Agenda Item	:	5
Source	:	**Nortel Networks**
Title	:	**Clarification of synchronisation procedures in case of reconfiguration**
Document for	:	**Discussion and approval**

1. Introduction

This paper is an explanatory paper to the CR in R1-010515. The purpose is to clarify some ambiguous points in the physical layer synchronisation procedures in 25.214. The current specification currently indicates how the UE and UTRAN should acquire and maintain synchronisation in case new radio links are established or added. Two separate cases are presented in 25.214 : one is called "no existing radio link" and the other "one or several existing radio links".

However it is currently not clear how both the UE and UTRAN behave when one or several of the existing radio links are being reconfigured either in the same cell or in a different cell, either in the downlink only, uplink only or both.

This paper discusses these various cases and how they should be treated on the UE and node B sides and proposes a number of changes on 25.214 and on the RRC protocol.

2. Which cases are covered by the current specifications?

In the current specification, two cases only are described :

- "no existing radio link" : this procedure applies when the first radio link is established i;e. one dedicated physical channel needs to be set up in the uplink and at least one dedicated physical channel needs to be set up in the downlink. This procedure can therefore apply for the first establishment and all inter-cell handover where both the uplink and downlink physical channels are changed compared to the configuration on the previous cell. However it is not clear what happens in case the downlink only is changed (inter-cell handover on the same frequency).

- "one or several existing radio links" : this procedure applies when there is an existing dedicated physical channel in the uplink and at least one dedicated physical channel needs to be set up in the downlink. This typically corresponds to updating the active set while maintaining at least one radio link unchanged between before and after the procedure

3. What are the missing cases?

As explained above the reconfiguration cases are nowhere specified. The following intra-cell reconfiguration cases should be considered

- uplink and downlink simultaneously

- downlink only

- uplink only

Whenever the parameters of the downlink physical channel are changed within a given cell (therefore in a given radio link), the UE has a risk of losing the downlink synchronisation. The parameters which can be modifed are e.g. channelisation code, scrambling code, spreading factor, frame offset... So the risk of losing synchronisation is quite serious in particular in case the timing of the downlink physical channel is changed. To overcome this problem, it is proposed that whenever the downlink physical channel changes the UE should acquire synchronisation on the new physical channel from the start and therefore apply the "no existing radio link procedure".

Since it will be applied also in the reconfiguration cases it is proposed to rename the procedure "synchronisation establishment procedure" so that it is not restricted to the initial establishment.

In the case of an uplink only reconfiguration, it is proposed that the normal monitoring procedure described in 4.3.3.2 is applied

4. Conclusion and proposal

It is proposed that the current 25.214 specifications are modified so that the "no existing radio link procedure" renamed "synchronisation establishment procedure" also applies for all the intra-cell reconfiguration cases. In addition it is proposed that the "one or several existing radio links procedures" is renamed "synchronisation addition procedure" since it does only apply when the active set is updated.

For consistency with RAN2 and RAN3 specifications, companion CRs to the CR on 25.214 have been produced on the RRC and NBAP protocols so that it is clearly indicated that

- the "synchronisation establishment procedure" applies for all reconfiguration procedures (radio bearer setup, radio bearer release, radio bearer reconfiguration, transport channel reconfiguration, physical channel reconfiguration and rrc connection setup for RRC, radio link setup, reconfiguration for NBAP) which modify the physical channel configuration.

- the "synchronisation addition procedure" applies when the active set is updated.

