approved, Node B Synchronisation is not supported for 1.28Mcps TDD.

Clauses affected:	⌘	6.1.2, 6.1.2.2 new: 6.1.2.X
Other specs affected:	⌘	☐ Other core specifications ⌘ 25.433v4.3.0 CR608 ☐ 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://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

Unchanged parts are omitted

6.1.2 Inter Node B Node Synchronisation

In the FDD mode Inter Node B Node Synchronisation could be reached via the RNC-Node B Node Synchronisation in order to determine inter Node B timing reference relations.

This could be used to determine Inter-cell relationships (considering T_cell) which can be used in the neighbour cell lists in order to speed up and simplify cell search done by UE at handover.

In TDD Inter Node B Node Synchronisation is used to achieve a common timing reference among Node B's (see Figure 5), that allows to support Intercell Synchronisation.

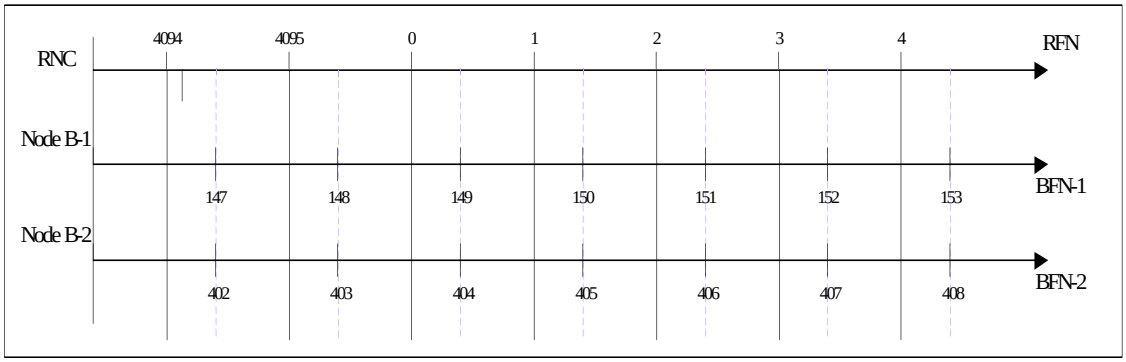

Figure 5: Synchronisation of BFNs through TDD Inter Node B Synchronisation

In TDD Inter Node B Node Synchronisation may be achieved via a standardised synchronisation port (see subclause 6.1.2.1) that allows to synchronise the Node B to an external reference.

Another option to achieve the Inter Node B Node Synchronisation in a TDD system is the synchronisation of cells or Node Bs via the air interface ([3.84Mcps TDD see subclause 6.1.2.2],[1.28Mcps TDD see subclause6.1.2.X]).

6.1.2.1 TDD Node B Synchronisation Ports

This subclause defines the Node B input and an output synchronisation ports that can be used for Inter Node B Node Synchronisation. These synchronisation ports are optional.

The input synchronisation port (SYNC IN) allows the Node B to be synchronised to an external reference (e.g. GPS), while the output synchronisation port (SYNC OUT) allows the Node B to synchronise directly another Node B (see Figure 6).

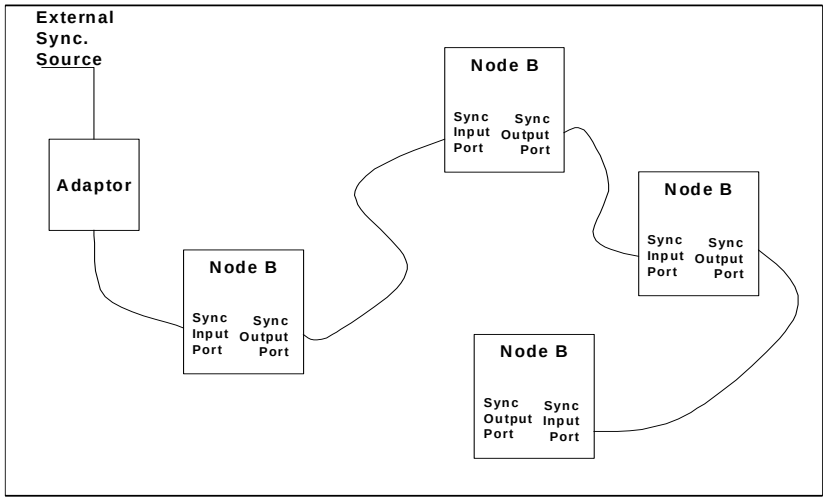

Figure 6: Usage of Synchronisation Ports

This allows connecting Node B's in a daisy chain configuration, so that a single external reference is enough and all remaining Node B's can be synchronised (e.g. in case of indoor operation).

The Node B starts the synchronisation to the external reference when a valid input synchronisation signal is detected at the input synchronisation port.

If a valid synchronisation signal is detected, the Node B regenerates that signal at its output synchronisation port.

The electrical characteristics of the synchronisation ports shall conform to RS422 [6] (output synchronisation port: subclause 4.1; input synchronisation port: subclause 4.2).

The synchronisation signal (illustrated in Figure 7a) is a 100 Hz signal having positive pulses of width between 5 µs and 1 ms, with the following exceptions:

- when (SFN mod 256 = 0) and not (SFN mod 4096 = 0), the pulse shall have a width between 2 ms and 3 ms;

This signal establishes the 10 ms frame interval, the 2.56 s multiframe interval, and the 4096 frames SFN period. The start of all frames in the cell of the node B is defined by the falling edge of the pulse. The required accuracy for the phase difference between the start of the 10ms frame interval is defined in [15]. The time delay from the falling edge of the signal at the SYNC IN port to the start of the transmitted radio frame shall not exceed 500ns.

The start of the 256 frame period is defined by the falling edge of the pulse corresponding to the frames where SFN mod 256 =0 (i.e. of width between 2 ms and 3 ms, or between 4ms and 5 ms, respectively).

The start of the 4096 frame period is defined by the falling edge of the pulse corresponding to the frames where SFN mod 4096 = 0 (i.e. of width between 4 ms and 5 ms).

The synchronisation signal at the input port shall have frequency accuracy better than the one of the Node B.

The relative phase difference of the synchronisation signals at the input port of any Node B in the synchronised area shall not exceed 2.5 µs.

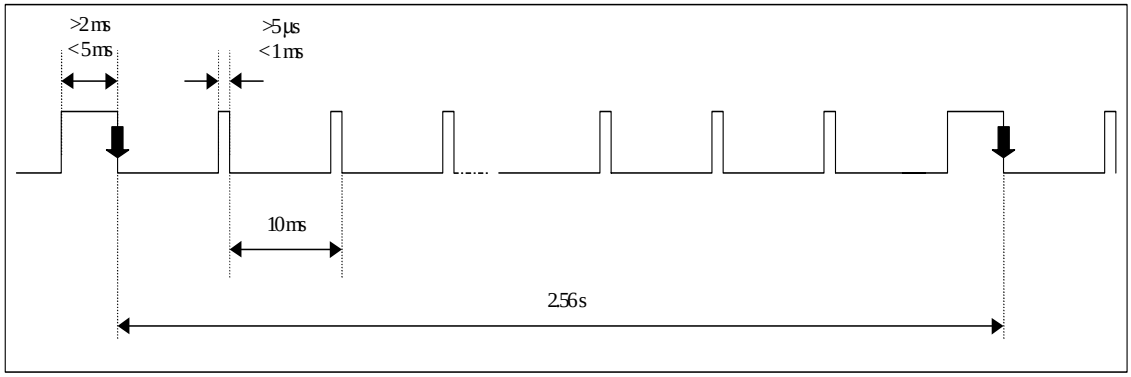

Figure 7: Synchronisation signal with 256 frames markers (Release 99)

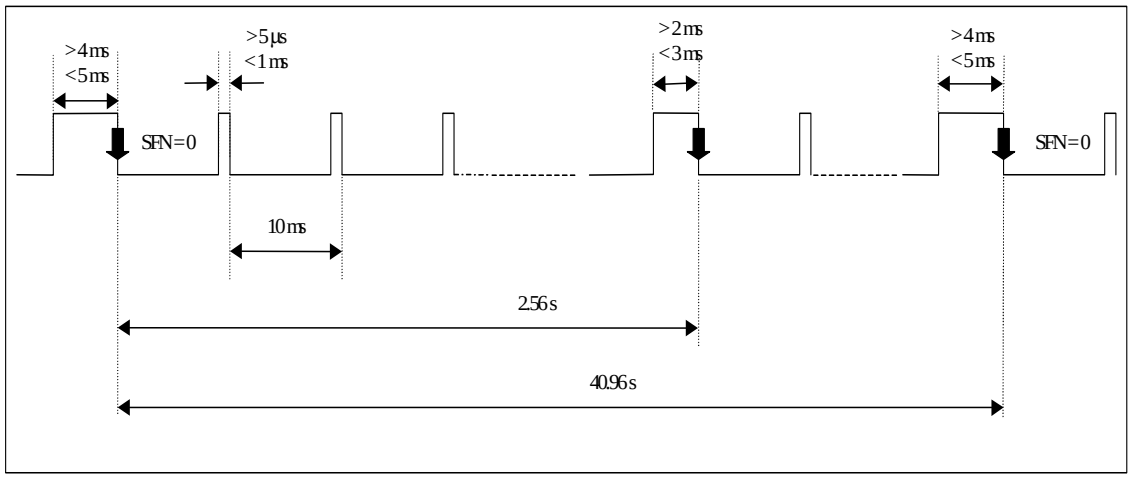

Figure 7a: Synchronisation signal with 256 and 4096 frames markers (Release 4)

Synchronisation by a GPS receiver

The signal transmitted by a Global Positioning System (GPS) satellite indicates the GPS time that provides an absolute time reference. This makes the GPS receiver suitable for Inter Node B Node Synchronisation.

Inter Node B Node Synchronisation is achieved by relating the synchronisation signal (at the input synchronisation port) to the GPS signal. Since the period of this signal is 2.56 s, this implies that every 6400 frames the start of a 256 frame period coincides with an integer GPS second, i.e. a multiframe shall start when GPS time mod 64 = 0.

In general, at each start of a GPS second indicating the GPS time in seconds, the associated full SFN (the 12 bits value) can be derived as: SFN = (GPS time * 100) mod 4096. If the synchronisation port signal shall be derived from GPS, the special pulses for the 256 frames period and the 4096 frames period shall be present in the synch port signal when SFN mod 256 = 0 or SFN mod 4096 = 0, respectively, where the SFN in these equations is linked to the GPS time by the said equation.

Backward compatibility to Release 99

The Release 4 synchronisation port definition is backward compatible with the R99 synch port in the following sense: It is possible to feed a Release 99 Node B with the Rel.4 synchronisation port signal. This results from the fact that the Rel.4 synch port pulses defined for SFN mod 256 = 0 and those defined for SFN mod 4096 = 0 both meet the pulse width tolerance defined for SFN mod 256 = 0 in Release 99. So the Rel.99 Node B will recognise these two classes of Release 4 pulses as valid Release 99 pulses for definition of the 256 frames multiframe start. The Rel.99 Node B will, however, ignore the differences between the 256 frames period pulse and the 4096 frames period pulse: The result is the 256 frames multiframe synchronisation as specified for Release 99.

The opposite scenario, however, i.e. connecting a Release 99 synchronisation port signal (without the 4096 frames marker) to a Release 4 Node B, shall be excluded. This would cause confusion for the "synchronisation via radio interface" procedure. The TDD cells in Rel.4 shall be either "reference" cells where the SFN is fully synchronised to an external reference, or they shall be "non-reference" without any external, local frame clock reference.

6.1.2.2 TDD Inter Node B Node Synchronisation procedure [3.84Mcps TDD]

The Node B synchronisation procedure is an optional procedure based on transmissions of cell synchronisation bursts in predetermined PRACH time slots according to an RNC schedule. Such soundings between neighbouring cells facilitate timing offset measurements by the cells. The measured timing offset values are reported to the RNC for processing. The RNC generates cell timing updates that are transmitted to the Node B and cells for implementation.

The synchronisation procedure has four phases to bring a network into a synchronised operation, the preliminary phase, the frequency acquisition phase, the initial phase and the steady-state phase. The procedure for late entrant cells is slightly different and is described separately.

For synchronisation via the air interface it has to be considered that as long as a cell is not synchronised the cell may interfere the neighbouring cells. This applies especially in case of late entrant cells where first the new cell has to be setup before the synchronisation procedure starts. By this Cell Setup procedure the SCH is already transmitting. The

RNC shall therefore disable the downlink time slots on Cell Setup procedure by means of the *Time slot Status* IE. When the cell synchronisation has been performed the downlink time slots shall be enabled by means of the Cell Reconfiguration procedure.

6.1.2.2.1 Preliminary Phase

1) There should be at least one cell in each RNC area (i.e. in the RNS) which is synchronised by an external reference (e.g. GPS receiver). The cells with reference timing shall initialise their SFN counter so that the frame with SFN=0 starts on January 6, 1980 at 00:00:00 GMT.

2) The RNC has to be informed at which of the cells the external reference clock is connected. Therefore, a 'Reference Clock availability' indicator is added within the RESOURCE STATUS INDICATION message that is sent from the Node B to the RNC when a Local Cell becomes existing at the Node B.

3) At Cell Setup a 'Reference SFN offset' may be given to the cells where the reference clock is connected in order to separate the synchronisation bursts from different RNC areas.

4) The RNC has to retrieve the reference time from the cells with the reference clock. For the reference time retrieval the DL Transport Channels Synchronisation procedure or the Node Synchronisation procedure on the PCH frame protocol (see [4]) shall be used. The Node B shall consider the SFN derived from the synchronisation port and the Reference SFN offset given by the RNC.

5) Now the RNC proceeds by updating the timing of all the remaining cells in the RNS, instructing them to adjust their clocks. Therefore, first the DL Transport Channels Synchronisation procedure on the PCH frame protocol shall be performed in order to determine the deviation from the reference SFN. The RNC then sends a CELL SYNCHRONISATION ADJUSTMENT REQUEST message to all the cells for SFN update, apart from the one(s) containing the reference clock. The cells shall adjust their SFN and frame timing accordingly.

6.1.2.2.1A Frequency Acquisition Phase

The frequency acquisition phase is used to bring cells of an RNS area to within frequency limits prior to initial synchronisation. No traffic is supported during this phase.

