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# January 18 – 21, 2000, Beijing, China

TSG-RAN Working Group 2 (Radio L2 and Radio L3) R2-000217
San Diego, CA, USA, 17 - 21 January 2000

**Title: LS on revised CPCH model employed in L2/L3 radio interface specifications**

**Source: TSG RAN WG2**

**To: TSG RAN WG1, TSG RAN WG3**

RAN WG2 has discussed the present descriptions of Common Packet Channel (CPCH) in L2/L3 radio interface specifications and has agreed on some changes of the previous CPCH model. The agreed revisions include necessary changes due to incorporation of CPCH Status Monitoring, Channel Assignment and UE Channel Selection. The revised CPCH model is outlined in the attached document Tdoc R2-000211rev1 "Description of CPCH model". Based on this model detailed CRs on TS 25.302, 25.303, 25.321 and 25.331 are being prepared in WG2.

RAN WG2 also would like to acknowledge reception of "Liaison Statement on the issues of Channel Assignment, UE Channel Selection and CPCH Status Indicator Channel (CSICH)" received from RAN WG1 (Tdoc R1-000151, R2-000208). WG2 would like to confirm, that in WG2 opinion, the assumptions on the addressed issues are fully aligned in both groups. CA has been included in the model which has been agreed in R2 but usage is decided by the network. The recommendations regarding CPCH related RRC parameters given in the Liaison statement will be considered when updating the related sections of the RRC specification TS 25.331.

**3GPP TSG RAN WG2 #10** **TSGR2#10(00)0211**
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**Source :** **TSG-RAN WG2**

**Date :** **18 January 2000**

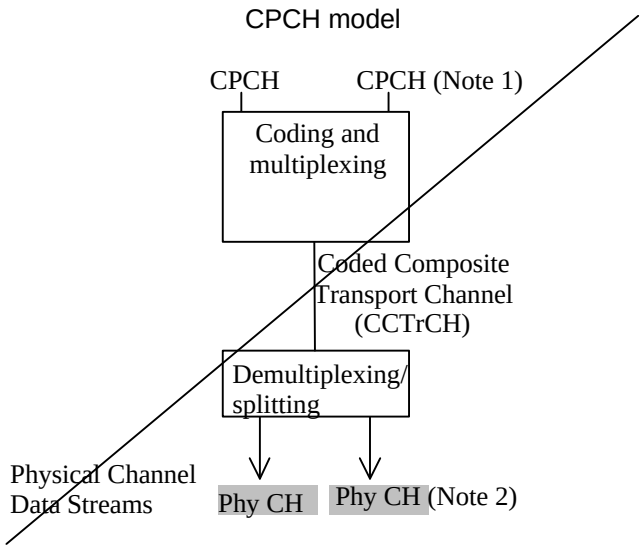
**Title :** **Description of CPCH model**

# Introduction

This document describes the results agreed in the discussions of the CPCH model at WG2#10. Based on this description, separate CRs to TS 25.302, 25.303, 25.321 and 25.331 will be produced.

## CPCH model

- The CPCH physical layer model presently given in TS 25.302 shall be simplified such that multiplexing of CPCH transport channels on PHY is not needed, cf. Fig. 1. Since there is always a single CPCH transport channel mapped to a PCPCH physical channel there is a one-to-one correspondence between a CPCH TFI and the TFCI conveyed on PCPCH. All CPCH transport channels of one CPCH set shall employ the same Transport Format Set




Note 1: The need to multiplex several CPCH transport channels is FFS
Note 2: Only the data part of the CPCH can be mapped on multiple physical channels

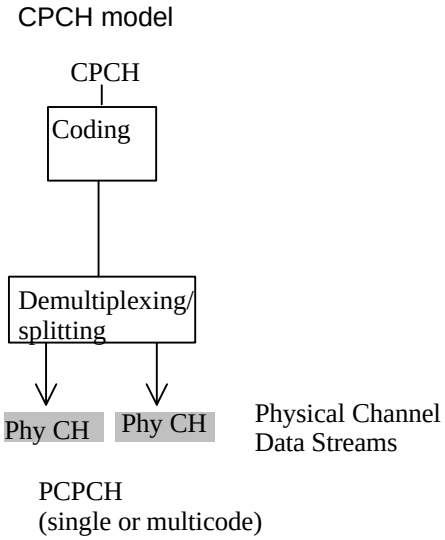



**Figure 1: CPCH physical layer model**

- Multiplexing of the logical channels (i.e. DTCHs and/or DCCHs) that are to be mapped onto a CPCH is performed on the MAC layer (in a MAC-d entity). The MAC specification TS 25.321 will be corrected by adding that UE-ID type, UE-ID and C/T field shall be included into the MAC header for CPCH (in the current version MAC header for CPCH is not specified yet). This model implies that there is a single QoS level provided for all services that employ CPCH transmission.