CR-Form-v4

CHANGE REQUEST

⌘   **25.214** CR **180**   ⌘ ev **-** ⌘ Current version: **3.6.0** ⌘

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

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

Title: ⌘	Clarification of synchronisation procedures	
Source: ⌘	Nortel Networks	
Work item code: ⌘		*Date:* ⌘ 05-15-2001
Category: ⌘ **F**		*Release:* ⌘ R99

Use <u>one</u> 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 <u>one</u> 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: ⌘	Synchronisation procedures as described in section 4.3 25.214 currently consider only the establishment and radio link addition cases and nothing is specified for the reconfiguration cases. The CR clarifies in which case the existing procedures can be used and how the UE and UTRAN should behave in terms of synchronisation.
Summary of change: ⌘	The synchronisation procedures "no existing radio link" (section 4.3.2.2) and "one or several existing radio links" (section 4.3.2.3) are renamed "synchronisation establishment procedures" and "synchronisation addition procedures". - the "synchronisation establishment procedures" applies when the first radio link is setup and when one or several existing radio links are reconfigured. This implies that the UE should stop transmitting when a downlink physical channel(s) of a radio link is reconfigured. - the "synchronisation addition procedure" applies when radio links are added and or removed and at least one previous radio link is kept unchanged. The rest of the text is clarified and aligned with RRC specifications
Consequences if not approved: ⌘	Unclear specifications, ambiguous UE and UTRAN behaviour as far as synchronisation is concerned when radio link reconfiguration occurs

Clauses affected: ⌘	4.3.2 and subclauses
Other specs affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	A companion CR has been prepared for 25.331 (CR25.331-806 in R2-011106)where reference to the synchronisation procedures are introduced in the corresponding procedures (reconfiguration and active set update)

How to create CRs using this form:

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4.3 DPCCH/DPDCH synchronisation

4.3.1 Synchronisation primitives

4.3.1.1 General

For the dedicated channels, synchronisation primitives are used to indicate the synchronisation status of radio links, both in uplink and downlink. The definition of the primitives is given in the following subclauses.

4.3.1.2 Downlink synchronisation primitives

Layer 1 in the UE shall every radio frame check synchronisation status of the downlink dedicated channels. Synchronisation status is indicated to higher layers using the CPHY-Sync-IND and CPHY-Out-of-Sync-IND primitives.

The criteria for reporting synchronisation status are defined in two different phases.

The first phase lasts until 160 ms after the downlink dedicated channel is considered established by higher layers (physical channel establishment is defined in [5]). During this time out-of-sync shall not be reported and in-sync shall be reported using the CPHY-Sync-IND primitive if the following criterion is fulfilled:

- The UE estimates the DPCCH quality over the previous 40 ms period to be better than a threshold Q_{in}. This criterion shall be assumed not to be fulfilled before 40 ms of DPCCH quality measurements have been collected. Q_{in} is defined implicitly by the relevant tests in [7].

The second phase starts 160 ms after the downlink dedicated channel is considered established by higher layers. During this phase both out-of-sync and in-sync are reported as follows.

Out-of-sync shall be reported using the CPHY-Out-of-Sync-IND primitive if either of the following criteria are fulfilled:

- The UE estimates the DPCCH quality over the previous 160 ms period to be worse than a threshold Q_{out}. Q_{out} is defined implicitly by the relevant tests in [7].

- The 20 most recently received transport blocks with a CRC attached, as observed on all TrCHs using CRC, have been received with incorrect CRC. In addition, over the previous 160 ms, all transport blocks with a CRC attached have been received with incorrect CRC.

In-sync shall be reported using the CPHY-Sync-IND primitive if both of the following criteria are fulfilled:

- The UE estimates the DPCCH quality over the previous 160 ms period to be better than a threshold Q_{in}. Q_{in} is defined implicitly by the relevant tests in [7].

- At least one transport block with a CRC attached, as observed on all TrCHs using CRC, is received in a TTI ending in the current frame with correct CRC. If no transport blocks are received, or no transport block has a CRC attached, this criterion shall be assumed to be fulfilled.

How the primitives are used by higher layers is described in [5]. The above definitions may lead to radio frames where neither the in-sync nor the out-of-sync primitives are reported.

4.3.1.3 Uplink synchronisation primitives

Layer 1 in the Node B shall every radio frame check synchronisation status of all radio link sets. Synchronisation status is indicated to the RL Failure/Restored triggering function using either the CPHY-Sync-IND or CPHY-Out-of-Sync-IND primitive. Hence, only one synchronisation status indication shall be given per radio link set.