1) The cell(s) identified as reference cell, i.e. external reference clock is connected to, shall transmit continuously cell sync bursts in every time slot where possible according to the information's given in the CELL SYNCHRONISATION INITIATION REQUEST message.

2) All other cells are considered as unlocked (i.e. not in frequency lock) shall listen for transmission from other cells and perform frequency locking to any transmission received. For setting the parameters within the Node B to listen for transmission from other cells, the CELL SYNCHRONISATION INITIATION REQUEST message is used.

3) A cell shall signal completion of frequency acquisition to the RNC, as soon as it has locked its frequency to the received signal, fulfilling the Frequency Stability requirement set in [17].

4) If the cell(s) have received transmission request on instructing the frequency acquisition and the cell(s) have performed frequency locking, the cell(s) shall begin transmitting the specified code for frequency locking of other cells.

5) When the RNC has received completion of frequency acquisition signals from all cells the frequency acquisition phase is completed.

6.1.2.2.1B Initial Phase

The procedure for initial synchronisation is used to bring cells of an RNS area into synchronisation at network start up. No traffic is supported during this phase.

1) For the sync procedure it is useful to know which cells can "hear" each other. Therefore, all cells are instructed to transmit their cell sync bursts in turn one after the other. The same cell sync burst code and code offset is used by all cells.

2) Each cell shall listen for transmissions from other cells. Each cell shall report the timing and received SIR of successfully detected cell sync bursts to the RNC.

3) Upon reception of a CELL SYNCHRONISATION ADJUSTMENT message the cell shall adjust its timing accordingly. The timing adjustment shall be completed before the CELL SYNCHRONISATION ADJUSTMENT RESPONSE message is sent. It shall be implemented by adjusting the timing and/or tuning the clock frequency.

4) Steps 1 to 3 are repeated as often as necessary in order to reach the minimum synchronisation accuracy defined in [16]. This serves the purpose to bring the network into tight synchronisation.
The SIR value within the cell sync burst reports is used by the RNC to define the schedule for the steady-state phase. I.e. to define when which cells transmit a cell sync burst and when which cell sync bursts shall be received. Cells which are sufficiently separated can be allowed to send the same cell sync burst at the same time. Cells which are not sufficiently separated have to use different cell sync codes and code offsets for distinctions.

6.1.2.2.2 Steady-State Phase

The steady-state phase allows cells to reach and/or maintain the required synchronisation accuracy. With the start of the steady-state phase traffic is supported in a cell. The steady-state phase starts with the Cell Synchronisation Reconfiguration procedure (see [3]) which defines the synchronisation schedule. I.e. each cell gets the information when to transmit a cell sync burst and when the individual cell sync bursts from the neighbouring cells shall be measured.

For definition of the SFN when the cell shall transmit or receive cell sync bursts, the SFN period is divided into cycles that have the same schedule. Within each cycle the Frame numbers for the cell sync bursts are calculated by the number of repetitions per cycle and by an offset. Code and code offset are used to identify the individual cell sync bursts.

1) The cell shall transmit a cell sync burst and measure cell sync bursts from neighbouring cells according to the information's given in the CELL SYNCHRONISATION RECONFIGURATION REQUEST message. Reception times for all relevant codes and code offsets shall be reported to the RNC with the CELL SYNCHRONISATION REPORT message.

2) Upon determination of an error in timing, the RNC adjusts the cell timing by means of the CELL SYNCHRONISATION ADJUSTMENT message. The timing adjustment shall be started at the beginning of the frame with the SFN given in the command. It shall be completed by the next cell sync slot. Timing adjustments shall be implemented via gradual steps at the beginning of a frame. The whole adjustment shall be implemented with maximum stepsize of one sample per frame.

3) Step 1 and 2 continue indefinitely

6.1.2.2.3 Late-Entrant Cells

The scheme for introducing new cells into a synchronised RNS is as follows:

1) Late entrant cells (new cells being added without reference clock) or cells recovering from unavailability shall first be roughly synchronised. Therefore, first the DL Transport Channels Synchronisation procedure on the PCH frame protocol shall be performed in order to determine the deviation from the reference SFN. The RNC then sends a CELL SYNCHRONISATION ADJUSTMENT message to the late-entrant cells for SFN update.

2) Frequency acquisition of the late entrant cell is started by instructing the late entrant cell first to listen to the regular schedule of cell sync bursts of the surrounding cells. The transmission schedule of the surrounding cells shall be signalled to the late entrant cell within the CELL SYNCHRONISATION INITIATION REQUEST message. Frequency locking is reported using the CELL SYNCHRONISATION REPORT message.

3) In addition or instead of a regular schedule a single common cell sync burst is transmitted in parallel by cells which are synchronised in the system and which are preferably the ones surrounding the late-entrant cell. The single cell sync burst is initiated by means of the CELL SYNCHRONISATION INITIATION REQUEST message to the surrounding cells.

4) The late entrant cell shall correlate against the cell sync burst according to the measurement information within the CELL SYNCHRONISATION INITIATION REQUEST message. The reception window shall be +/- 3 frames around the SFN frame given in the measurement information. The late entrant cell shall take the earliest reception as the timing of the system and adjusts its own timing and SFN number accordingly.

5) Thereafter, the late entrant cell shall start regular measurements after the reception of a CELL SYNCHRONISATION RECONFIGURATION REQUEST message and it shall report the timing of the measured

cell sync bursts to the RNC. In turn, the late entrant cell receives its own schedules for sync transmissions and receptions and enters the steady-state phase.

6.1.2.X TDD Inter Node B Node Synchronisation procedure [1.28Mcps TDD]

The Node B synchronization procedure for 1.28 Mcps TDD is an optional procedure based on the usage of the transmissions of the DwPCH to achieve Node B synchronisation over the air.

The main difference to the corresponding procedure for 3.84 Mcps TDD is the use of the DwPCH instead of the PRACH for synchronisation burst transmission and reception.

In addition, some extensions for the Steady State phase compared to the 3.84Mcps TDD solution have been specified:

- The ability to perform averaging of correlation results of several received SYNC_DL bursts within a Synchronisation Cycle;
- The ability of the cell to perform self-adjustment of the timing based on measurements, and to report the accumulated adjustments to the RNC.

The synchronization procedure has three phases to bring a network into a synchronized operation, the preliminary phase, the initial phase and the steady-state phase. In addition there is a procedure for late entrant cells.

For synchronisation via the air interface it has to be considered that as long as a cell is not synchronised the cell may interfere the neighbouring cells. This applies especially in case of late entrant cells where first the new cell has to be setup before the synchronisation procedure starts. The RNC shall therefore disable the downlink time slots on Cell Setup procedure by means of the *Time slot Status* IE. When the cell synchronisation has been performed the downlink time slots shall be enabled by means of the Cell Reconfiguration procedure.

6.1.2.X.1 Preliminary Phase

1) There should be at least one cell in each RNC area (i.e. in the RNS) which is synchronised by an external reference (e.g. GPS receiver). These cells is called “master cells”. These cells shall initialise their SFN counter so that the frame with SFN=0 starts on January 6, 1980 at 00:00:00 GMT.

2) The RNC has to be informed which of the cells are master cells. Therefore, a 'Reference Clock availability' indicator is added within the RESOURCE STATUS INDICATION message that is sent from the Node B to the RNC when a Local Cell becomes existing at the Node B.

3) At Cell Setup a 'Reference SFN offset' may be given to the cells where the reference clock is connected in order to separate the synchronisation bursts from different RNC areas.

4) The RNC has to retrieve the reference time from the cells with reference clock. For the reference time retrieval the DL Transport Channels Synchronisation procedure or the Node Synchronisation procedure on the PCH frame protocol (see [4]) shall be used. The Node B shall consider the SFN derived from the synchronisation port and the Reference SFN offset given by the RNC.

5) Now the RNC proceeds by updating the timing of all the remaining cells in the RNS, instructing them to adjust their clocks. Therefore, first the DL Transport Channels Synchronisation procedure or the Node Synchronisation procedure on the PCH frame protocol shall be performed in order to determine the deviation from the reference SFN. The RNC then sends a CELL SYNCHRONISATION ADJUSTMENT REQUEST message to all the cells for SFN update, apart from the one(s) containing the reference clock. The cells shall adjust their SFN and frame timing accordingly.

6.1.2.X.2 Initial Phase

The procedure for initial synchronization is used to bring cells of an RNS area into synchronization at a network start up. No traffic is supported during this phase:

1) For the sync procedure it is useful to know which cells can “hear” each other. Therefore, all cells are instructed to transmit their SYNC_DL Codes one-at-a-time.

2) Each cell shall listen to transmissions from other cells based on RNC schedule for initial synchronisation. The SYNC_DL sequence is transmitted continuously throughout each radio frame period. Each cell shall report the timing and received S/(N+I) of successfully detected SYNC_DL codes to the RNC.

3) Upon reception of a CELL SYNCHRONISATION ADJUSTMENT message the cell shall adjust its timing accordingly. The timing adjustment shall be completed before the CELL SYNCHRONISATION ADJUSTMENT RESPONSE message is sent. It shall be implemented by adjusting the timing and/or tuning the clock frequency.

4) Steps 1 to 3 are repeated as often as necessary in order to reach the minimum synchronisation accuracy defined in [16]. This serves the purpose to bring the network into tight synchronisation.
The rapid updates allow the correction of the clock frequencies as well as the clock timings to be adjusted in a short timeframe. This rapidly brings the network into tight synchronization.
The S/(N+I) values are used to define the schedule for the steady-state phase. Cells which are sufficiently separated or use different frequency bands can be allowed to send the same SYNC_DL burst at the same time. Cells which are not sufficiently separated have to use different SYNC_DL codes for distinctions.

6.1.2.X.3 Steady-State Phase

The steady-state phase allows the system to reach or maintain the required synchronization accuracy. There is a "basic method", and there are extensions which may be required under adverse circumstances, to achieve reliable measurements of SYNC_DL codes from neighbour cells, and to achieve immediate, fast timing corrections while reducing the Iub interface signalling load.

6.1.2.X.3.1 Basic method

With the start of the steady-state phase traffic is supported in a cell. The steady-state phase starts with the Cell Synchronisation Reconfiguration procedure (see [3]) which defines the synchronisation schedule. I.e. each cell gets the information when to transmit a SYNC_DL code and when the individual SYNC_DL codes from the neighbouring cells shall be measured.

For definition of the "Synchronisation Frames", i.e. the SFNs when the cell shall transmit or receive SYNC_DL codes, the SFN period is divided into Synchronisation Cycles that include the same number of Synchronisation Frames. The interval from one Synchronisation Frame to the next is called a Repetition Period. Each Synchronisation Cycle has the same transmit and receive schedule.

To be specific, the SFNs which are used as Synchronisation Frames are calculated from the "Number of cacles per SFN period" and the "Number of Repetitions per Cycle" as follows (where Repetition Period may be a non-integer number):

Cycle length: 4096 / value of the IE 'Number of cycles per SFN period'

Repetition period: Cycle length / value of IE 'Number of repetitions per cycle period'

Synchronisation Frame SFN = floor((k-1) * Cycle length + (i-1)* Repetition period)

k = {1, 2, 3, .. Number of cycle per SFN period} = cycle counter

i = {1, 2, 3, .. Number of repetitions within cycle period} = Repetition counter

This provides the set of Synchronisation Frames SFN within the SFN period or 4096 frames. Then the procedure works as follows:

1) Each of the cells transmits its own predetermined SYNC_DL sequence on the DwPCH and receives the specific SYNC_DL of neighbouring cells according to the information given in the CELL SYNCHRONISATION RECONFIGURATION REQUEST message. All cells shall report the reception timing for each specific SYNC_DL to the RNC with the CELL SYNCHRONISATION REPORT message.

2) Upon determination of an error in timing, the RNC adjusts the cell timing by means of the CELL SYNCHRONISATION ADJUSTMENT message. The timing adjustment shall be started at the beginning of the frame with the SFN given in the command. It shall be completed by the next cell sync slot. Timing adjustments shall be implemented via gradual steps at the beginning of a frame. The whole adjustment shall be implemented with maximum stepsize of one sample per frame.

3) Steps 1 and 2 continue indefinitely.

6.1.2.X.3.2 Extended method

The following extensions of the basic scheme are available: Averaging of measurements, and self-adjustment of the radio interface timing.

1) **Averaging of measurements:** For increasing the S/(N+I) values of measured SYNC_DL bursts, it shall be possible for a cell to apply an averaging of SYNC_DL bursts received from the same neighbouring cell, before deriving the receive timing from the correlation result. – During the averaging period, the timing in the neighbouring cells transmitting the SYNC_DL bursts should be "frozen" in order to avoid "blurring" of the averaged measurements. – This optional averaging is supported by subdividing the Synchronisation Cycles into a number of "Subcycles" where in each Subcycle, a full set of SYNC_DL samples is received, and by averaging over the subcycles, such that at the end of a Synchronisation Cycle a full set of timing deviation measurements with improved S/(N+I) is available. The number of subcycles is configured by the CRNC.

This introduction of "Subcycles" implies a change in the equations how to calculate the Synchronisation Frames SFN: The *Number of subcycles per cycle period* IE is taken into account as follows:

Cycle length: 4096 / value of the IE 'Number of cycles per SFN period'

Subcycle length: Cycle length / value of IE 'Number of subcycles per cycle period'

Repetition period: Subcycle length / value of IE 'Number of repetitions per subcycle period'

Synchronisation Frame SFN = floor((k-1) * Cycle length + (i-1)* Repetition period)

k = {1, 2, 3, .. Number of cycle per SFN period} = cycle counter

j = {1, 2, 3, .. Number of subcycles per cycle} = subcycle counter

i = {1, 2, 3, .. Number of repetitions within cycle period} = Repetition counter

This provides the set of Synchronisation Frames SFN within the SFN period of 4096 frames.

Note 1: Subcycle length and Repetiton period can have non-integer values.

Note 2: If the number of subcycles per cycle is set to unity, the "subcycles" are identitical to the "cycles", and no averaging occurs.

At the end of each Cycle, a full set of Time of Arrival measurements is available, with or without averaging. So these measurements can be further processed as in the basic method.

