

**Agenda item:** 8  
**Source:** Golden Bridge Technology  
**Title:** CPCH Primitives for TS25.302, Services Provided by the Physical Layer

**Document for:** Discussion and approval

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## **INTRODUCTION**

In order for the UE to utilize the CPCH channels available in a cell, interlayer primitives must be modified to add the CPCH parameters needed for CPCH access. At RANWG2#5 contribution R2-99596 [1] was presented to list the RRC parameters needed for access and control of CPCH channels. In this contribution, those RRC parameters are added as new parameters in existing physical layer primitives.

## **DISCUSSION**

CPCH parameters are broadcast in the System Information message in the BCCH to all UEs. In addition, RNC may send CPCH parameters to a UE using DCCH resources. CPCH parameters include CPCH channel timing value, priority values, backoff control parameters, the physical channel description and persistency value for each CPCH channel included in the CPCH set assigned to this UE by RNC. The CPCH parameters are read by RRC in the UE, are parsed and distributed to the MAC and PHY layers using interlayer primitives.

MAC layer requires the following CPCH parameters for each CPCH channel in the CPCH Set:

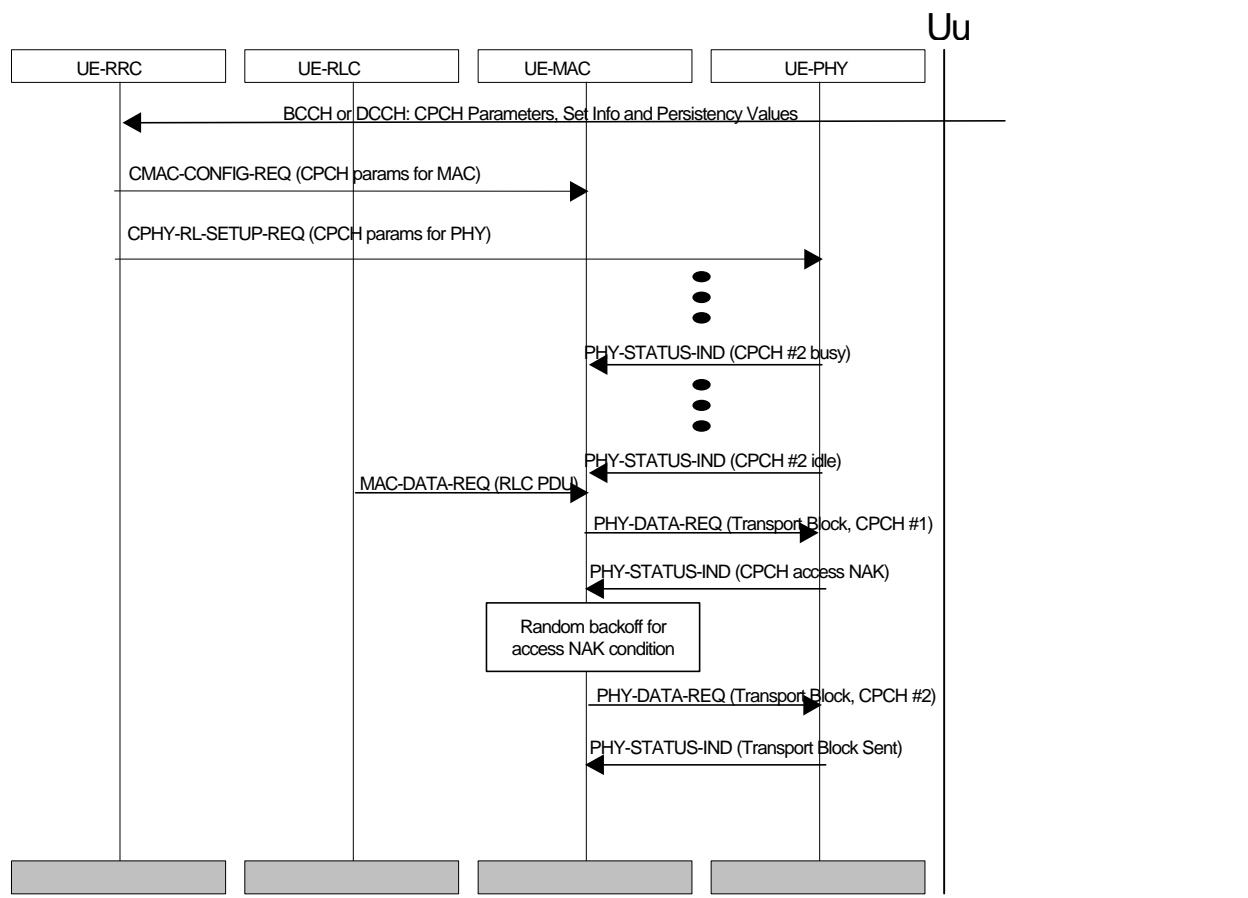
- CPCH channel number
- CPCH persistency value
- CPCH channel data rate (implicit in the UL channelisation code)
- N<sub>Fmax</sub> (Max packet length in frames)
- Priority values
- Backoff control parameters