The exact criteria for indicating in-sync/out-of-sync is not subject to specification, but could e.g. be based on received DPCCH quality or CRC checks. One example would be to have the same criteria as for the downlink synchronisation status primitives.

4.3.2   Radio link establishment4.3.2 Radio link synchronisation

4.3.2.1   General

The establishment of a radio link can be divided into two casesTwo synchronisation procedures are defined in order to obtain radio link synchronisation between UE and UTRAN:

-   Synchronisation establishment procedure: It is used when there is no existingthe first radio link(s) is established or when one or several existing radio links are reconfigured i.e. when at least one downlink dedicated physical channel and one uplink dedicated physical channel are to be set up or at least one downlink dedicated physical channel is to be reconfigured;

-   or Synchronisation addition procedure: It is used when one or several radio links already existneed to be added, and at least one previous radio link is kept unchanged, i.e. when at least one downlink dedicated physical channel is to be set up and an uplink dedicated physical channel already exists.

The cases where one of these two procedures is applied in the UE is specified in 25.331.

The two cases procedures are described in subclauses 4.3.2.2 and 4.3.2.3 respectively.

4.3.2.2 Node B radio link set state machine

In Node B, each radio link set can be in three different states: initial state, out-of-sync state and in-sync state. Transitions between the different states is shown in figure 1 below. The state of the Node B at the start of radio link establishment is described in the following subclauses. Transitions between initial state and in-sync state are described in subclauses 4.3.2.2 and 4.3.2.3 and transitions between the in-sync and out-of-sync states are described in subclause 4.3.3.2.
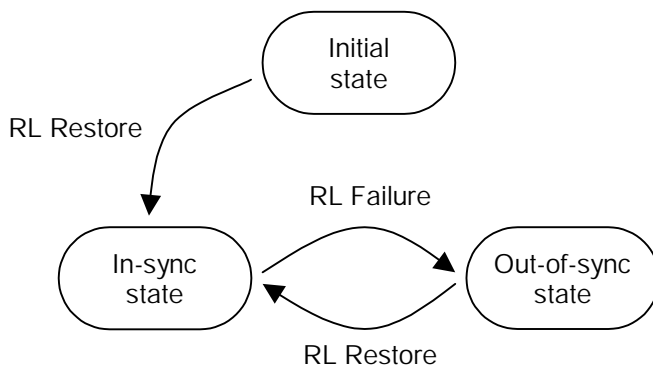

Figure 1: Node B radio link set states and transitions

4.3.2.23   No existing radio Synchronisation establishment procedurelink

When one or several radio links are to be established and there is no existing radio link for the UE already, a dedicated physical channel is to be set up in uplink and at least one dedicated physical channel is to be set up in downlink. This corresponds to the case when a dedicated physical channel is initially set up on a frequency.

The synchronisation establishment procedure, which begins at the time indicated by higher layers (either immediately at receipt of upper layer signalling, or at an indicated activation time), radio link establishment is as follows:

a)   a) Each NNode B involved in the procedure considerssets the all its radio link sets for this UE which are to be set up to be in the initial state.

b)   UTRAN shall start the transmission of the downlink DPCCH. and may start the transmission of DPDCH if any data is to be transmitted. The initial downlink DPCCH transmit power is set by higher layers [6]. Downlink TPC commands are generated as described in 5.1.2.2.1.2.

c)b)   The UE shall not transmit on uplink until higher layers consider the downlink physical channel established,.. Note that in case of a reconfiguration, it means that the UE has stopped uplink transmission at the initiation of the procedure.

d)　The UE establishes downlink chip and frame synchronisation of DPCCH, using the P-CCPCH timing and timing offset information notified from UTRAN or available from the previous configuration if the same timing offset is maintained. Frame synchronisation can be confirmed using the frame synchronisation word. Downlink synchronisation status is reported to higher layers every radio frame according to subclause 4.3.1.2.