2) **Self-adjustment of the radio interface timing**: It should be possible for the RNC to allow the Node B to perform a timing correction based on its own measurements autonomously without requiring the RNC to calculate the amount of timing correction. This reduces the amount of Iub interface signalling while allowing for fast corrections of timing deviations. – So the RNC shall indicate the possibility of self-adjustment, by including a *Propagation Delay Compensation* IE into the CELL SYNCHRONISATION RECONFIGURATION message, in addition to the SYNC_DL code to measure. Whenever this optional IE is present, the Node B should use the respective SYNC_DL measurement (after potential averaging) to perform the self-adjustment at the end of a Synchronisation Cycle. – Whenever this IE is not present, no self-adjustment shall be performed. – In each measurement report where the Node B reports the measured Time of Arrival values, the Node B shall also include the accumulated phase adjustments since the last measurement report to the RNC for surveillance purposes.

6.1.2.X.4 Late-Entrant Cells

The scheme for introducing new cells into a synchronized RNS is as follows:

1) Late-entrant cells (new cells being added without reference clock) or cells recovering from unavailability shall first be roughly synchronised via Iub interface messages. Therefore, first the DL Transport Channels Synchronisation procedure or the Node Synchronisation procedure on the PCH frame protocol shall be performed in order to determine the deviation from the reference SFN. The RNC then sends a CELL SYNCHRONISATION ADJUSTMENT message to the late-entrant cells for SFN update.

2) Frequency acquisition of the late entrant cell is started by instructing the late entrant cell first to listen to the regular schedule of SYNC_DL codes of the surrounding cells. The transmission schedule of the surrounding cells shall be signalled to the late entrant cell within the CELL SYNCHRONISATION INITIATION REQUEST message. Frequency locking is reported using the CELL SYNCHRONISATION REPORT message.

3) The RNC should tell the late-entrant which SYNC_DL codes and carrier frequencies to listen for, corresponding to its neighbour cells signalled within the CELL SYNCHRONISATION RECONFIGURATION REQUEST message.

4) The late entrant then reports the timing of the SYNC_DL codes using the CELL SYNCHRONISATION REPORT message. The RNC knows the location of all cells and therefore should be able to compute a timing adjustment for the late-entrant that takes into account the expected propagation delays between the late-entrant and its neighbouring cells The RNC adjusts the cell and the cycle is repeated until the RNC is satisfied that the cell's timing accuracy fulfills the requirements to be allowed to enter the Steady State phase.

Unchanged parts are omitted

3GPP TSG-RAN WG3 Meeting #27 ***R3-020888***

Orlando, FL, USA, 18th – 22nd February 2002

CR-Form-v3

CHANGE REQUEST

⌘ **25.433** **CR** **608** ⌘ rev **2** ⌘ Current version: **4.3.0** ⌘

*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 ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	Node B synchronisation for 1.28Mcps TDD
Source:	⌘	~~Siemens~~R-WG3
Work item code:	⌘	RANimp-NBSLCR
Date:	⌘	February 2002
Category:	⌘	**B**
Release:	⌘	REL-5

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 current text does not include Node B Synchronisation over the air interface for 1.28Mcps TDD.
Summary of change:	⌘	NodeB synchronisation for 1.28Mcps TDD is introduced.
Consequences if not approved:	⌘	If this CR is not approved, Node B Synchronisation is not supported for 1.28Mcps TDD.

Clauses affected:	⌘	8.2.20.1, 8.2.20.2, 8.2.20.3, 8.2.21.1, 8.2.21.2, 8.2.21.3, 8.2.221, 8.2.22.2, 8.2.23.1, 8.2.23.2, 8.2.24.2, 8.2.25.2, 9.1.75, 9.1.78, 9.1.81, 9.1.84, 9.2.3.7C, 9.2.3.18C, 9.2.3.18D, 9.3.3, 9.3.4, 9.3.6 new: 9.2.3.a
Other specs affected:	⌘	**X** Other core specifications ⌘ 25.402 v4.3.0 CR032 ☐ 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.

8 NBAP Procedures

/* partly omitted */

8.2.20 Cell Synchronisation Initiation [TDD]

8.2.20.1 General

This procedure is used by a CRNC to request the transmission of cell synchronisation bursts and/or to start measurements on cell synchronisation bursts in a Node B. Note: The term "cell synchronisation burst" is used as a generic term which refers to the synchronisation bursts used in the two TDD chip rate options. A "cell synchronisation burst" is a [3.84Mcps TDD – cell sync burst sent in the PRACH time slots] or a [1.28Mcps TDD - SYNC_DL code sent in the DwPTS], respectively.

8.2.20.2 Successful Operation

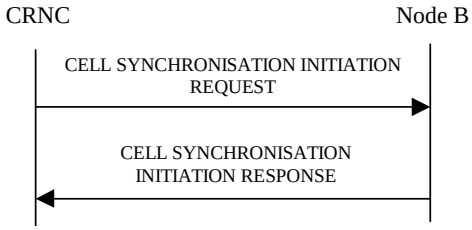

Figure 27C Cell Synchronisation Initiation procedure, Successful Operation

The procedure is initiated with a CELL SYNCHRONISATION INITIATION REQUEST message sent from the CRNC to the Node B using the Node B control port.

Upon reception, the Node B shall initiate the requested transmission according to the parameters given in the request and start the measurement on cell synchronisation bursts if requested.

Cell Sync Burst Transmission Initiation

When the Cell Sync Burst Transmission Initiation Information is present, the Node B shall configure the transmission of the cell sync burst according to the parameters given in the CELL SYNCHRONISATION INITIATION REQUEST message. The *SFN* IE indicates the frame number when the cell shall start transmitting cell sync bursts.

[3.84Mcps TDD - When the Cell Sync Burst Transmission Initiation Information is present and the 'Frequency Acquisition' is indicated within the *Synchronisation Report Type* IE, the Node B shall first perform only frequency locking on received cell sync bursts. Transmission of the indicated cell sync bursts shall be started only if the frequency locking is performed successfully and 'Frequency Acquisition completed' is reported to the RNC.]

[3.84Mcps TDD - Cell Sync Burst Measurement characteristics] [1.28Mcps TDD – SYNC_DL Code Measurement characteristics LCR]

When the [3.84Mcps TDD - Cell Sync Burst Measurement Initiation Information][1.28Mcps TDD – SYNC_DL Code Measurement Initiation Information LCR] is present, the Node B shall initiate measurements on the indicated cell synchronisation burst.

In case the *SFN* IE is present, the Node B shall after measurement of the indicated cell synchronisation burst adjust the frame number of the indicated cell according to the SFN of the CELL SYNCHRONISATION INITIATION REQUEST message. This adjustment shall only apply to the late entrant cell at the late entrant phase.

Synchronisation Report characteristics

The *Synchronisation Report Characteristics* IE indicates how the reporting of the cell synchronisation burst measurement shall be performed. Whenever the Cell Synchronisation Initialtion procedure is initiated, only the 'Frequency Acquisition completed' or 'Frame related' report characteristics type shall apply.

[3.84Mcps TDD - If the *Synchronisation Report characteristics type* IE is set to 'Frequency Acquisition completed', the Node B shall signal completion of frequency acquisition to the RNC when locking is completed.]

If the *Synchronisation Report characteristics type* IE is set to 'Frame related', the Node B shall report the result of the cell synchronisation burst measurement after every measured frame.

Response message
If the Node B was able to initiate the cell synchronisation burst transmission and/or measurement requested by the CRNC it shall respond with the CELL SYNCHRONISATION INITIATION RESPONSE message sent over the Node B control port.

8.2.20.3 Unsuccessful Operation

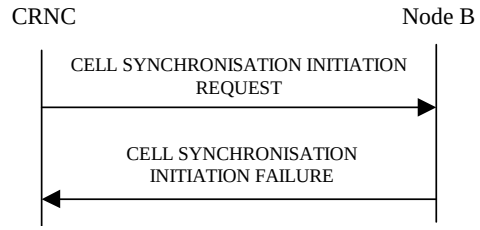

Figure 27D Cell Synchronisation Initiation procedure, Unsuccessful Operation

If the requested transmission or measurement on cell synchronisation bursts cannot be initiated, the Node B shall send a CELL SYNCHRONISATION INITIATION FAILURE message over the Node B control port. The message shall include the *Cause* IE set to an appropriate value.

Typical cause values are as follows:

Radio Network Layer Cause

- Cell Synchronisation not supported
- Power level not supported
- Measurement Temporarily not Available
- Frequency Acquisition not supported

Miscellaneous Cause

- O&M Intervention
- HW failure

8.2.20.4 Abnormal Conditions

-

8.2.21 Cell Synchronisation Reconfiguration [TDD]

8.2.21.1 General

This procedure is used by a CRNC to reconfigure the transmission of cell synchronisation bursts and/or to reconfigure measurements on cell synchronisation bursts in a Node B.

8.2.21.2 Successful Operation

8.2.21.2.1 General

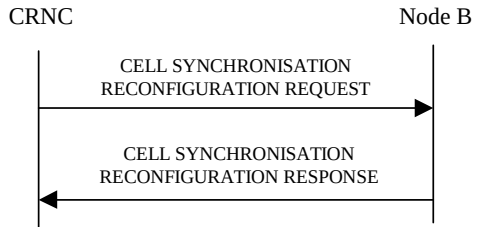

Figure 27E Cell Synchronisation Reconfiguration procedure, Successful Operation

The procedure is initiated with a CELL SYNCHRONISATION RECONFIGURATION REQUEST message sent from the CRNC to the Node B using the Node B control port.

Upon reception, the Node B shall reconfigure the cell sync burst transmission and/or measurements according to the parameters given in the request.

8.2.21.2.2 Cell Sync Burst Schedule

Within the CELL SYNCHRONISATION RECONFIGURATION REQUEST message first the schedule for the steady state phase is fixed. I.e. the number of cycles per SFN period is defined with the same schedule. For each cycle the number of repetitions is defined according to following equations:

Cycle length: 4096 / value of the IE 'Number of cycles per SFN period'

Repetition period: Cycle length / value of IE 'Number of repetitions per cycle period'

Cell Sync Frame number is calculated by:

SFN = floor((k-1) * Cycle length + (i-1)* Repetition period)

k = {1, 2, 34, .. Number of cycle per SFN period}

i = {1, 2, 3, .. Cell Sync Frame number within cycle period}

8.2.21.2.3 [1.28Mcps TDD – SYNC DL Code Schedule]

Within the CELL SYNCHRONISATION RECONFIGURATION REQUEST message first the schedule for the steady state phase is fixed. The "schedule" includes

- the list of frame numbers SFN within the SFN period where synchronisation burst transmission or reception takes place, i.e. the "synchronisation frames", and
- the associated actions (burst transmission, reception, averaging, reporting etc) to be performed for synchronisation purpose by the Node B at each of these SFNs.

Within the synchronisation frames, only the first subframe shall be used for sending or receiving a synchronisation burst in the DwPTS while in the second subframe, normal operation continues.

In case of 1.28Mcps TDD, the synchronisation schedule includes the option of averaging of measured correlation results within the Node B over a sequence of measurements, for increasing the reliability of the Time of Arrival measurement obtained from the correlation results. For this purpose, the concept of "subcycles" has been introduced: Each Synchronisation Cycle is devided into "subcycles" where in each subcycle, the same set of SYNC_DL transmissions and receptions is performed, and averaging takes place over all the subcycles within a Synchronisation Cycle. Since the list of actions (transmission, measurements etc) is the same in each subcycle, and the subcycles are repeated to make up a cycle, and the cycles make up an SFN period, the full list of actions is derived by the actions specified for a subcycle.

The full list of SFNs which make up the synchronisation schedule within the SFN period are calculated in Node B and RNC autonomously based on the following parameters included in the CELL SYNCHRONISATION

RECONFIGURATION REQUEST message: "Number of cycles per SFN period", "Number of sybcycles per cycle period", and "Number of repetitions per cycles period", along the following equations:

Cycle length: 4096 / value of the IE 'Number of cycles per SFN period'

Subcycle length: Cycle length / value of the IE "Number of subcycles per cycle period"

Repetition period: Subcycle length / value of IE 'Number of repetitions per cycle period'

SFN = floor((k-1) * Cycle length + (j-1)*Subcycle length + (i-1)* Repetition period)

k = {1, 2, 3, .. Number of cycle per SFN period}

j = {1, 2, 3, .. Number of subcycles per cycle}

i = {1, 2, 3, .. Number of repetitions per cycle period}

Note that if the *Number of subcycles per cycle* IE is equal to 1, then the subcycles are identical to the "Synchronisation Cycles".

If the *Number of subcycles per cycle* IE is included in the CELL SYNCHRONISATION RECONFIGURATION REQUEST [TDD], then the Node B shall apply this number for dividing the Synchronisation Cycles in Subcycles. If the IE is not present, then the Node B shall assume that there is one subcycle per synchronisation cycle only, which is identical to the synchronisation cycle.

Averaging is performed as follows:

- From each SYNC_DL code being received according to the schedule, the Node B shall calculate a "correlation function" by matching the received data with the respective expected code.
- Therefore the set of measurements within one sybcycle provides a set of "correlation functions".
- The set of correlation functions of the first subcycle within a synchronisation cycle is stored in an averaging memory.
- The sets of correlation functions of the subsequent subcycles within a synchronisation cycle are combined with the available contents of the "averaging memory", to produce an average over all the sets of correlation functions within a synchronisation cycle.
- At the end of a synchronisation cycle, the Time-of-Arrival measurements for that synchronisation cycle are obtained by evaluating the final set of correlation functions.

These Time-of-Arrival measurements, together with associated SIR values obtained from the averaged correlation functions, are included in a Measurement Report to the RNC, according to a measurement reporting plan.

In addition, the Time-of-Arrival measurements may optionally be used for autonomous self-adjustment of the timing of the respective cell.

8.2.21.2.4 [3.84Mcps TDD - Cell Sync Burst Transmission Reconfiguration] [1.28Mcps TDD – SYNC_DL Code Transmission Reconfiguration]

When the [3.84Mcps TDD - Cell Sync Burst Transmission Reconfiguration Information] [1.28Mcps TDD – SYNC_DL Code Transmission Reconfiguration Information LCR] is present, the Node B shall reconfigure the transmission of the [3.84Mcps TDD - cell sync burst] [1.28Mcps TDD - SYNC_DL Code] according to the parameters given in the CELL SYNCHRONISATION RECONFIGURATION REQUEST message.

[3.84Mcps TDD - If the CELL SYNCHRONISATION RECONFIGURATION REQUEST message includes the *Cell Sync Burst Code* IE the Node B shall reconfigure the synchronisation code in the cell according to the *Cell Sync Burst Code* IE value.]