PHY layer requires the following CPCH parameters for each CPCH channel in the CPCH Set:

- AP preamble code (common to all CPCH channels in this CPCH set)
- AP-AICH channelisation code (common to all CPCH channels in this CPCH set)
- CD preamble code (common to all CPCH channels in this CPCH set)
- CD-AICH channelisation code (common to all CPCH channels in this CPCH set)
- CPCH channel timing parameter (common to all CPCH channels in this CPCH set)
- Nap\_retrans\_max parameter (common to all CPCH channels in this CPCH set)

- CPCH channel number
- UL scrambling code
- UL channelisation code
- DL channelisation code
- Preamble signature(s) for channel access

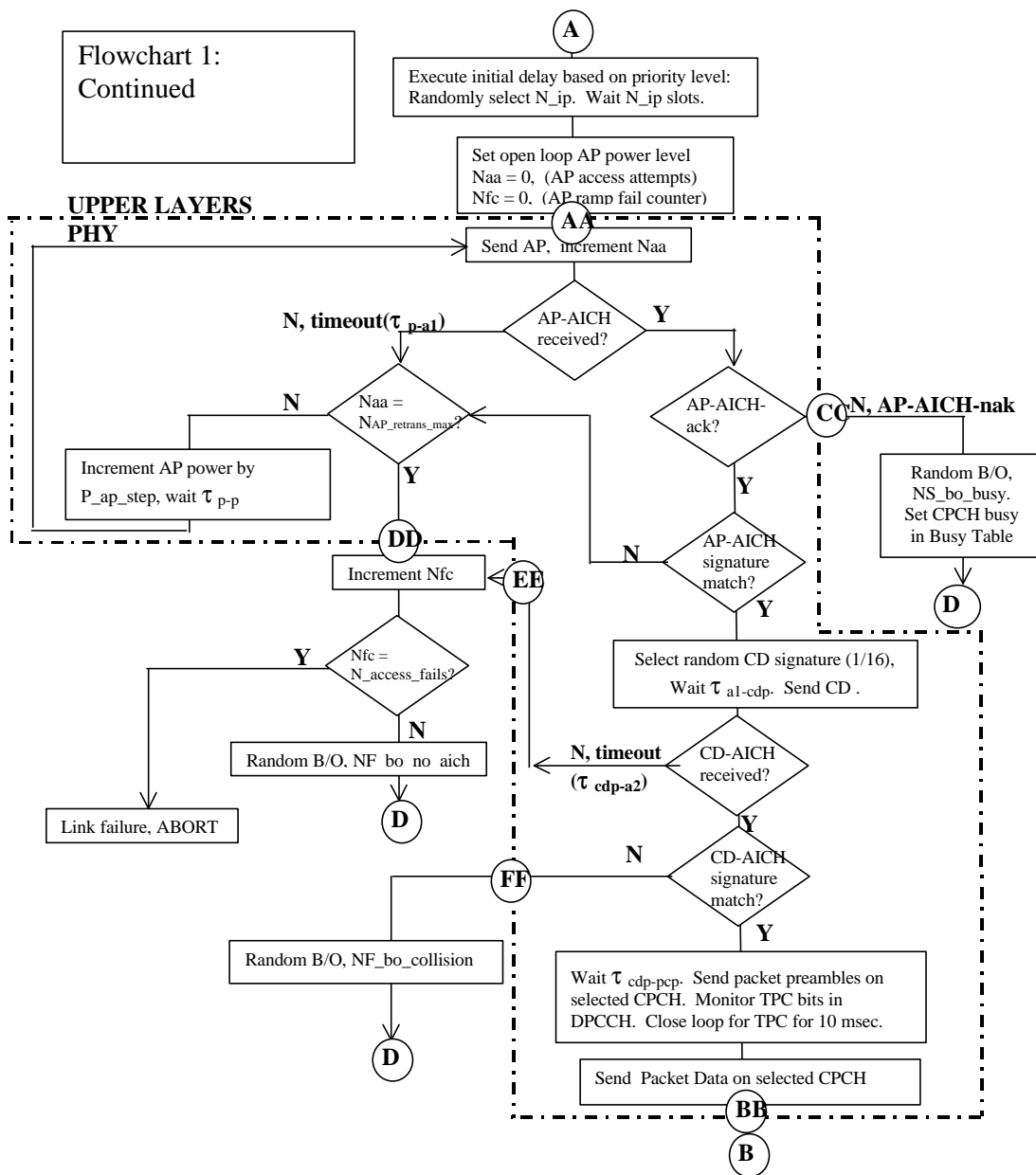
When the UE has data to be transmitted on the CPCH, interlayer primitives must contain parameters which specify the use of the selected CPCH channel. Figure 1 below presents a typical scenario showing the interlayer primitives containing CPCH parameters. The figure does not depict the PHY CPCH access procedure.