- **Example message sequence for data transmission on CPCH**

The message sequence given in Figure 2 below, shall clarify usage of the CPCH transport channel.

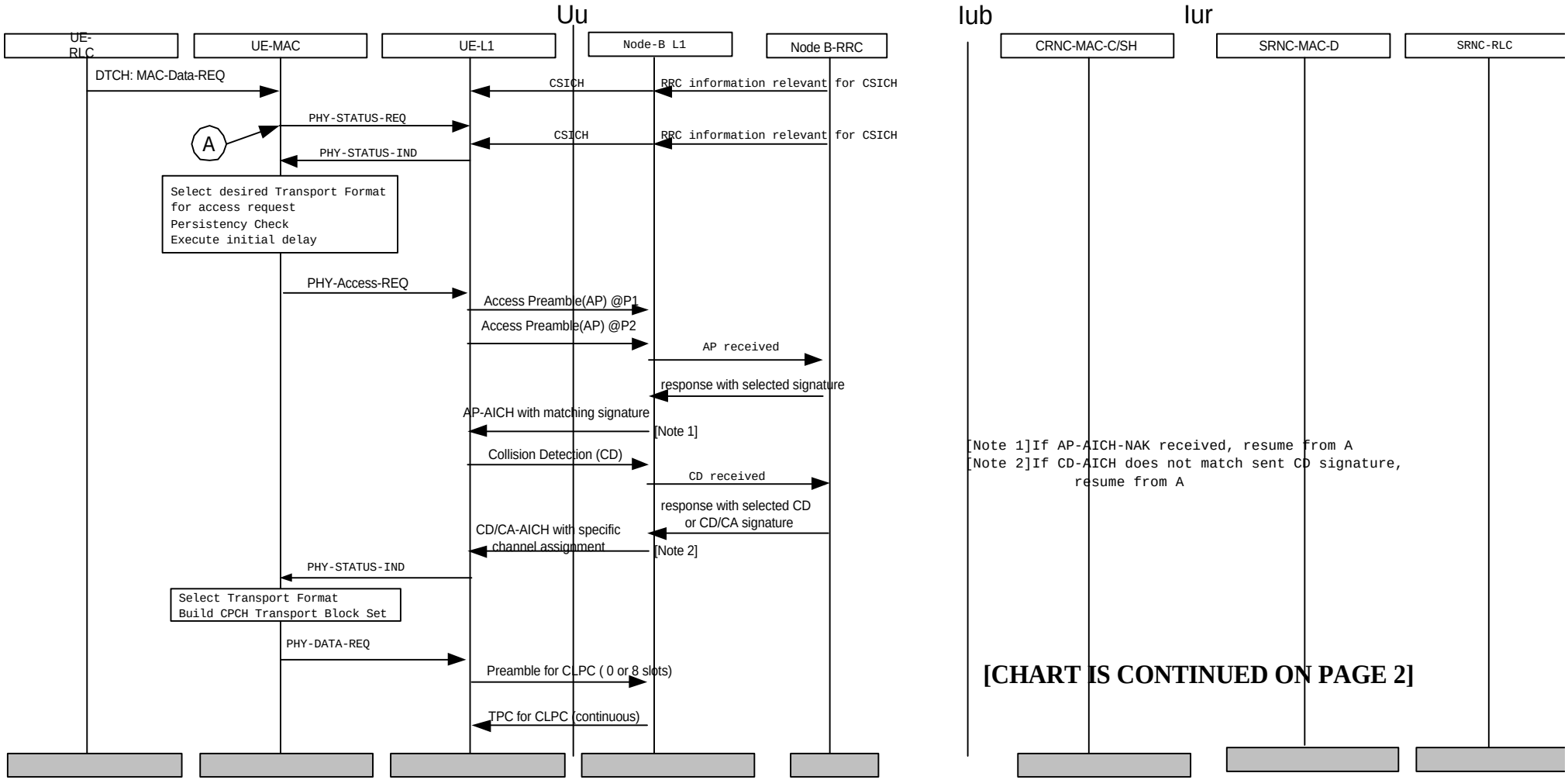



**Figure 2: Example of data transmission on CPCH (page 1 of 2)**

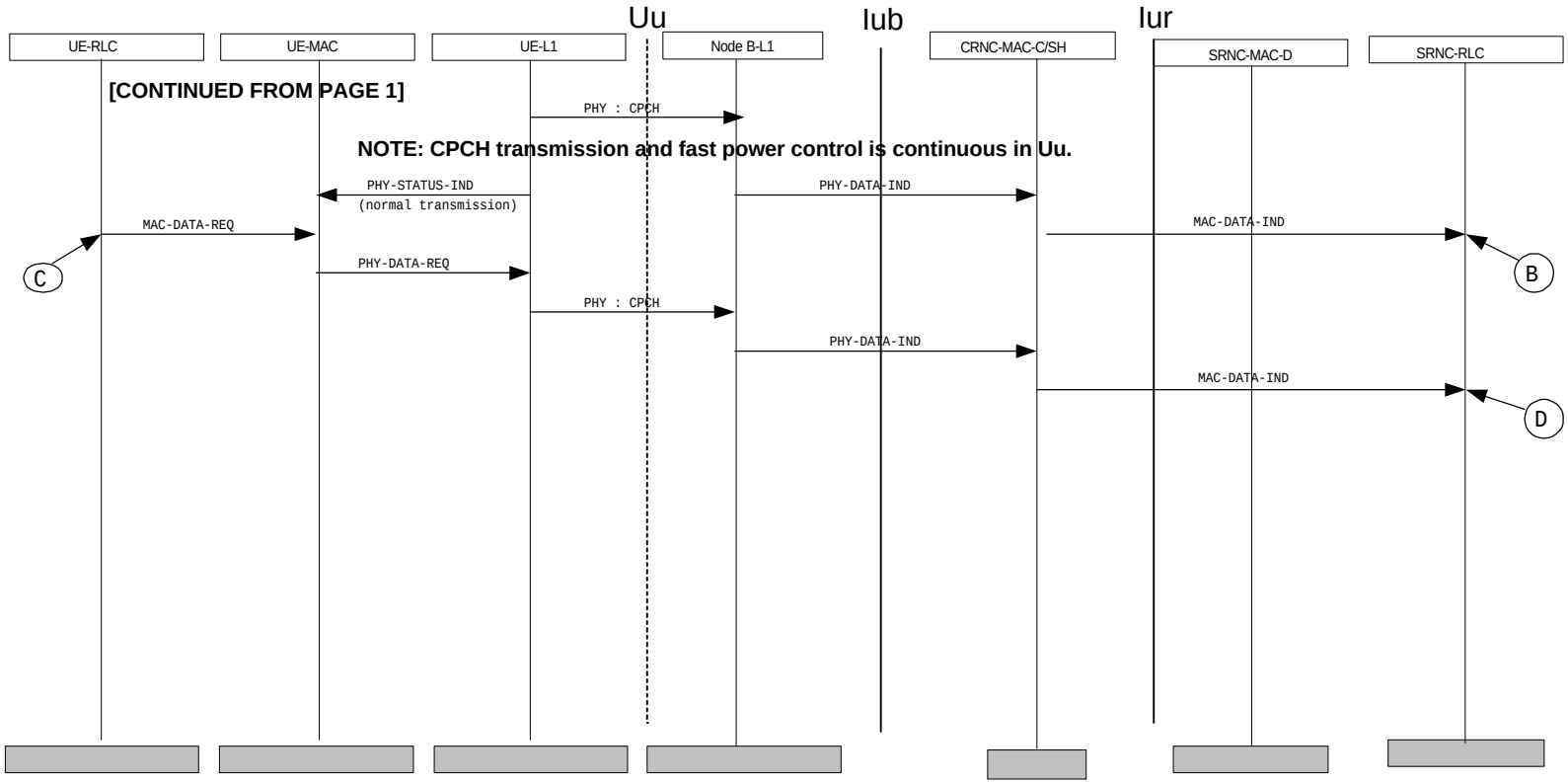



**Figure 2: Example of data transmission on CPCH (part 2 of 2)**

Figure 2 shows an example of data transmission on CPCH. It is assumed that RLC acknowledged or unacknowledged transmission modes are applied for all logical channels mapped to CPCH.
CPCH transmission is applied in the Connected mode RRC state CELL_FACH with CPCH resources assigned to the UE. The UE needs to be configured for CPCH transmission via a respective RRC procedure (e.g. with RADIO BEARER SETUP or TRANSPORT CHANNEL RECONFIGURATION messages).
Upon reception of a data transmission request from RLC, MAC first requests CPCH channel status information from the physical layer. It is assumed that CPCH channel status information is broadcast on the CSICH physical channel using the same DL channelization code as AP-AICH. The status information provides an indication of the maximum available data rate on PCPCH resources when Channel Assignment (CA) is active. When Channel Assignment is not active, then UE Channel Selection is employed. In this case the status information provides indication of the availability of each defined PCPCH. In either case, the channel status information is converted into a set of transport formats which are allowed to be employed at that given time. Whether channel assignment is active or not shall be indicated via System Information message. Current assumption is that the conversion of CPCH status information into Transport Formats is a L1 internal function.