[3.84Mcps TDD - If the CELL SYNCHRONISATION RECONFIGURATION REQUEST message includes the *Cell Sync Burst Code* shift IE the Node B shall reconfigure the synchronisation code shift in the cell according to the *Cell Sync Burst Code* shift IE value.]

[3.84Mcps TDD - If the CELL SYNCHRONISATION RECONFIGURATION REQUEST message includes the *DL transmission Power* IE the Node B shall reconfigure the Dl transmission power of the cell sync burst in the cell according to the *DL transmission Power* IE value.]

[1.28Mcps TDD - If the CELL SYNCHRONISATION RECONFIGURATION REQUEST message includes the *DwPCH Power* IE the Node B shall store the DwPCH power according to the *DwPCH Power* IE value. For the duration of those subsequent transmissions of the DwPCH which are specifically for the purpose of Node B synchronisation the power of the DwPCH shall be set to the stored power. During subsequent transmissions of the DwPCH which are for normal operation the power of the DwPCH shall assume its normal level.]

8.2.21.2.5 [3.84Mcps TDD - Cell Sync Burst Measurement Reconfiguration] [1.28Mcps TDD – SYNC_DL Code Measurement Reconfiguration]

When the [3.84Mcps TDD - Cell Sync Burst Measurement Reconfiguration Information] [1.28Mcps TDD - Cell SYNC_DL Code Measurement Reconfiguration Information LCR] is present, the Node B shall reconfigure the [3.84Mcps TDD - cell sync burst] [1.28Mcps TDD - SYNC_DL Code] measurements according the parameters given in the message.

If the CELL SYNCHRONISATION RECONFIGURATION REQUEST message includes the [3.84Mcps TDD -Cell Sync Burst Measurement Information][1.28Mcps TDD – SYNC_DL Code Measurement Information LCR] the measurements shall apply on the individual [3.84Mcps TDD - cell sync bursts] [1.28Mcps TDD - SYNC_DL Codes] on the requested Sync Frame number.

[1.28Mcps TDD - When the *Propagation Delay Compensation* IE is present in the Cell Sync Burst Measurement Information, the Node B shall, if supported, perform the following functions: (1) use the respective SYNC_DL measurement (after potential averaging) to perform the self-adjustment of the respective cell's timing at the end of a Synchronisation Cycle; (2) include the *Accumulated Clock Update* IE in the CELL SYNCHRONISATION REPORT message, to report the total accumulated amount of timing adjustments since the last report to the RNC. This Accumulated Clock Update value shall also include the adjustments which may have been performed by explicit order from the RNC in the CELL SYNCHRONISATION ADJUSTMENT REQUEST message. The times for self-adjustment at the end of a synchronisation cycle shall be independent from the measurement reporting characteristics; the Accumulated Adjustment values shall be included in the CELL SYNCHRONISATION REPORT messages without influencing the frequency of measurement reporting.]

If the *Synchronisation Report Type* IE is provided, the measurement reporting shall apply according the parameter given in the message.

Synchronisation Report characteristics

The *Synchronisation Report Characteristics* IE indicates how the reporting of the cell synchronisation burst measurement shall be performed.

If the *Synchronisation Report characteristics type* IE is set to 'Frame related', the Node B shall report the result of the cell synchronisation burst measurement after every measured frame.

If the *Synchronisation Report characteristics type* IE is set to 'SFN period related', the Node B shall report the result of the cell synchronisation burst measurements after every SFN period.

If the *Synchronisation Report characteristics type* IE is set to 'Cycle length related', the Node B shall report the result of the cell synchronisation burst measurements after every cycle length within the SFN period.

If the *Synchronisation Report characteristics type* IE is set to 'Threshold exceeding', the Node B shall report the result of the [3.84Mcps TDD - cell sync burst] [1.28Mcps TDD - SYNC_DL Code] measurement when the [3.84Mcps TDD - cell sync burst timing] [1.28Mcps TDD – SYNC_DL Code timing] rises or falls more than the requested threshold value compared to the arrival time in synchronised state which is represented by the [3.84Mcps TDD - *Cell Sync Burst Arrival Time* IE] [1.28Mcps TDD – *SYNC_DL Code ID Arrival Time* IE].

Response message

If the Node B was able to reconfigure the cell synchronisation burst transmission and/or measurement requested by the CRNC it shall respond with the CELL SYNCHRONISATION RECONFIGURATION RESPONSE message sent over the Node B control port.

8.2.21.3 Unsuccessful Operation

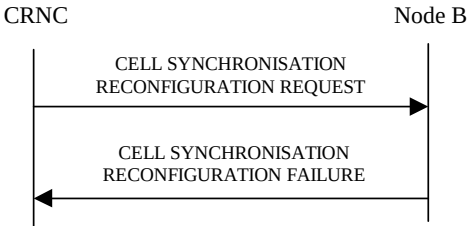

Figure 27F Cell Synchronisation Reconfiguration procedure, Unsuccessful Operation

If the Node B cannot reconfigure the requested transmission or measurement on [3.84Mcps TDD - cell sync burst] [1.28Mcps TDD – SYNC_DL Code], the CELL SYNCHRONISATION RECONFIGURATION FAILURE message shall be sent to the CRNC. The message shall include the *Cause* IE set to an appropriate value.

Typical cause values are as follows:

Radio Network Layer Cause

- Cell Synchronisation not supported
- Power level not supported
- Measurement Temporarily not Available

Miscellaneous Cause

- O&M Intervention
- HW failure

8.2.21.4 Abnormal Conditions

-

8.2.22 Cell Synchronisation Reporting [TDD]

8.2.22.1 General

This procedure is used by a Node B to report the result of [3.84Mcps TDD - cell sync burst] [1.28Mcps TDD - SYNC_DL Code] measurements requested by the CRNC with the Cell Synchronisation Initiation or Cell Synchronisation Reconfiguration procedure.

8.2.22.2 Successful Operation

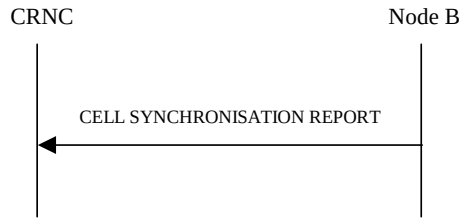

Figure 27G Cell Synchronisation Reporting procedure, Successful Operation

If the requested synchronisation measurement reporting criteria are met, the Node B shall initiate a Cell Synchronisation Reporting procedure. The CELL SYNCHRONISATION REPORT message shall use the Node B control port.

In the steady state phase when several [3.84Mcps TDD - cell sync bursts] [1.28Mcps TDD - SYNC_DL Codes] shall be measured per Sync Frame number, the sequence of the reported measured values shall be the same as defined in the Cell Synchronisation Reconfiguration procedure.

[1.28Mcps TDD - The Node B shall - if supported - include the *Accumulated Clock update* IE in the CELL SYNCHRONISATION REPORT message whenever the RNC has included at least one instance of the *Propagation Delay Compensation* IE in the CELL SYNCHRONISATION RECONFIGURATION REQUEST message. The *Accumulated Clock update* IE shall include the accumulated timing adjustment which has been done as commanded by the RNC, as well as by self-adjustment, since the last *Accumulated Clock update* IE report.]

If the achieved measurement accuracy does not fulfil the given accuracy requirement defined in [23], the Cell Sync Burst not available shall be reported.

8.2.22.3 Abnormal Conditions

-

8.2.23 Cell Synchronisation Termination [TDD]

8.2.23.1 General

This procedure is used by the CRNC to terminate a [3.84Mcps TDD - cell sync burst] [1.28Mcps TDD - SYNC_DL Code] transmission or measurement previously requested by the Cell Synchronisation Initiation procedure or Cell Synchronisation Reconfiguration procedure.

8.2.23.2 Successful Operation

Figure 27H Cell Synchronisation Termination procedure, Successful Operation

This procedure is initiated with a CELL SYNCHRONISATION TERMINATION REQUEST message, sent from the CRNC to the Node B using the Node B control port.

Upon reception, the Node B shall terminate transmission of [3.84Mcps TDD - cell sync bursts or reporting of cell sync burst measurements] [1.28Mcps TDD - SYNC_DL Codes or reporting of SYNC_DL Code measurements] corresponding to the CSB Transmission Id or CSB Measurement Id.

8.2.23.3 Abnormal Conditions

-

8.2.24 Cell Synchronisation Failure [TDD]

8.2.24.1 General

This procedure is used by the Node B to notify the CRNC that a synchronisation burst transmission or synchronisation measurement procedure can no longer be supported.

8.2.24.2 Successful Operation

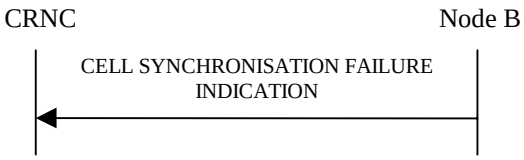

Figure 27I Cell Synchronisation Failure procedure, Successful Operation

This procedure is initiated with a CELL SYNCHRONISATION FAILURE INDICATION message, sent from the Node B to the CRNC using the Node B control port, to inform the CRNC that a previously requested transmission or measurement on [3.84Mcps TDD - cell sync bursts] [1.28Mcps TDD – SYNC_DL Codes] can no longer be supported.

8.2.24.3 Abnormal Conditions

-

8.2.25 Cell Synchronisation Adjustment [TDD]

8.2.25.1 General

The purpose of Cell Synchronisation Adjustment procedure is to allow the CRNC to adjust the timing of the radio transmission of a cell within a Node B for time alignment.

8.2.25.2 Successful Operation

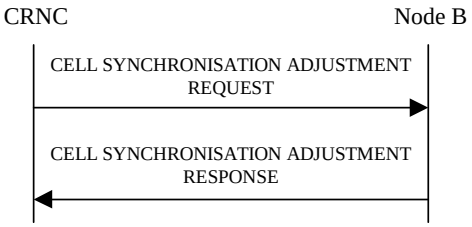

Figure 27J Cell Synchronisation Adjustment, Successful Operation

This procedure is initiated with a CELL SYNCHRONISATION ADJUSTMENT REQUEST message sent by the CRNC to the Node B using the Node B control port.

Upon reception, the Node B adjusts its timing according to the parameters given in the message.

If the CELL SYNCHRONISATION ADJUSTMENT REQUEST message includes the *Frame Adjustment value* IE the Node B shall apply the frame adjustment in the cell according to the *Frame Adjustment value* IE value.

If the CELL SYNCHRONISATION ADJUSTMENT REQUEST message includes the *Timing Adjustment value* IE the Node B shall apply the timing adjustment in the cell according to the *Timing Adjustment value* IE value.

[3.84Mcps TDD - If the CELL SYNCHRONISATION ADJUSTMENT REQUEST message includes the *DL Transmission Power* IE the Node B shall apply the transmission power of the cell sync burst according to the *DL Transmission Power* IE value.]

[1.28Mcps TDD - If the CELL SYNCHRONISATION ADJUSTMENT REQUEST message includes the *DwPCH Power* IE the Node B shall store the DwPCH power according to the *DwPCH Power* IE value. For the duration of those subsequent transmissions of the DwPCH which are specifically for the purpose of Node B synchronisation the power of the DwPCH shall be set to the stored power. During subsequent transmissions of the DwPCH which are for normal operation the power of the DwPCH shall assume its normal level.]

If the CELL SYNCHRONISATION ADJUSTMENT REQUEST message includes the *SFN* IE the Node B shall apply the synchronisation adjustment starting with the SFN number indicated in the message.

When the cell synchronisation adjustment is successfully done by the Node B the Node B shall respond with a CELL SYNCHRONISATION ADJUSTMENT RESPONSE message.

8.2.25.3 Unsuccessful Operation

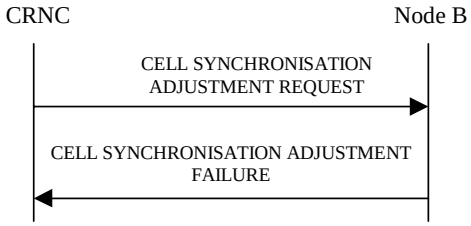

Figure 27K Cell Synchronisation Adjustment, Unsuccessful Operation

If the Node B cannot perform the indicated cell synchronisation adjustment due to hardware failure or other problem it shall send the CELL SYNCHRONISATION ADJUSTMENT FAILURE as a response.

Typical cause values are as follows:

Radio Network Layer Cause

- Cell Synchronisation Adjustment not supported
- Power level not supported

Miscellaneous Cause

- O&M Intervention
- HW failure

8.2.25.4 Abnormal Conditions

-

/* partly omitted */

9.1.75 CELL SYNCHRONISATION INITIATION REQUEST [TDD]

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Discriminator	M		9.2.1.45		–	
Message Type	M		9.2.1.46		YES	reject
Transaction ID	M		9.2.1.62		–	
C-ID	M		9.2.1.9		YES	reject
Cell Sync Burst Repetition Period	M		9.2.3.4J		YES	reject
Time Slot Information		01..15		Mandatory for 3.84Mcps TDD only	GLOBAL	reject
>Time Slot	M		9.2.3.23		–	
Cell Sync Burst Transmission Initiation Information		0..1		3.84Mcps TDD only	GLOBAL	reject
>CSB Transmission ID	M		9.2.3.4N			
>SFN	M		9.2.1.53A		–	
>Cell Sync Burst Code	M		9.2.3.4G		–	
>Cell Sync Burst Code shift	M		9.2.3.4H			
>Initial DL transmission Power	M		DL Power 9.2.1.21		–	
Cell Sync Burst Measurement Initiation Information		0..1		3.84Mcps TDD only	GLOBAL	reject
>CSB Measurement ID	M		9.2.3.4I			
>Cell Sync Burst Code	M		9.2.3.4G		–	
>Cell Sync Burst Code shift	M		9.2.3.4H			
>Synchronisation Report Type	M		9.2.3.18E		–	
>SFN	O		9.2.1.53A		–	
>Synchronisation Report Characteristics	M		9.2.3.18D		–	
SYNC_DL Code Transmission Initiation Information LCR		0..1		1.28Mcps TDD only	GLOBAL	reject
>CSB Transmission ID	M		9.2.3.4N		–	
>SFN	M		9.2.1.53A		–	
>UARFCN	M		9.2.1.65		–	
>SYNC_DL Code ID	M		9.2.3.18B		–	
>DwPCH Power	M		9.2.3.5B		–	
SYNC_DL Code Measurement Initiation Information LCR		0..1		1.28Mcps TDD only	GLOBAL	reject
>CSB Measurement ID	M		9.2.3.4I		–	
>SFN	O		9.2.1.53A		–	
>UARFCN	M		9.2.1.65		–	
>SYNC_DL Code ID	M		9.2.3.18B		–	
>Synchronisation Report Type	M		9.2.3.18E		–	
>Synchronisation Report Characteristics	M		9.2.3.18D		–	