c)　If no activation time for uplink DPCCH has been signalled to the UE, uplink DPCCH transmission shall start when higher layers consider the downlink physical channel established. If an activation time has been given, uplink DPCCH transmission shall not start before the downlink physical channel has been established and the activation time has been reached. Physical channel establishment and activation time are defined in [5].

e)　When higher layers consider the downlink physical channel established, the UE shall begin uplink transmission. The initial uplink DPCCH transmit power is set by higher layers [5]. The total signalling response delay for the establishment of a new DPCH shall not exceed the requirements given in [8] sub-clause 7.3. A power control pre-amble shall be applied as indicated by higher layers. The uplink DPDCH transmission shall not start before the end of the power control preamble. The length of the power control preamble is N_{pcp} radio frames beginning at the start of uplink DPCCH transmission, where N_{pcp} is a higher layer parameter set by UTRAN [5]. Note that the transmission start delay between DPCCH and DPDCH may be cancelled using a power control preamble of 0 length. The uplink DPDCH transmission shall not start before the end of the power control preamble. The length of the power control preamble is N_{pcp} radio frames beginning at the start of uplink DPCCH transmission, where N_{pcp} is a higher layer parameter set by UTRAN [5]. Note that the transmission start delay between DPCCH and DPDCH may be cancelled using a power control preamble of 0 length. The starting time for transmission of DPDCHs shall also satisfy the constraints on adding transport channels to a CCTrCH, as defined in [2] sub-clause 4.2.14.

f)　d) UTRAN establishes uplink chip and frame synchronisation. Frame synchronisation can be confirmed using the frame synchronisation word. Radio link sets remain in the initial state until N_INSYNC_IND successive in-sync indications are received from layer 1, when Node B shall trigger the RL Restore procedure indicating which radio link set has obtained synchronisation. When RL Restore has been triggered the radio link set shall be considered to be in the in-sync state. The parameter value of N_INSYNC_IND is configurable, see [6]. The RL Restore procedure may be triggered several times, indicating when synchronisation is obtained for different radio link sets.

Note: The total signalling response delay for the establishment of a new DPCH shall not exceed the requirements given in [8] sub-clause 7.3.

4.3.2.34　Synchronisation addition procedure One or several existing radio links

When one or several radio links are to be established and one or several radio links already exist, there is an existing DPCCH/DPDCH in the uplink, and at least one corresponding dedicated physical channel shall be set up in the downlink. This corresponds to the case when new radio links are added to the active set and downlink transmission starts for those radio links.

The synchronisation addition procedure, which begins at the time indicated by higher layers (either immediately at receipt of upper layer signalling, or at an indicated activation time), radio link establishment is as follows:

a)　a) The following applies to a Node B:

- Node B considers nNew radio link sets to be are set up to be in initial state.

- If a one or several radio links is to be are added or removed to an existing radio link set (except if the radio link set becomes empty), this radio link set shall be considered to be in the state the radio link set was prior to the addition of the radio link, i.e. if the radio link set was in the in-sync state before the addition of the radio link it shall remain in that state.

b)　UTRAN starts the transmission of the downlink DPCCH/DPDCH for each new radio link at a frame timing such that the frame timing received at the UE will be within $T_0 \pm 148$ chips prior to the frame timing of the uplink DPCCH/DPDCH at the UE. Simultaneously, UTRAN establishes uplink chip and frame synchronisation of the each new radio link. Frame synchronisation can be confirmed using the frame synchronization word. Radio link sets considered to be in the initial state shall remain in the initial state until N_INSYNC_IND successive in-sync indications are received from layer 1, when Node B shall trigger the RL Restore procedure indicating which radio link set has obtained synchronisation. When RL Restore is triggered the radio link set shall be considered to be in the in-sync state. The parameter value of N_INSYNC_IND is configurable, see [6]. The RL Restore

procedure may be triggered several times, indicating when synchronisation is obtained for different radio link sets.

c) The UE establishes chip and frame synchronisation of ~~the~~ each new radio link. Frame synchronisation can be confirmed using the frame synchronization word. Downlink synchronisation status shall be reported to higher layers every radio frame according to subclause 4.3.1.2.