**Figure 1: Typical interlayer primitives containing CPCH parameters.**

Unlike MAC-PHY uplink data primitives for dedicated channels, PHY-DATA-REQ primitives for CPCH include a parameter which specifies which CPCH channel Layer 1 should access. If access to the requested CPCH is granted, the PHY layer responds with a PHY-STATUS-IND with an event code indicating that data was sent normally. If access to the requested channel is not successful, the PHY layer responds with a PHY-STATUS-IND with an event code indicating

the failure mode. The CPCH procedure description in [4] provides details of MAC-PHY interaction. Figure 2, below, is from [4] and shows in flowchart form the interaction between MAC and PHY layers. In the chart the following the interlayer boundary points are labeled and listed here with the corresponding interlayer primitive.



**Figure 2. UE MAC/PHY Boundary for CPCH Access.**

- AA. Transmission Request. Uses PHY-DATA-REQ with parameters:

- CPCH channel number which PHY is to use for access.
- TFCI for multiplexed data.
- Initial access delay (number of slots) for priority.
- BB. Transmission Complete. Uses PHY-STATUS-IND with event code parameter indicating normal CPCH transmission.
- CC. CPCH Access Failed. Uses PHY-STATUS-IND with event code parameter indicating no AICH received after Nap-retrans\_max access attempt cycles.
- DD. CPCH Access Failed. Uses PHY-STATUS-IND with event code parameter indicating requested CPCH is busy upon receipt of AP-AICH\_nak.
- EE. CPCH Access Failed. Uses PHY-STATUS-IND with event code parameter indicating timeout, no CD-AICH received.
- FF. CPCH Access Failed. Uses PHY-STATUS-IND with event code parameter indicating collision, CD-AICH signature does not match.

The PHY primitives must be modified to include the new parameters listed above.

## PROPOSAL

The following changes should be incorporated into the latest version of TS25.302, Services Provided by the Physical Layer. The baseline text listed here for these changes is from R2-99648 [3] which improved the nomenclature for PHY layer primitives.

### 10.1.1 PHY-Data-REQ

The PHY-DATA primitives are used to request and indicate SDUs used for Layer 2 peer to peer communications passed to and from the physical layer. One PHY-DATA primitive is submitted every Transmission Time Interval for each Transport Channel.

**Primitive Type:** request.

**Parameters:**

- TFCI
- Type of compressedmode (e.g. uncompressed, compressed with beginning/middle/end of frame)
- Transport Block Set
- CRC check result (indication only)
- CPCH channel number (for CPCH only)
- Initial delay (for CPCH only)

### 10.1.3 PHY-Status-IND

The PHY-STATUS primitive can be used by the layer 1 to notify higher layers of an event which has occurred.

**Primitive Type:** indication

**Parameters**

- CPCH channel number (for CPCH only)
- Event values:
  - 1 Normal CPCH transmission.
  - 2 No AICH received after Nap-retrans max access attempt cycles.
  - 3 Requested CPCH is busy, received an AP-AICH\_nak.
  - 4 Timeout, no CD-AICH received.
  - 5 Collision, CD-AICH signature does not match.
  - 6 CPCH channel busy, received AP-AICH\_ack or AP-AICH\_nak
  - 7 CPCH channel idle, received CD-AICH\_nak

4.

#### 10.2.2.5 CPHY-RL-Setup-REQ

The Request primitive is sent from RRC to L1 for establishment of a Radio link to a certain UE.

**Primitive:**

**Parameters:**

- Physical channel description
- Physical channel ID

NOTE: For setup of CPCH channels, this primitive is used to convey the CPCH physical channel description to L1 for use when MAC requests CPCH channel access. One primitive is sent for each CPCH channel in the CPCH set.

## REFERENCES

- [1] TSGR2#5(99)596, "CPCH parameter additions to 25.331, RRC Protocol Specification"
- [2] TSGR2#5(99)513, "Services provided by the Physical Layer", TS25.302 V2.3.0
- [3] TSGR2#5(99)648, "Primitives of the Physical Layer"
- [4] TSGR2#6(99)797, "CPCH Access Procedures"