/* partly omitted */

9.1.78 CELL SYNCHRONISATION RECONFIGURATION REQUEST [TDD]

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Discriminator	M		9.2.1.45		–	
Message Type	M		9.2.1.46		YES	reject
Transaction ID	M		9.2.1.62		–	
C-ID	M		9.2.1.9		YES	reject
Time Slot	M		9.2.3.23	3.84Mcps TDD only. For 1.28Mcps TDD the CRNC should set this to 0 and the Node B shall ignore it	YES	reject
Number of cycles per SFN period	M		9.2.3.7B		YES	reject
Number of repetitions per cycle period	M		9.2.3.7C		YES	reject
Cell Sync Burst Transmission Reconfiguration Information		0 .. < maxnoofCellSyncBursts >		3.84Mcps TDD only	Global	reject
>CSB Transmission ID	M		9.2.3.4N		–	
>Sync Frame number to transmit	M		Sync Frame number 9.2.3.18C		–	
>Cell Sync Burst Code	O		9.2.3.4G		–	
>Cell Sync Burst Code shift	O		9.2.3.4H		–	
>DL transmission Power	O		DL Power 9.2.1.21		–	
Cell Sync Burst Measurement Reconfiguration Information		0..1		3.84Mcps TDD only	YES	reject
>Cell Sync Burst Measurement Information		1 .. <maxnoof CellSyncBursts>			GLOBAL	reject
>>Sync Frame number to receive	M		Sync Frame number 9.2.3.18C		–	
>>Cell Sync Burst Information		1..< maxnoofreceptionsperSyncFrame>			–	
>>>CSB Measurement ID	M		9.2.3.4I		–	
>>>Cell Sync Burst Code	M		9.2.3.4G		–	
>>>Cell Sync Burst Code shift	M		9.2.3.4H		–	
>Synchronisation Report	O		9.2.3.18E		YES	reject

Type						
>Synchronisation Report Characteristics	O		9.2.3.18D		YES	reject
Number of subcycles per cycle period	O		9.2.3.a	1.28Mcps TDD only	YES	reject
SYNC_DL Code Transmission Reconfiguration Information LCR		0 .. <maxnoofSyncFramesLCR>		1.28Mcps TDD only	GLOBAL	reject
>CSB Transmission ID	M		9.2.3.4N		–	
>Sync Frame number for transmission	M		Sync Frame number 9.2.3.18C		–	
>UARFCN	M		9.2.1.65		–	
>SYNC_DL Code ID	O		9.2.3.18B		–	
>DwPCH Power	O		9.2.3.5B		–	
SYNC_DL Code Measurement Reconfiguration Information LCR		0..1		1.28Mcps TDD only	YES	reject
>SYNC_DL Code Measurement Information LCR		1 .. <maxnoofSyncDLCodesLCR>			GLOBAL	reject
>>Sync Frame number to receive	M		Sync Frame number 9.2.3.18C		–	
>>Sync_DLCode Information LCR		1..< maxnoofreceptionsperSyncFrameLCR>			–	
>>>CSB Measurement ID	M		9.2.3.4I		–	
>>>SYNC_DL Code ID	M		9.2.3.18B		–	
>>>UARFCN	M		9.2.1.65		–	
>>>Propagation Delay Compensation	O		Timing Adjustment value 9.2.3.22a		–	
>Synchronisation Report Type	O		9.2.3.18E		YES	reject
>Synchronisation Report Characteristics	O		9.2.3.18D		YES	reject

Range bound	Explanation
maxnoofCellSyncBursts	Maximum number of cell sync bursts per cycle for 3.84Mcps TDD
maxnoofreceptionsperSyncFrame	Maximum number of cell sync burst receptions per Sync Frame for 3.84Mcps TDD
maxnoofSyncFramesLCR	Maximum number of Sync Frames per subcycle for 1.28Mcps TDD
maxnoofreceptionsperSyncFrameLCR	Maximum number of SYNC_DL Code ID receptions per Sync Frame for 1.28Mcps TDD

/* partly omitted */

9.1.81 CELL SYNCHRONISATION REPORT [TDD]

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Discriminator	M		9.2.1.45		–	
Message Type	M		9.2.1.46		YES	ignore
Transaction ID	M		9.2.1.62		–	
Cell Synchronisation Information		*1..* <maxCellinNodeB >			EACH	ignore
>C-ID	M		9.2.1.9		YES	ignore
>CHOICE *Synchronisation Report Type*					YES	ignore
>>*Initial Phase* or *Steady-State Phase*					–	
>>>Cell Sync Burst Measured Information		~~0~~1 .. <maxnoofCellSyncBursts>		Mandatory for 3.84Mcps TDD only	–	
>>>>SFN	M		9.2.1.53A		–	
>>>>Cell Sync Burst Information		1..<maxnoofreceptionsperSyncFrame>			–	
>>>>>CHOICE *Cell Sync Burst Availability Indicator*	M				–	
>>>>>>*Cell Sync Burst Available*					–	
>>>>>>>Cell Sync Burst Timing	M		9.2.3.4L		–	
>>>>>>>Cell Sync Burst SIR	M		9.2.3.4K		–	
>>>>>>*Cell Sync Burst not Available*			NULL		–	
>>>Accumulated Clock update	O		Timing Adjustment Value 9.2.3.22a		–	
>>>SYNC_DL Codes Measured Information		0..<maxnoofSyncFramesLCR>		Mandatory for 1.28Mcps TDD only	YES	ignore
>>>>SFN	M		9.2.1.53A		–	
>>>>SYNC_DL Code Information		1..<maxnoofreceptionsperSyncFrameLCR>			–	
>>>>>CHOICE SYNC_DL Code *Availability Indicator*	M				–	
>>>>>>SYNC_DL Code *Available*					–	
>>>>>>>SYNC_DL Code ID Timing	M		Cell Sync Burst Timing 9.2.3.4L		–	
>>>>>>>SYNC_DL Code ID SIR	M		Cell Sync Burst SIR 9.2.3.4K		–	
>>>>>>SYNC_DL Code *not*			NULL		–	

Available						
>>Late-Entrant Cell			NULL		–	
>>Frequency Acquisition			NULL		–	

Range bound	Explanation
maxCellinNodeB	Maximum number of Cells in a Node B
maxnoofCellSyncBursts	Maximum number of cell sync bursts per cylce for 3.84Mcps TDD
maxnoofreceptionsperSyncFrame	Maximum number of cell sync burst receptions per Sync Frame for 3.84Mcps TDD
maxnoofSyncFramesLCR	Maximum number of SYNCFrames per measurement reporting period for 1.28Mcps TDD
maxnoofreceptionsperSyncFrameLCR	Maximum number of SYNC_DL Code ID receptions per Sync Frame for 1.28Mcps TDD

/* partly omitted */

9.1.84 CELL SYNCHRONISATION ADJUSTMENT REQUEST [TDD]

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Discriminator	M		9.2.1.45		–	
Message Type	M		9.2.1.46		YES	ignore
Transaction ID	M		9.2.1.62		–	
Cell Adjustment Information		1.. <maxCellinNodeB>			EACH	ignore
>C-ID	M		9.2.1.9		–	
>Frame Adjustment value	O		9.2.3.5C		–	
>Timing Adjustment value	O		9.2.3.22a		–	
>DL Transmission Power	O		9.2.1.21	3.84Mcps TDD only	–	
>SFN	O		9.2.1.53A		–	
>DwPCH Power	O		9.2.3.5B	1.28Mcps TDD only	YES	ignore

Range bound	Explanation
MaxCellinNodeB	Maximum number of Cells in a Node B

/* partly omitted */

9.2.3.7C Number of repetitions per cycle period

The *Number of repetitions per cycle period* IE indicates the number of Sync frames per Cycle Length where the [3.84Mcps TDD - cell sync bursts] [1.28Mcps TDD – Sync_DL Codes] shall be transmitted or the cell sync bursts from the neighbouring cells shall be measured.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Number of repetitions per cycle period			INTEGER (2..10)	

/* partly omitted */

9.2.3.18C Sync Frame number

The *Sync Frame Number* IE indicates the number of the Sync frame within a Synchronisation Cycle or Subcycle, respectively, where the cell sync bursts shall be transmitted or the cell sync bursts from the neighbouring cells shall be measured.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Sync Frame number			INTEGER (1..10)	

9.2.3.18D Synchronisation Report Characteristics

The *Synchronisation Report Characteristics* IE defines how the reporting on measured [3.84Mcps TDD - cell sync bursts] [1.28Mcps TDD – Sync_DL Codes] shall be performed

Different methods shall apply for the measured [3.84Mcps TDD - cell sync burst] [1.28Mcps TDD – Sync_DL Codes] reports. [3.84Mcps TDD - In the frequency acquisition phase the measurement report shall be sent when the frequency locking is completed.] In the initial phase and for the measurement on late-entrant cells an immediate report after the measured frame is expected.

In the steady-state phase measurement reports may be given after every measured frame, after every SFN period, after every cycle length or only when the requested threshold is exceeded.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Synchronisation Report characteristics type	M		ENUMERATED (Frame related, SFN period related, Cycle length related, Threshold exceeding, Frequency Acquisition completed, ...)	
Threshold exceeding	C-Threshold exceeding			Applies only to the Steady State Phase
>Cell Sync Burst Threshold Information		~~1~~0 .. <maxnoofCellSyncBursts>		Mandatory for 3.84Mcps TDD only
>>Sync Frame number to receive	M		Sync Frame number 9.2.3.18C	
>>Cell Sync Burst Information		1..<maxnoofreceptionsperSyncFrame>		
>>>Cell Sync Burst Code	M		9.2.3.4G	
>>>Cell Sync Burst Code shift	M		9.2.3.4H	
>>>Cell Sync Burst Arrival Time	O		Cell Sync Burst Timing 9.2.3.4L	
>>>Cell Sync Burst Timing Threshold	O		9.2.3.4M	
>SYNC_DL Code Threshold Information LCR		0..<maxnoofSyncFramesLCR>		Mandatory for 1.28Mcps TDD only
>>Sync Frame number to	M		Sync Frame number	

receive			9.2.3.18C	
>>SYNC_DL Code Information LCR		1..<maxnoofreceptionsperSyncFrameLCR>		
>>>SYNC_DL Code ID	M		9.2.3.18B	
>>>SYNC_DL Code ID Arrival Time	O		Cell Sync Burst Timing 9.2.3.4L	
>>>SYNC_DL Code ID Timing Threshold	O		Cell Sync Burst Timing Threshold 9.2.3.4M	

Range bound	Explanation
maxnoofCellSyncBursts	Maximum number of cell sync burst per cycle for 3.84Mcps TDD
maxnoofreceptionsperSyncFrame	Maximum number of cell sync burst receptions per Sync Frame for 3.84Mcps TDD
maxnoofSyncFramesLCR	Maximum number of SYNC Frames per repetition period for 1.28Mcps TDD
maxnoofreceptionsperSyncFrameLCR	Maximum number of SYNC_DL Code ID receptions per Sync Frame for 1.28Mcps TDD

/* partly omitted */

9.2.3.7B Number of cycles per SFN period

The *Number of cycles per SFN period* IE indicates the number of repetitions per SFN period where the same schedule shall apply.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Number of cycles per SFN period			ENUMERATED (1, 2, 4, 8, ..., 16, 32, 64)	

9.2.3.a Number of subcycles per cycle period

The *Number of subcycles per cycle period* IE indicates the number of subcycles within a Synchronisation Cycle. Within each subcycle, the same sequence of SYNC_DL Code transmissions and receptions is performed.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Number of subcycles per cycle period			INTEGER (1..16,...)	

/* partly omitted */

9.3.3 PDU Definitions

/* partly omitted */

```
    id-DL-Timeslot-LCR-InformationModify-ModifyList-RL-ReconfPrepTDD,
    id-TimeslotISCPInfoList-LCR-DL-PC-RqstTDD,
    id-UL-DPCH-LCR-InformationAddListIE-RL-ReconfPrepTDD,
    id-UL-DPCH-LCR-InformationModify-AddList,
    id-UL-DPCH-LCR-InformationModify-AddListIE-RL-ReconfPrepTDD,
    id-UL-TimeslotLCR-Information-RL-ReconfPrepTDD,
    id-UL-SIRTarget,
    id-PDSCH-AddInformation-LCR-PSCH-ReconfRqst,
    id-PDSCH-AddInformation-LCR-AddListIE-PSCH-ReconfRqst,
    id-PDSCH-ModifyInformation-LCR-PSCH-ReconfRqst,
    id-PDSCH-ModifyInformation-LCR-ModifyListIE-PSCH-ReconfRqst,
    id-PUSCH-AddInformation-LCR-PSCH-ReconfRqst,
    id-PUSCH-AddInformation-LCR-AddListIE-PSCH-ReconfRqst,
    id-PUSCH-ModifyInformation-LCR-PSCH-ReconfRqst,
    id-PUSCH-ModifyInformation-LCR-ModifyListIE-PSCH-ReconfRqst,
    id-PUSCH-Info-DM-Rqst,
    id-PUSCH-Info-DM-Rsp,
    id-PUSCH-Info-DM-Rprt,
    id-RL-InformationResponse-LCR-RL-AdditionRspTDD,
    id-SYNCDlCodeId-TransInitLCR-CellSyncInitiationRqstTDD,
    id-SYNCDlCodeId-MeasureInitLCR-CellSyncInitiationRqstTDD,
    id-SYNCDlCodeIdTransReconfInfoLCR-CellSyncReconfRqstTDD,
    id-SYNCDlCodeIdMeasReconfigurationLCR-CellSyncReconfRqstTDD,
    id-SYNCDlCodeIdMeasInfoList-CellSyncReconfRqstTDD,
    id-SyncDLCodeIdsMeasInfoList-CellSyncReprtTDD,
    id-SyncDLCodeIdThreInfoLCR,
    id-NSubCyclesPerCyclePeriod-CellSyncReconfRqstTDD,
    id-DwPCH-Power,

    maxNrOfCCTrCHs,
    maxNrOfCellSyncBursts,
    maxNrOfCodes,
    maxNrOfCPCHs,
    maxNrOfDCHs,
    maxNrOfDLTSs,
    maxNrOfDLTSLCRs,
    maxNrOfDPCHs,
    maxNrOfDSCHs,
    maxNrOfFACHs,
    maxNrOfRLs,
    maxNrOfRLs-1,
    maxNrOfRLs-2,
    maxNrOfRLSets,
    maxNrOfPCPCHs,
```

```
    maxNrOfPDSCHs,
    maxNrOfPUSCHs,
    maxNrOfPRACHLCRs,
    maxNrOfPDSCHSets,
    maxNrOfPUSCHSets,
    maxNrOfReceptsPerSyncFrame,
    maxNrOfSCCPCHs,
    maxNrOfSCCPCHLCRs,
    maxNrOfULTSs,
    maxNrOfULTSLCRs,
    maxNrOfUSCHs,
    maxAPSigNum,
    maxCPCHCell,
    maxFACHCell,
    maxFPACHCell,
    maxNoofLen,
    maxRACHCell,
    maxPCPCHCell,
    maxPRACHCell,
    maxSCCPCHCell,
    maxSCPICHCell,
    maxCellinNodeB,
    maxCCPinNodeB,
    maxCommunicationContext,
    maxLocalCellinNodeB,
    maxNrOfSlotFormatsPRACH,
    maxNrOfCellSyncBursts,
    maxNrOfReceptsPerSyncFrame,
    maxIB,
    maxIBSEG,
    maxNoOfSyncFramesLCR,
    maxNrofreceptionsperSyncFrameLCR
FROM NBAP-Constants;
```