CR-Form-v4

CHANGE REQUEST

⌘   **25.214** CR **181**   ⌘   ev   **-**   ⌘   Current version: **4.0.0** ⌘

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

Title: ⌘	Clarification of synchronisation procedures	
Source: ⌘	Nortel Networks	
Work item code: ⌘		*Date:* ⌘ 05-15-2001
Category: ⌘ **F**		*Release:* ⌘ REL-4

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4.3 DPCCH/DPDCH synchronisation

4.3.1 Synchronisation primitives

4.3.1.1 General

For the dedicated channels, synchronisation primitives are used to indicate the synchronisation status of radio links, both in uplink and downlink. The definition of the primitives is given in the following subclauses.

4.3.1.2 Downlink synchronisation primitives

Layer 1 in the UE shall every radio frame check synchronisation status of the downlink dedicated channels. Synchronisation status is indicated to higher layers using the CPHY-Sync-IND and CPHY-Out-of-Sync-IND primitives.

The criteria for reporting synchronisation status are defined in two different phases.

The first phase lasts until 160 ms after the downlink dedicated channel is considered established by higher layers (physical channel establishment is defined in [5]). During this time out-of-sync shall not be reported and in-sync shall be reported using the CPHY-Sync-IND primitive if the following criterion is fulfilled:

- The UE estimates the DPCCH quality over the previous 40 ms period to be better than a threshold Q_{in}. This criterion shall be assumed not to be fulfilled before 40 ms of DPCCH quality measurements have been collected. Q_{in} is defined implicitly by the relevant tests in [7].

The second phase starts 160 ms after the downlink dedicated channel is considered established by higher layers. During this phase both out-of-sync and in-sync are reported as follows.

Out-of-sync shall be reported using the CPHY-Out-of-Sync-IND primitive if either of the following criteria are fulfilled:

- The UE estimates the DPCCH quality over the previous 160 ms period to be worse than a threshold Q_{out}. Q_{out} is defined implicitly by the relevant tests in [7].

- The 20 most recently received transport blocks with a CRC attached, as observed on all TrCHs using CRC, have been received with incorrect CRC. In addition, over the previous 160 ms, all transport blocks with a CRC attached have been received with incorrect CRC.

In-sync shall be reported using the CPHY-Sync-IND primitive if both of the following criteria are fulfilled:

- The UE estimates the DPCCH quality over the previous 160 ms period to be better than a threshold Q_{in}. Q_{in} is defined implicitly by the relevant tests in [7].

- At least one transport block with a CRC attached, as observed on all TrCHs using CRC, is received in a TTI ending in the current frame with correct CRC. If no transport blocks are received, or no transport block has a CRC attached, this criterion shall be assumed to be fulfilled.

How the primitives are used by higher layers is described in [5]. The above definitions may lead to radio frames where neither the in-sync nor the out-of-sync primitives are reported.

4.3.1.3 Uplink synchronisation primitives

Layer 1 in the Node B shall every radio frame check synchronisation status of all radio link sets. Synchronisation status is indicated to the RL Failure/Restored triggering function using either the CPHY-Sync-IND or CPHY-Out-of-Sync-IND primitive. Hence, only one synchronisation status indication shall be given per radio link set.

The exact criteria for indicating in-sync/out-of-sync is not subject to specification, but could e.g. be based on received DPCCH quality or CRC checks. One example would be to have the same criteria as for the downlink synchronisation status primitives.