Based on the permitted transport formats and the data available for transmission, MAC selects a desired transport format for CPCH access request. The MAC CPCH transmission control procedure is started by performing the persistency check based on persistence value received from RRC. When persistence check is passed, the physical CPCH transmission procedure is initiated by sending of a PHY-Access-REQ primitive. The PCPCH transmission procedure starts with an access preamble power ramping cycle. MAC then waits for status indication from L1 via PHY-Status-IND primitive. When acquisition of the access preamble is indicated on AP-AICH the CD preamble is sent on PCPCH. Reception of the CD preamble in Node B is indicated on CD-ICH to the UE. If Channel Assignment is active, channel assignment information is simultaneously transmitted on CD/CA-ICH. Layer 1 provides status indication to MAC indicating the CD or CD/CA information. The CA information defines in the UE on L1 the PCPCH to use for the power control preamble and the message part. Then MAC builds the CPCH transport block set to be transmitted via PHY-Data-REQ with the appropriate Transport Format which may differ from the requested transport format.

NOTE: Details of the mapping of the CA information to entries of the CPCH channelisation code tree are not agreed yet. Two different proposals are under study. In one proposal (Samsung) it is assumed that individual mapping tables for each Access Preamble are employed. In this scheme the interpretation of CA information in the UE depends on the Access Preamble that was used in the CPCH preamble transmission phase. In the other proposal (GBT), there is a single mapping table, not AP preamble specific, which applies to all channels of a CPCH set.