/* partly omitted */

```
-- **************************************************************
--
-- CELL SYNCHRONISATION INITIATION REQUEST TDD
--
-- **************************************************************

CellSynchronisationInitiationRequestTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationInitiationRequestTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationInitiationRequestTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationInitiationRequestTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    { ID    id-SYNCDlCodeId-TransInitLCR-CellSyncInitiationRqstTDD      CRITICALITY     reject                      EXTENSION   SYNCDlCodeId-
TransInitLCR-CellSyncInitiationRqstTDD      PRESENCE    optional    }|  -- 1.28Mcps TDD only
```

```
    { ID    id-SYNCDlCodeId-MeasureInitLCR-CellSyncInitiationRqstTDD        CRITICALITY     reject                      EXTENSION   SYNCDlCodeId-
MeasureInitLCR-CellSyncInitiationRqstTDD        PRESENCE    optional    },  -- 1.28Mcps TDD only
    ...
}

CellSynchronisationInitiationRequestTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-C-ID                         CRITICALITY     reject      TYPE    C-ID                                        PRESENCE mandatory   }|
    { ID    id-cellSyncBurstRepetitionPeriod            CRITICALITY     reject      TYPE    CellSyncBurstRepetitionPeriod   PRESENCE mandatory   }|
    { ID    id-timeslotInfo-CellSyncInitiationRqstTDD   CRITICALITY     reject      TYPE    TimeslotInfo-CellSyncInitiationRqstTDD   PRESENCE
    mandatoryoptional   }|  -- Mandatory for 3.84Mcps TDD only
    { ID    id-CellSyncBurstTransInit-CellSyncInitiationRqstTDD     CRITICALITY     reject      TYPE                CellSyncBurstTransInit-
CellSyncInitiationRqstTDD       PRESENCE    optional    }|  -- 3.84Mcps TDD only
    { ID    id-CellSyncBurstMeasureInit-CellSyncInitiationRqstTDD       CRITICALITY     reject                      TYPE  CellSyncBurstMeasureInit-
CellSyncInitiationRqstTDD       PRESENCE    optional    },  -- 3.84Mcps TDD only
    ...
}

CellSyncBurstTransInit-CellSyncInitiationRqstTDD::= SEQUENCE {
    cSBTransmissionID                       CSBTransmissionID,
    sfn                                     SFN,
    cellSyncBurstCode                       CellSyncBurstCode,
    cellSyncBurstCodeShift                  CellSyncBurstCodeShift,
    initialDLTransPower                     DL-Power,
    iE-Extensions                           ProtocolExtensionContainer { { CellSyncBurstTransInit-CellSyncInitiationRqstTDD-ExtIEs} }   OPTIONAL,
    ...
 }

CellSyncBurstTransInit-CellSyncInitiationRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

TimeslotInfo-CellSyncInitiationRqstTDD::= SEQUENCE (SIZE (1..15)) OF TimeSlot

CellSyncBurstMeasureInit-CellSyncInitiationRqstTDD::= SEQUENCE {
    cSBMeasurementID                        CSBMeasurementID,
    cellSyncBurstCode                       CellSyncBurstCode,
    cellSyncBurstCodeShift                  CellSyncBurstCodeShift,
    synchronisationReportType               SynchronisationReportType,
    sfn                                     SFN                         OPTIONAL,
    synchronisationReportCharacteristics    SynchronisationReportCharacteristics,
    iE-Extensions                           ProtocolExtensionContainer { { CellSyncBurstMeasureInit-CellSyncInitiationRqstTDD-ExtIEs} }    OPTIONAL,
    ...
 }

CellSyncBurstMeasureInit-CellSyncInitiationRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {

    ...
}

SYNCDlCodeId-TransInitLCR-CellSyncInitiationRqstTDD::= SEQUENCE {
    cSBTransmissionID                       CSBTransmissionID,
    sfn                                     SFN,
    uARFCN                                  UARFCN,
```

```
    sYNCDlCodeId                            SYNCDlCodeId,
    DwPCH-Power                             DwPCH-Power,
    iE-Extensions                           ProtocolExtensionContainer { { SYNCDlCodeId-TransInitLCR-CellSyncInitiationRqstTDD-ExtIEs } }  OPTIONAL,
    ...
}

SYNCDlCodeId-TransInitLCR-CellSyncInitiationRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}


SYNCDlCodeId-MeasureInitLCR-CellSyncInitiationRqstTDD::= SEQUENCE {
    cSBMeasurementID                        CSBMeasurementID,
    sfn                                     SFN             OPTIONAL,
    uARFCN                                  UARFCN,
    sYNCDlCodeId                            SYNCDlCodeId,
    synchronisationReportType               SynchronisationReportType,
    synchronisationReportCharacteristics    SynchronisationReportCharacteristics,
    iE-Extensions                           ProtocolExtensionContainer { { SYNCDlCodeId-MeasureInitLCR-CellSyncInitiationRqstTDD-ExtIEs } }OPTIONAL,
    ...
}

SYNCDlCodeId-MeasureInitLCR-CellSyncInitiationRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- CELL SYNCHRONISATION INITIATION RESPONSE TDD
--
-- **************************************************************

CellSynchronisationInitiationResponseTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationInitiationResponseTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationInitiationResponseTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationInitiationResponseTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationInitiationResponseTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-CriticalityDiagnostics                   CRITICALITY     ignore      TYPE    CriticalityDiagnostics                      PRESENCE
    optional    },
    ...
}

-- **************************************************************
--
-- CELL SYNCHRONISATION INITIATION FAILURE TDD
--
```

```
-- **************************************************************

CellSynchronisationInitiationFailureTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationInitiationFailureTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationInitiationFailureTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationInitiationFailureTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationInitiationFailureTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-Cause                            CRITICALITY     ignore      TYPE    Cause                                   PRESENCE mandatory
    }|
    { ID    id-CriticalityDiagnostics           CRITICALITY     ignore      TYPE    CriticalityDiagnostics            PRESENCE optional },
    ...
}

-- **************************************************************
--
-- CELL SYNCHRONISATION RECONFIGURATION REQUEST TDD
--
-- **************************************************************

CellSynchronisationReconfigurationRequestTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationReconfigurationRequestTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationReconfigurationRequestTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationReconfigurationRequestTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    { ID    id-NSubCyclesPerCyclePeriod-CellSyncReconfRqstTDD       CRITICALITY     reject      EXTENSION           NSubCyclesPerCyclePeriod
    PRESENCE    optional    }|  -- 1.28Mcps TDD only
    { ID    id-SYNCDlCodeIdTransReconfInfoLCR-CellSyncReconfRqstTDD     CRITICALITY     reject                      EXTENSION
    SYNCDlCodeIdTransReconfInfoLCR-CellSyncReconfRqstTDD        PRESENCE    optional    }|  -- 1.28Mcps TDD only
    { ID    id-SYNCDlCodeIdMeasReconfigurationLCR-CellSyncReconfRqstTDD     CRITICALITY     reject                      EXTENSION
    SYNCDlCodeIdMeasReconfigurationLCR-CellSyncReconfRqstTDD        PRESENCE    optional    },  -- 1.28Mcps TDD only
    ...
}

CellSynchronisationReconfigurationRequestTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-C-ID                         CRITICALITY     reject      TYPE    C-ID                                    PRESENCE    mandatory
    }|
    { ID    id-TimeSlot                     CRITICALITY     reject      TYPE    TimeSlot                                PRESENCE    mandatory   }|
-- 1.28Mcps TDD - There is no Time Slot indication needed, the CRNC should indicate Time Slot 0 and the Node B shall ignore it
    { ID    id-NCyclesPerSFNperiod          CRITICALITY     reject      TYPE    NCyclesPerSFNperiod                     PRESENCE    mandatory   }|
    { ID    id-NRepetitionsPerCyclePeriod   CRITICALITY     reject      TYPE    NRepetitionsPerCyclePeriod PRESENCE    mandatory   }|
    { ID    id-CellSyncBurstTransReconfInfo-CellSyncReconfRqstTDD       CRITICALITY     reject                      TYPE
    CellSyncBurstTransReconfInfo-CellSyncReconfRqstTDD      PRESENCE    optional    }|  -- 3.84Mcps TDD only
    { ID    id-CellSyncBurstMeasReconfiguration-CellSyncReconfRqstTDD       CRITICALITY     reject                  TYPE
    CellSyncBurstMeasReconfiguration-CellSyncReconfRqstTDD      PRESENCE    optional    },  -- 3.84Mcps TDD only
    ...
```

```
}

CellSyncBurstTransReconfInfo-CellSyncReconfRqstTDD ::= SEQUENCE (SIZE (1.. maxNrOfCellSyncBursts)) OF CellSyncBurstTransInfoItem-
CellSyncReconfRqstTDD

CellSyncBurstTransInfoItem-CellSyncReconfRqstTDD ::= SEQUENCE {
    cSBTransmissionID                       CSBTransmissionID,
    syncFrameNumberToTransmit               SyncFrameNumber,
    cellSyncBurstCode                       CellSyncBurstCode           OPTIONAL,
    cellSyncBurstCodeShift                  CellSyncBurstCodeShift      OPTIONAL,
    dlTransPower                            DL-Power                    OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { CellSyncBurstTransInfoItem-CellSyncReconfRqstTDD-ExtIEs} }
    OPTIONAL,
    ...
}

CellSyncBurstTransInfoItem-CellSyncReconfRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSyncBurstMeasReconfiguration-CellSyncReconfRqstTDD ::= ProtocolIE-Single-Container {{ CellSyncBurstMeasInfo-CellSyncReconfRqstTDD }}

CellSyncBurstMeasInfo-CellSyncReconfRqstTDD NBAP-PROTOCOL-IES ::= {
    { ID id-CellSyncBurstMeasInfoList-CellSyncReconfRqstTDD CRITICALITY reject  TYPE CellSyncBurstMeasInfoList-CellSyncReconfRqstTDD PRESENCE
    mandatory }|
    { ID id-SynchronisationReportType                   CRITICALITY reject  TYPE SynchronisationReportType                          PRESENCE
    optional }|
    { ID id-SynchronisationReportCharacteristics        CRITICALITY reject  TYPE SynchronisationReportCharacteristics       PRESENCE optional },
    ...
}

CellSyncBurstMeasInfoList-CellSyncReconfRqstTDD ::= SEQUENCE (SIZE (1.. maxNrOfCellSyncBursts)) OF CellSyncBurstMeasInfoItem-CellSyncReconfRqstTDD

CellSyncBurstMeasInfoItem-CellSyncReconfRqstTDD ::= SEQUENCE {
    syncFrameNrToReceive                    SyncFrameNumber,
    syncBurstInfo                           CellSyncBurstInfoList-CellSyncReconfRqstTDD,
    ...
}

CellSyncBurstInfoList-CellSyncReconfRqstTDD ::= SEQUENCE (SIZE (1..maxNrOfReceptsPerSyncFrame)) OF CellSyncBurstInfoItem-CellSyncReconfRqstTDD

CellSyncBurstInfoItem-CellSyncReconfRqstTDD ::= SEQUENCE {
    cSBMeasurementID                        CSBMeasurementID,
    cellSyncBurstCode                       CellSyncBurstCode,
    cellSyncBurstCodeShift                  CellSyncBurstCodeShift,
    iE-Extensions                           ProtocolExtensionContainer { { CellSyncBurstMeasInfo-CellSyncReconfRqstTDD-ExtIEs} }    OPTIONAL,
    ...
}

CellSyncBurstMeasInfo-CellSyncReconfRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
SYNCDlCodeIdTransReconfInfoLCR-CellSyncReconfRqstTDD ::= SEQUENCE {SIZE {1..maxNrofSyncFramesLCR} OF SYNCDlCodeIdTransReconfItemLCR-
CellSyncReconfRqstTDD

SYNCDlCodeIdTransReconfItemLCR-CellSyncReconfRqstTDD ::= SEQUENCE {
    cSBTransmissionID                       CSBTransmissionID,
    syncFrameNumberforTransmit              SyncFrameNumber,
    uARFCN                                  UARFCN,
    sYNCDlCodeId                            SYNCDlCodeId    OPTIONAL,
    DwPCH-Power                             DwPCH-Power     OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { SYNCDlCodeIdTransReconfInfoLCR-CellSyncReconfRqstTDD-ExtIEs} }
    OPTIONAL,
    ...
}

SYNCDlCodeIdTransReconfInfoLCR-CellSyncReconfRqstTDD-ExtIEs : := {
    ...
}



SYNCDlCodeIdMeasReconfigurationLCR-CellSyncReconfRqstTDD ::= ProtocolIE-Single-Container {{ SYNCDlCodeIdMeasInfoLCR-CellSyncReconfRqstTDD }}

SYNCDlCodeIdMeasInfoLCR-CellSyncReconfRqstTDD NBAP-PROTOCOL-IES ::= {
    { ID id-SYNCDlCodeIdMeasInfoList-CellSyncReconfRqstTDD  CRITICALITY reject  EXTENSION SYNCDlCodeIdMeasInfoList-CellSyncReconfRqstTDDPRESENCE
    mandatory }|
    { ID id-SynchronisationReportType                   CRITICALITY reject  EXTENSION SynchronisationReportType                     PRESENCE
    optional }|
    { ID id-SynchronisationReportCharacteristics        CRITICALITY reject  EXTENSION SynchronisationReportCharacteristics        PRESENCE optional
},
    ...
}

SYNCDlCodeIdMeasInfoList-CellSyncReconfRqstTDD:= SEQUENCE (SIZE (1.. maxNrofSyncDLCodesLCR)) OF SYNCDlCodeIdMeasInfoItem-CellSyncReconfRqstTDD

SYNCDlCodeIdMeasInfoItem-CellSyncReconfRqstTDD ::= SEQUENCE {
    syncFrameNrToReceive                    SyncFrameNumber,
    sYNCDlCodeIdInfoLCR                     SYNCDlCodeIdInfoListLCR-CellSyncReconfRqstTDD,
    iE-Extensions                           ProtocolExtensionContainer { { SYNCDlCodeIdMeasInfoItem-CellSyncReconfRqstTDD-ExtIEs} }     OPTIONAL,
    ...
}

SYNCDlCodeIdMeasInfoItem-CellSyncReconfRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}


SYNCDlCodeIdInfoListLCR-CellSyncReconfRqstTDD ::= SEQUENCE (SIZE (1.. maxNrofreceptionsperSyncFrameLCR)) SYNCDlCodeIdInfoItemLCR-
CellSyncReconfRqstTDD ))

SYNCDlCodeIdInfoItemLCR-CellSyncReconfRqstTDD ::= SEQUENCE {
    cSBMeasurementID                        CSBMeasurementID,
    sYNCDlCodeId                            SYNCDlCodeId,
```

```
    uARFCN                                  UARFCN,