4.3.2 ~~Radio link establishment~~4.3.2 Radio link synchronisation

4.3.2.1 General

~~The establishment of a radio link can be divided into two cases~~Two synchronisation procedures are defined in order to obtain radio link synchronisation between UE and UTRAN:

- Synchronisation establishment procedure: It is used ~~-~~when ~~there is no existing~~the first radio link(s) is established or when one or several existing radio links are reconfigured i.e. when at least one downlink dedicated physical channel and one uplink dedicated physical channel are to be set up or at least one downlink dedicated physical channel is to be reconfigured;

- ~~or~~ Synchronisation addition procedure: It is used ~~-~~ when one or several radio links ~~already exist~~need to be added, and at least one previous radio link is kept unchanged, i.e. when at least one downlink dedicated physical channel is to be set up and an uplink dedicated physical channel already exists.

The cases where one of these two procedures is applied in the UE is specified in 25.331.

The two ~~cases~~procedures are described in subclauses 4.3.2.2 and 4.3.2.3 respectively.

4.3.2.2 Node B radio link set state machine

In Node B, each radio link set can be in three different states: initial state, out-of-sync state and in-sync state. Transitions between the different states is shown in figure 1 below. The state of the Node B at the start of radio link establishment is described in the following subclauses. Transitions between initial state and in-sync state are described in subclauses 4.3.2.2 and 4.3.2.3 and transitions between the in-sync and out-of-sync states are described in subclause 4.3.3.2.
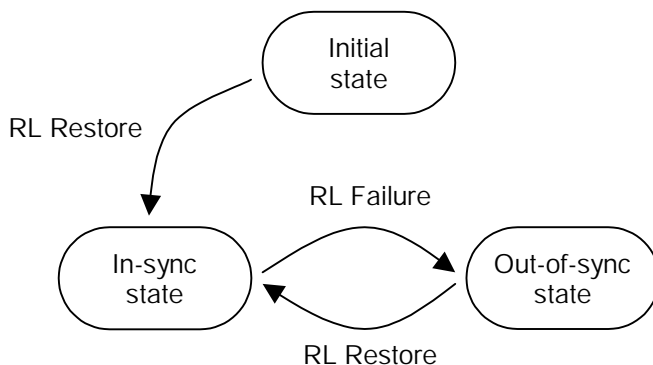

Figure 1: Node B radio link set states and transitions

4.3.2.~~2~~3 ~~No existing radio~~ Synchronisation establishment procedure~~link~~

~~When one or several radio links are to be established and there is no existing radio link for the UE already, a dedicated physical channel is to be set up in uplink and at least one dedicated physical channel is to be set up in downlink. This corresponds to the case when a dedicated physical channel is initially set up on a frequency.~~

The synchronisation establishment procedure, which begins at the time indicated by higher layers (either immediately at receipt of upper layer signalling, or at an indicated activation time), ~~radio link establishment~~ is as follows:

a) ~~a)~~Each N~~N~~ode B involved in the procedure ~~considers~~sets the ~~all its~~ radio link sets for this UE ~~which are to be set up to be~~ in the initial state.

b) ~~-~~UTRAN shall start the transmission of the downlink DPCCH. and may start the transmission of DPDCH if any data is to be transmitted. The initial downlink DPCCH transmit power is set by higher layers [6]. Downlink TPC commands are generated as described in 5.1.2.2.1.2.

c)~~b)~~ The UE shall not transmit on uplink until higher layers consider the downlink physical channel established,.. Note that in case of a reconfiguration, it means that the UE has stopped uplink transmission at the initiation of the procedure.

d) The UE establishes downlink chip and frame synchronisation of DPCCH, using the P-CCPCH timing and timing offset information notified from UTRAN or available from the previous configuration if the same timing offset is maintained. Frame synchronisation can be confirmed using the frame synchronisation word. Downlink synchronisation status is reported to higher layers every radio frame according to subclause 4.3.1.2.

c) If no activation time for uplink DPCCH has been signalled to the UE, uplink DPCCH transmission shall start when higher layers consider the downlink physical channel established. If an activation time has been given, uplink DPCCH transmission shall not start before the downlink physical channel has been established and the activation time has been reached. Physical channel establishment and activation time are defined in [5].