After the 0 or 8 slot period for the power control preamble, the first Transport Block Set (first TTI) of the message is transmitted.
Data transmission on CPCH is continued until all available data has been sent or until the maximum frame length [NF_max] (number of TTIs) is reached. The acknowledgements from RLC entities in SRNC are routed by the NW MAC to the UE RLC entities using the FACH DL transport channel.
In Figure 2, the events between points A and B define the CPCH transmission procedure for the first TTI. Events from point C to D describe the CPCH transmission procedure for each subsequent TTI.

- Emergency stop of CPCH transmission

  WG2 has agreed that a procedure is needed to stop CPCH transmission based on a request from RRC at the network side, for example, for reacting on temporary overload conditions. WG2 would like to ask WG1 to consider using the DL DPCH unused capacity for this purpose. The signalling should be implemented in such a way that the UE may response to the emergency stop command very quickly, e.g. within a single radio frame.

- CPCH control signalling

  WG2 has also has agreed that a signalling procedure would be desirable to provide the UE with RRC control commands during CPCH transmission. This control signalling is intended to be used for rate reduction for congestion control, and other purposes tbd. WG2 would like to ask WG1 to consider using the TFCI bits which are currently unused on the DL DPCCH to provide a robust means of sending respective control commands which are not as time-critical as eg. the emergency stop commands (cf. reference Tdoc R2-000145 "CPCH control method for abnormal situations", source: LGIC, GBT).