    propagationDelayCompensation            TimingAdjustmentValue       OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { SYNCDlCodeIdInfoLCR-CellSyncReconfRqstTDD-ExtIEs} }   OPTIONAL,
    ...
}

SYNCDlCodeIdInfoLCR-CellSyncReconfRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}


-- **************************************************************
--
-- CELL SYNCHRONISATION RECONFIGURATION RESPONSE TDD
--
-- **************************************************************

CellSynchronisationReconfigurationResponseTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationReconfigurationResponseTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationReconfigurationResponseTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationReconfigurationResponseTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationReconfigurationResponseTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-CriticalityDiagnostics                   CRITICALITY     ignore      TYPE    CriticalityDiagnostics       PRESENCE optional },
    ...
}

-- **************************************************************
--
-- CELL SYNCHRONISATION RECONFIGURATION FAILURE TDD
--
-- **************************************************************

CellSynchronisationReconfigurationFailureTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container        {{CellSynchronisationReconfigurationFailureTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationReconfigurationFailureTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationReconfigurationFailureTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationReconfigurationFailureTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-Cause                            CRITICALITY     ignore      TYPE    Cause                                   PRESENCE mandatory
    }|
    { ID    id-CriticalityDiagnostics           CRITICALITY     ignore      TYPE    CriticalityDiagnostics            PRESENCE optional },
    ...
```

```
}

-- **************************************************************
--
-- CELL SYNCHRONISATION ADJUSTMENT REQUEST TDD
--
-- **************************************************************

CellSynchronisationAdjustmentRequestTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container        {{CellSynchronisationAdjustmentRequestTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationAdjustmentRequestTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationAdjustmentRequestTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationAdjustmentRequestTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-CellAdjustmentInfo-SyncAdjustmntRqstTDD  CRITICALITY ignore  TYPE CellAdjustmentInfo-SyncAdjustmentRqstTDD PRESENCE mandatory   },
    ...
}

CellAdjustmentInfo-SyncAdjustmentRqstTDD::= SEQUENCE (SIZE (1..maxCellinNodeB)) OF ProtocolIE-Single-Container {{ CellAdjustmentInfoItemIE-
SyncAdjustmntRqstTDD }}

CellAdjustmentInfoItemIE-SyncAdjustmntRqstTDD NBAP-PROTOCOL-IES ::= {
    { ID id-CellAdjustmentInfoItem-SyncAdjustmentRqstTDD        CRITICALITY     ignore          TYPE                    CellAdjustmentInfoItem-
SyncAdjustmentRqstTDD       PRESENCE    mandatory }
}

CellAdjustmentInfoItem-SyncAdjustmentRqstTDD ::= SEQUENCE {
    c-ID                                C-ID,
    frameAdjustmentValue                FrameAdjustmentValue        OPTIONAL,
    timingAdjustmentValue               TimingAdjustmentValue       OPTIONAL,
    dLTransPower                        DL-Power                    OPTIONAL, -- 3.84Mcps TDD only
    sfn                                 SFN                         OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { CellAdjustmentInfoItem-SyncAdjustmntRqstTDD-ExtIEs} }     OPTIONAL,
    ...
 }

CellAdjustmentInfoItem-SyncAdjustmntRqstTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    { ID id-DwPCH-Power     CRITICALITY ignore EXTENSION    DwPCH-Power     PRESENCE optional }, -- 1.28Mcps TDD only
    ...
}

-- **************************************************************
--
-- CELL SYNCHRONISATION ADJUSTMENT RESPONSE TDD
--
-- **************************************************************

CellSynchronisationAdjustmentResponseTDD ::= SEQUENCE {
```

```
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationAdjustmentResponseTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationAdjustmentResponseTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationAdjustmentResponseTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationAdjustmentResponseTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-CriticalityDiagnostics           CRITICALITY     ignore      TYPE    CriticalityDiagnostics                  PRESENCE optional },
    ...
}

-- **************************************************************
--
-- CELL SYNCHRONISATION ADJUSTMENT FAILURE TDD
--
-- **************************************************************

CellSynchronisationAdjustmentFailureTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationAdjustmentFailureTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationAdjustmentFailureTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationAdjustmentFailureTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationAdjustmentFailureTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-CauseLevel-SyncAdjustmntFailureTDD   CRITICALITY ignore      TYPE    CauseLevel-SyncAdjustmntFailureTDD   PRESENCE mandatory   }|
    { ID    id-CriticalityDiagnostics               CRITICALITY ignore      TYPE    CriticalityDiagnostics                       PRESENCE optional
    },
    ...
}

CauseLevel-SyncAdjustmntFailureTDD ::= CHOICE {
    generalCause            GeneralCauseList-SyncAdjustmntFailureTDD,
    cellSpecificCause       CellSpecificCauseList-SyncAdjustmntFailureTDD,
    ...
}

GeneralCauseList-SyncAdjustmntFailureTDD::= SEQUENCE {
    cause                                   Cause,
    iE-Extensions                           ProtocolExtensionContainer { { GeneralCauseList-SyncAdjustmntFailureTDD-ExtIEs} }    OPTIONAL,
    ...
}

GeneralCauseList-SyncAdjustmntFailureTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
CellSpecificCauseList-SyncAdjustmntFailureTDD ::= SEQUENCE {
    unsuccessful-cell-InformationRespList-SyncAdjustmntFailureTDD      Unsuccessful-cell-InformationRespList-SyncAdjustmntFailureTDD,
    iE-Extensions                               ProtocolExtensionContainer { { CellSpecificCauseList-SyncAdjustmntFailureTDD-ExtIEs} }     OPTIONAL,
    ...
}

CellSpecificCauseList-SyncAdjustmntFailureTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

Unsuccessful-cell-InformationRespList-SyncAdjustmntFailureTDD ::= SEQUENCE (SIZE (1..maxNrOfRLs))                 OF ProtocolIE-Single-Container {{
Unsuccessful-cell-InformationRespItemIE-SyncAdjustmntFailureTDD }}

Unsuccessful-cell-InformationRespItemIE-SyncAdjustmntFailureTDD NBAP-PROTOCOL-IES ::= {
    { ID    id-Unsuccessful-cell-InformationRespItem-SyncAdjustmntFailureTDD        CRITICALITY                   ignore      TYPE  Unsuccessful-
cell-InformationRespItem-SyncAdjustmntFailureTDD        PRESENCE    mandatory},
    ...
}

Unsuccessful-cell-InformationRespItem-SyncAdjustmntFailureTDD::= SEQUENCE {
    c-ID                                        C-ID,
    cause                                       Cause,
    iE-Extensions                               ProtocolExtensionContainer { { Unsuccessful-cell-InformationRespItem-SyncAdjustmntFailureTDD-ExtIEs}
}       OPTIONAL,
    ...
}

Unsuccessful-cell-InformationRespItem-SyncAdjustmntFailureTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- **************************************************************
--
-- CELL SYNCHRONISATION TERMINATION REQUEST TDD
--
-- **************************************************************

CellSynchronisationTerminationRequestTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationTerminationRequestTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationTerminationRequestTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationTerminationRequestTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationTerminationRequestTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-C-ID                         CRITICALITY     ignore      TYPE    C-ID                                    PRESENCE mandatory   }|
    { ID    id-CSBTransmissionID            CRITICALITY     ignore      TYPE    CSBTransmissionID                       PRESENCE optional    }|
    { ID    id-CSBMeasurementID             CRITICALITY     ignore      TYPE    CSBMeasurementID                        PRESENCE optional    },
    ...
}
```

```
-- **************************************************************
--
-- CELL SYNCHRONISATION FAILURE INDICATION TDD
--
-- **************************************************************

CellSynchronisationFailureIndicationTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationFailureIndicationTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationFailureIndicationTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationFailureIndicationTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationFailureIndicationTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-C-ID                         CRITICALITY     ignore      TYPE    C-ID                                    PRESENCE mandatory   }|
    { ID    id-CSBTransmissionID            CRITICALITY     ignore      TYPE    CSBTransmissionID                       PRESENCE optional    }|
    { ID    id-CSBMeasurementID             CRITICALITY     ignore      TYPE    CSBMeasurementID                        PRESENCE optional    }|
    { ID    id-Cause                        CRITICALITY     ignore      TYPE    Cause                                   PRESENCE mandatory   },
    ...
}

-- **************************************************************
--
-- CELL SYNCHRONISATION REPORT TDD
--
-- **************************************************************

CellSynchronisationReportTDD ::= SEQUENCE {
    protocolIEs             ProtocolIE-Container    {{CellSynchronisationReportTDD-IEs}},
    protocolExtensions      ProtocolExtensionContainer  {{CellSynchronisationReportTDD-Extensions}}     OPTIONAL,
    ...
}

CellSynchronisationReportTDD-Extensions NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

CellSynchronisationReportTDD-IEs NBAP-PROTOCOL-IES ::= {
    { ID    id-CellSyncInfo-CellSyncReprtTDD        CRITICALITY ignore      TYPE    CellSyncInfo-CellSyncReprtTDD        PRESENCE mandatory   },
    ...
}


CellSyncInfo-CellSyncReprtTDD ::= SEQUENCE (SIZE (1..maxCellinNodeB))   OF ProtocolIE-Single-Container {{ CellSyncInfoItemIE-CellSyncReprtTDD }}

CellSyncInfoItemIE-CellSyncReprtTDD NBAP-PROTOCOL-IES ::= {
    { ID    id-C-ID                                     CRITICALITY ignore  TYPE C-ID
    PRESENCE    mandatory}|
    { ID    id-SyncReportType-CellSyncReprtTDD      CRITICALITY ignore      TYPE SyncReportType-CellSyncReprtTDD      PRESENCE optional},
```

```
    ...
}

SyncReportType-CellSyncReprtTDD ::= CHOICE {
    intStdPhSyncInfo-CellSyncReprtTDD       IntStdPhCellSyncInfo-CellSyncReprtTDD,
    lateEntrantCell             NULL,
    frequencyAcquisition        NULL,
    ...
}

IntStdPhCellSyncInfoList-CellSyncReprtTDD ::= SEQUENCE {
    cellSyncBurstMeasuredInfo                   CellSyncBurstMeasInfoList-CellSyncReprtTDD,
    iE-Extensions                               ProtocolExtensionContainer { { IntStdPhCellSyncInfoList-CellSyncReprtTDD-ExtIEs} }   OPTIONAL,
    ...
}

IntStdPhCellSyncInfoList-CellSyncReprtTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    { ID id-AccumulatedClockupdate-CellSyncReprtTDD     CRITICALITY ignore  EXTENSION   TimingAdjustmentValue       PRESENCE optional }|
    { ID id-SyncDLCodeIdsMeasInfoList-CellSyncReprtTDD CRITICALITY  ignore EXTENSION    SyncDLCodeIdsMeasInfoList-CellSyncReprtTDD   PRESENCE
optional }, -- Mandatory for 1.28Mcps TDD only
    ...
}


CellSyncBurstMeasInfoList-CellSyncReprtTDD ::= SEQUENCE (SIZE (1..maxNrOfCellSyncBursts)) OF CellSyncBurstMeasInfoItem-CellSyncReprtTDD --
Mandatory for 3.84Mcps TDD only

CellSyncBurstMeasInfoItem-CellSyncReprtTDD ::= SEQUENCE {
    sFN                                     SFN,
    cellSyncBurstInfo-CellSyncReprtTDD      SEQUENCE (SIZE (1..maxNrOfReceptsPerSyncFrame)) OF CellSyncBurstInfo-CellSyncReprtTDD,
    ...
}

CellSyncBurstInfo-CellSyncReprtTDD ::= CHOICE {
    cellSyncBurstAvailable      CellSyncBurstAvailable-CellSyncReprtTDD,
    cellSyncBurstNotAvailable   NULL,
    ...
}

CellSyncBurstAvailable-CellSyncReprtTDD ::= SEQUENCE {
    cellSyncBurstTiming         CellSyncBurstTiming,
    cellSyncBurstSIR            CellSyncBurstSIR,
    ...
}

SyncDLCodeIdsMeasInfoList-CellSyncReprtTDD ::= SEQUENCE (SIZE (0..maxNoOfSyncFramesLCR)) OF SyncDLCodeIdsMeasInfoItem-CellSyncReprtTDD
-- Mandatory for 1.28Mcps TDD only

SyncDLCodeIdsMeasInfoItem-CellSyncReprtTDD ::= SEQUENCE {
    sFN                                     SFN,
    syncDLCodeIdInfo-CellSyncReprtTDD       SEQUENCE (SIZE (1..maxNrOfReceptsPerSyncFrameLCR)) OF syncDLCodeIdInfo-CellSyncReprtTDD,
    iE-Extensions                           ProtocolExtensionContainer { { SyncDLCodeIdsMeasInfoItem-CellSyncReprtTDD-ExtIEs } }     OPTIONAL,
    ...
```

```
}

SyncDLCodeIdsMeasInfoItem-CellSyncReprtTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}


syncDLCodeIdInfo-CellSyncReprtTDD ::= CHOICE {
    syncDLCodeIdAvailable               SyncDLCodeIdAvailable-CellSyncReprtTDD,
    syncDLCodeIDNotAvailable            NULL,
    ...
}

SynCodeIdAvailable-CellSyncReprtTDD ::= SEQUENCE {
    syncDLCodeIdTiming          CellSyncBurstTiming,
    syncDLCodeIdSIR             CellSyncBurstSIR,
    iE-Extensions               ProtocolExtensionContainer { { SynCodeIdAvailable-CellSyncReprtTDD-ExtIEs } }          OPTIONAL,
    ...
}

SynCodeIdAvailable-CellSyncReprtTDD-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}


END
```