e) When higher layers consider the downlink physical channel established, the UE shall begin uplink transmission. The initial uplink DPCCH transmit power is set by higher layers [5]. The total signalling response delay for the establishment of a new DPCH shall not exceed the requirements given in [8] sub-clause 7.3. A power control pre-amble shall be applied as indicated by higher layers. The uplink DPDCH transmission shall not start before the end of the power control preamble. The length of the power control preamble is N_{pcp} radio frames beginning at the start of uplink DPCCH transmission, where N_{pcp} is a higher layer parameter set by UTRAN [5]. Note that the transmission start delay between DPCCH and DPDCH may be cancelled using a power control preamble of 0 length. The uplink DPDCH transmission shall not start before the end of the power control preamble. The length of the power control preamble is N_{pcp} radio frames beginning at the start of uplink DPCCH transmission, where N_{pcp} is a higher layer parameter set by UTRAN [5]. Note that the transmission start delay between DPCCH and DPDCH may be cancelled using a power control preamble of 0 length. The starting time for transmission of DPDCHs shall also satisfy the constraints on adding transport channels to a CCTrCH, as defined in [2] sub-clause 4.2.14.

f) d) UTRAN establishes uplink chip and frame synchronisation. Frame synchronisation can be confirmed using the frame synchronisation word. Radio link sets remain in the initial state until N_INSYNC_IND successive in-sync indications are received from layer 1, when Node B shall trigger the RL Restore procedure indicating which radio link set has obtained synchronisation. When RL Restore has been triggered the radio link set shall be considered to be in the in-sync state. The parameter value of N_INSYNC_IND is configurable, see [6]. The RL Restore procedure may be triggered several times, indicating when synchronisation is obtained for different radio link sets.

Note: The total signalling response delay for the establishment of a new DPCH shall not exceed the requirements given in [8] sub-clause 7.3.

4.3.2.34　　Synchronisation addition procedure~~One or several existing radio links~~

When one or several radio links are to be established and one or several radio links already exist, there is an existing DPCCH/DPDCH in the uplink, and at least one corresponding dedicated physical channel shall be set up in the downlink. This corresponds to the case when new radio links are added to the active set and downlink transmission starts for those radio links.

The synchronisation addition procedure, which begins at the time indicated by higher layers (either immediately at receipt of upper layer signalling, or at an indicated activation time), radio link establishment is as follows:

a) a) The following applies to a Node B:

- Node B considers nNew radio link sets to beare set up to be in initial state.

- If a one or several radio links is to beare added or removed to an existing radio link set (except if the radio link set becomes empty), this radio link set shall be considered to be in the state the radio link set was prior to the addition of the radio link, i.e. if the radio link set was in the in-sync state before the addition of the radio link it shall remain in that state.

b) UTRAN starts the transmission of the downlink DPCCH/DPDCH for each new radio link at a frame timing such that the frame timing received at the UE will be within $T_0 \pm 148$ chips prior to the frame timing of the uplink DPCCH/DPDCH at the UE. Simultaneously, UTRAN establishes uplink chip and frame synchronisation of the each new radio link. Frame synchronisation can be confirmed using the frame synchronization word. Radio link sets considered to be in the initial state shall remain in the initial state until N_INSYNC_IND successive in-sync indications are received from layer 1, when Node B shall trigger the RL Restore procedure indicating which radio link set has obtained synchronisation. When RL Restore is triggered the radio link set shall be considered to be in the in-sync state. The parameter value of N_INSYNC_IND is configurable, see [6]. The RL Restore

procedure may be triggered several times, indicating when synchronisation is obtained for different radio link sets.

c) The UE establishes chip and frame synchronisation of ~~the~~ each new radio link. Frame synchronisation can be confirmed using the frame synchronization word. Downlink synchronisation status shall be reported to higher layers every radio frame according to subclause 4.3.1.2.