9.3.4 Information Elements Definitions

/* partly omitted */

```
-- ==========================================
--  N
-- ==========================================

NCyclesPerSFNperiod ::= ENUMERATED {
    v1,
    v2,
    v4,
    v8,
    ...,
    v16,
    v32,
    v64
}

NEOT ::= INTEGER (0..8)
```

```
NFmax ::= INTEGER (1..64,...)

NRepetitionsPerCyclePeriod ::= INTEGER (2..10)

N-INSYNC-IND ::= INTEGER (1..256)

N-OUTSYNC-IND ::= INTEGER (1..256)

NeighbouringCellMeasurementInformation ::= SEQUENCE (SIZE (1..maxNrOfMeasNCell)) OF
        CHOICE {
                neighbouringFDDCellMeasurementInformation       NeighbouringFDDCellMeasurementInformation,
                neighbouringTDDCellMeasurementInformation       NeighbouringTDDCellMeasurementInformation,
                ...
            }

NeighbouringFDDCellMeasurementInformation ::= SEQUENCE {
    uC-Id                               UC-Id,
    uARFCN                              UARFCN,
    primaryScramblingCode               PrimaryScramblingCode,
    iE-Extensions                       ProtocolExtensionContainer { { NeighbouringFDDCellMeasurementInformationItem-ExtIEs} } OPTIONAL,
    ...
}

NeighbouringFDDCellMeasurementInformationItem-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

NeighbouringTDDCellMeasurementInformation ::= SEQUENCE {
    uC-Id                               UC-Id,
    uARFCN                              UARFCN,
    cellParameterID                     CellParameterID,
    timeSlot                            TimeSlot,
    midambleShiftAndBurstType           MidambleShiftAndBurstType,
    iE-Extensions                       ProtocolExtensionContainer { { NeighbouringTDDCellMeasurementInformationItem-ExtIEs} } OPTIONAL,
    ...
}

NeighbouringTDDCellMeasurementInformationItem-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

NodeB-CommunicationContextID ::= INTEGER (0..1048575)

NStartMessage ::= INTEGER (1..8)
```

NSubCyclesPerCyclePeriod ::= INTEGER (1..16,...)

/* partly omitted */

```
-- ========================================
--  S
========================================
```

/* partly omitted */

```
SSDT-Indication ::= ENUMERATED {
    ssdt-active-in-the-UE,
    ssdt-not-active-in-the-UE
}

Start-Of-Audit-Sequence-Indicator ::= ENUMERATED {
    start-of-audit-sequence,
    not-start-of-audit-sequence
}

STTD-Indicator ::= ENUMERATED {
    active,
    inactive,
    ...
}

SSDT-SupportIndicator ::= ENUMERATED {
    sSDT-Supported,
    sSDT-not-supported
}

SyncCase ::= INTEGER (1..2,...)

SYNCDlCodeId ::= INTEGER (1..32,...)

SyncFrameNumber ::= INTEGER (1..10)

SynchronisationReportCharacteristics ::= SEQUENCE {
    synchronisationReportCharacteristicsType    SynchronisationReportCharacteristicsType,
    synchronisationReportCharactThreExc         SynchronisationReportCharactThreExc         OPTIONAL,
        -- This IE shall be included if the synchronisationReportCharacteristicsType IE is set to “thresholdExceeding”.
    iE-Extensions                               ProtocolExtensionContainer { { SynchronisationReportCharacteristics-ExtIEs } } OPTIONAL,
    ...
}

SynchronisationReportCharacteristics-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    [ID id-SyncDLCodeIdThreInfoLCR  CRITICALITY ignore EXTENSION    SyncDLCodeIdThreInfoLCR     PRESENCE optional },
    ...
}

SynchronisationReportCharactThreExc::=  SEQUENCE (SIZE (1..maxNrOfCellSyncBursts)) OF SynchronisationReportCharactThreInfoItem -- Mandatory for
3.84Mcps TDD only
```

```
SynchronisationReportCharactThreInfoItem ::= SEQUENCE {
    syncFrameNumber             SyncFrameNumber,
    cellSyncBurstInformation    SEQUENCE (SIZE (1.. maxNrOfReceptsPerSyncFrame)) OF SynchronisationReportCharactCellSyncBurstInfoItem,
    iE-Extensions               ProtocolExtensionContainer { { SynchronisationReportCharactThreInfoItem-ExtIEs } }    OPTIONAL,
    ...
}

SynchronisationReportCharactThreInfoItem-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

SynchronisationReportCharactCellSyncBurstInfoItem ::= SEQUENCE {
    cellSyncBurstCode               CellSyncBurstCode,
    cellSyncBurstCodeShift          CellSyncBurstCodeShift,
    cellSyncBurstTiming             CellSyncBurstTiming             OPTIONAL,
    cellSyncBurstTimingThreshold    CellSyncBurstTimingThreshold    OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { SynchronisationReportCharactCellSyncBurstInfoItem-ExtIEs } }   OPTIONAL,
    ...
}

SynchronisationReportCharactCellSyncBurstInfoItem-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

SyncDLCodeIdThreInfoLCR ::= SEQUENCE (SIZE (0..maxNoOfSyncFramesLCR)) OF SyncDLCodeIdThreInfoList  --Mandatory for 1.28Mcps TDD only

SyncDLCodeIdThreInfoList ::= SEQUENCE {
    syncFrameNoToReceive            SyncFrameNumber,
    syncDLCodeIdInfoLCR             SyncDLCodeInfoListLCR,
    iE-Extensions                   ProtocolExtensionContainer { { SyncDLCodeIdThreInfoList-ExtIEs } }     OPTIONAL,
    ...
}

SyncDLCodeIdThreInfoList-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}


SyncDLCodeInfoListLCR ::= SEQUENCE (SIZE (1..maxNoOfSyncDLCodesLCR)) OF SyncDLCodeInfoItemLCR

SyncDLCodeInfoItemLCR ::= SEQUENCE {
    syncDLCodeId                    SYNCDlCodeId,
    syncDLCodeIdArrivTime           CellSyncBurstTiming             OPTIONAL,
    syncDLCodeIdTimingThre          CellSyncBurstTimingThreshold    OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { SyncDLCodeInfoItem-LCR-ExtIEs } }    OPTIONAL,
    ...
}

SyncDLCodeInfoItem-LCR-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
SynchronisationReportCharacteristicsType ::= ENUMERATED {
    frameRelated,
    sFNperiodRelated,
    cycleLengthRelated,
    thresholdExceeding,
    frequencyAcquisitionCompleted,
    ...
}

SynchronisationReportType ::= ENUMERATED {
    initialPhase,
    steadyStatePhase,
    lateEntrantCell,
    frequencyAcquisition,
    ...
}
```

/* partly omitted */

9.3.6 Constant Definitions

/* partly omitted */

```
maxNrOfCodes                INTEGER ::= 10
maxNrOfDLTSs                INTEGER ::= 15
maxNrOfDLTSLCRs             INTEGER ::= 6
maxNrOfErrors               INTEGER ::= 256
maxNrOfTFs                  INTEGER ::= 32
maxNrOfTFCs                 INTEGER ::= 1024
maxNrOfRLs                  INTEGER ::= 16
maxNrOfRLs-1                INTEGER ::= 15  -- maxNrOfRLs – 1
maxNrOfRLs-2                INTEGER ::= 14  -- maxNrOfRLs – 2
maxNrOfRLSets               INTEGER ::= maxNrOfRLs
maxNrOfDPCHs                INTEGER ::= 240
maxNrOfDPCHLCRs             INTEGER ::= 240
maxNrOfSCCPCHs              INTEGER ::= 8
maxNrOfCPCHs                INTEGER ::= 16
maxNrOfPCPCHs               INTEGER ::= 64
maxNrOfDCHs                 INTEGER ::= 128
maxNrOfDSCHs                INTEGER ::= 32
maxNrOfFACHs                INTEGER ::= 8
maxNrOfCCTrCHs              INTEGER ::= 16
maxNrOfPDSCHs               INTEGER ::= 256
maxNrOfPUSCHs               INTEGER ::= 256
maxNrOfPDSCHSets            INTEGER ::= 256
maxNrOfPRACHLCRs            INTEGER ::= 8
```

```
maxNrOfPUSCHSets            INTEGER ::= 256
maxNrOfSCCPCHLCRs           INTEGER ::= 8
maxNrOfULTSs                INTEGER ::= 15
maxNrOfULTSLCRs             INTEGER ::= 6
maxNrOfUSCHs                INTEGER ::= 32
maxAPSigNum                 INTEGER ::= 16
maxNrOfSlotFormatsPRACH     INTEGER ::= 8
maxCellinNodeB              INTEGER ::= 256
maxCCPinNodeB               INTEGER ::= 256
maxCPCHCell                 INTEGER ::= maxNrOfCPCHs
maxCTFC                     INTEGER ::= 16777215
maxLocalCellinNodeB         INTEGER ::= maxCellinNodeB
maxNoofLen                  INTEGER ::= 7
maxFPACHCell                INTEGER ::= 8
maxRACHCell                 INTEGER ::= maxPRACHCell
maxPRACHCell                INTEGER ::= 16
maxPCPCHCell                INTEGER ::= 64
maxSCCPCHCell               INTEGER ::= 32
maxSCPICHCell               INTEGER ::= 32
maxTTI-count                INTEGER ::= 4
maxIBSEG                    INTEGER ::= 16
maxIB                       INTEGER ::= 64
maxFACHCell                 INTEGER ::= 256 -- maxNrOfFACHs * maxSCCPCHCell
maxRateMatching             INTEGER ::= 256
maxCodeNrComp-1             INTEGER ::= 256
maxNrOfCellSyncBursts       INTEGER ::= 10
maxNrOfCodeGroups           INTEGER ::= 256
maxNrOfReceptsPerSyncFrame  INTEGER ::= 16
maxNrOfMeasNCell            INTEGER ::= 96
maxNrOfMeasNCell-1          INTEGER ::= 95  -- maxNrOfMeasNCell – 1
maxNrOfTFCIGroups           INTEGER ::= 256
maxNrOfTFCI1Combs           INTEGER ::= 512
maxNrOfTFCI2Combs           INTEGER ::= 1024
maxNrOfTFCI2Combs-1         INTEGER ::= 1023
maxNrOfSF                   INTEGER ::= 8
maxTGPS                     INTEGER ::= 6
maxCommunicationContext     INTEGER ::= 1048575
maxNrOfLevels               INTEGER ::= 256
maxNoSat                    INTEGER ::= 16
maxNoGPSItems               INTEGER ::= 8
maxNoOfSyncFramesLCR        INTEGER ::= 512
maxNrofreceptionsperSyncFrameLCR    INTEGER ::= 8
```

/* partly omitted */

```
id-PUSCH-ModifyInformation-LCR-ModifyListIE-PSCH-ReconfRqst        ProtocolIE-ID ::= 493
id-timeslotInfo-CellSyncInitiationRqstTDD                          ProtocolIE-ID ::= 496
id-SyncReportType-CellSyncReprtTDD                                 ProtocolIE-ID ::= 497
id-PUSCH-Info-DM-Rqst                                              ProtocolIE-ID ::= 505
id-PUSCH-Info-DM-Rsp                                               ProtocolIE-ID ::= 506
id-PUSCH-Info-DM-Rprt                                              ProtocolIE-ID ::= 507
```

```
id-InitDL-Power                                                 ProtocolIE-ID ::= 509
id-cellSyncBurstRepetitionPeriod                                ProtocolIE-ID ::= 511
id-ReportCharacteristicsType-OnModification                     ProtocolIE-ID ::= 512
id-SFNSFNMeasurementValueInformation                            ProtocolIE-ID ::= 513
id-SFNSFNMeasurementThresholdInformation                        ProtocolIE-ID ::= 514
id-TUTRANGPSMeasurementValueInformation                         ProtocolIE-ID ::= 515
id-TUTRANGPSMeasurementThresholdInformation                     ProtocolIE-ID ::= 516
id-Rx-Timing-Deviation-Value-LCR                                ProtocolIE-ID ::= 520
id-RL-InformationResponse-LCR-RL-AdditionRspTDD                 ProtocolIE-ID ::= 51
id-SYNCDlCodeId-TransInitLCR-CellSyncInitiationRqstTDD          ProtocolIE-ID ::= 543
id-SYNCDlCodeId-MeasureInitLCR-CellSyncInitiationRqstTDD        ProtocolIE-ID ::= 544
id-SYNCDlCodeIdTransReconfInfoLCR-CellSyncReconfRqstTDD         ProtocolIE-ID ::= 545
id-SYNCDlCodeIdMeasReconfigurationLCR-CellSyncReconfRqstTDD     ProtocolIE-ID ::= 546
id-SYNCDlCodeIdMeasInfoList-CellSyncReconfRqstTDD               ProtocolIE-ID ::= 547
id-SyncDLCodeIdsMeasInfoList-CellSyncReprtTDD                   ProtocolIE-ID ::= 548
id-SyncDLCodeIdThreInfoLCR                                      ProtocolIE-ID ::= 549
id-NSubCyclesPerCyclePeriod-CellSyncReconfRqstTDD               ProtocolIE-ID ::= 550
id-DwPCH-Power                                                  ProtocolIE-ID ::= 551

END
```