Upper Layers/ L1 GPRS interface

L1M_GS061-1

Ver 1.12

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Department: Application Specific Product / Wireless Communications System

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HISTORY

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Ver 1.12	07/20/04	N. Benech	22

NOTES:

1. Creation
2. Defined Non-Serving Cell PBCCH reading interface. Included messages related to Circuit Switched mode: “MPHC_”. Described the way to evolve from MS Power On to Packet Idle Mode.
3. PCCCH_Type field removed from MPHP_START_PCCCH_REQ message, i.e. SPLIT_PG_CYCLE is not supported on CCCH. Basic GSM tasks (FB/SB search, Synchronization on Serving, Serving/Neighbour BCCH, Full measurements (Cell Selection + PLMN)) moved in a new specification [1]. Editorial modifications and figure comments reworked in “Idle Serving Cell Packet Paging” clause. Three sections merged and regrouped in a new one: “Periodic measurements” (“Cell Reselection measurements, “Network Controlled Cell Reselection measurements” and “Extended measurements”). Type naming modified (cf. standard redefinition).
4. Figure from section **Error! Reference source not found.** updated (symmet`rical behaviour between Packet and Circuit Switched mode). Add a Note1 & Note2 in Serving Cell PBCCH Reading interface: 1) update can be given only after a stop message, 2) in packet transfer mode, priority is given to PBCCH over packet transfer activities. Serving Cell and Neighbor Cell PBCCH Reading Interface re-worked due to ETSI 05.02 modification (mapping of PBCCH data defined). Rename Serving Cell PBCCH Reading messages in MPHP_SCELL_PBCCH_xxx as Neighbor Cell PBCCH Reading messages: MPHP_NCELL_PBCCH_xxx in order to be in line with new Circuit Switched L3/L1 interface (cf. [1]). Comments added in Packet Paging section: all PCCCH blocks read means all 12 blocks of MFL52 are read. In “Co-channel Interference measurements” section, Note relative to interface optimization, removed (for L3 point of view, it’s easier to have 1 request followed by one result). “rxlev” type is not UWORD8 but WORD8. Adding comment on level of priority for interference measurment task. Comment, remark and note removed from “Packet Access” section: comment related to prerequisite (from the fact that all 12 blocks is reported, we don’t have to read full PBCCH), Remark related to possible conflict between PBCCH + PCCCH and PRACH (ETSI CR approved: no monitoring of PBCCH during Packet Acess), Note related to **BS_PRACH_BLKS** parameter (L1 uses **BS_PRACH_BLKS** parameter, if it is present, and cross-checked with USF decoding). **BS_PRACH_BLKS** has priority over USF decoding result. Note in ‘Packet Polling procedure” section removed: a minimum of 8 frames are proposed to react after receiving a Packet Polling message.
5. T_MPHP_START_PCCCH_REQ message structure modified: IMSImod field defines only (IMSI mod 1000) and one field added: KCN = KC*N. This is due to modification

in the PAGING_GROUP equation between 05.02 v6.2.0 and v6.4.0. Add comment relative to SPLIT_PG_CYCLE field in Packet Paging Reading interface. Comments of sections **Error! Reference source not found.** and **Error! Reference source not found.** modified in order to explain that the purpose of this figures is not to describe how L3 has to communicate with L1 but to show the possible transition that allows the current L3/L1 interface. Add comments to figure illustrating links between CS Idle, Packet Idle, Dedicated and Packet Transfer mode.
"*radio_freq*" name used instead of "*arfcn*" in all the specification. Channel description parameters aligned on CS structures (cf. [1]): creation of Packet Channel description is based on single_rf, hopping_rf and frequency_list (a new parameter is introduced: rf_chn_cnt, which corresponds to the number of channels in the MA list) structures. These modifications have been made in: Serving Cell PBCCH Reading Interface, Packet Paging Reading Interface, Co-channel Interference measurements and in Non Serving Cell PBCCH Reading Interface. Flow chart of section 4 updated. Note1 in section 4.1 modified: an update of the number of PSI to read can be made on fly and not need a stop message.
In MPHP_SCELL_PBCCH_REQ structure, it's specified that **relative_position_array**[] it's a fixed array and not a dynamic one and that the entries of this array does not have to be in a specific order.
MF51 block type is no longer relevant and has been deleted from T_MPHP_DATA_IND structure (l2_channel parameter). L2_PCHANNEL_NPBCCH type block removed from l2_channel_parameter.
A specific message (MPHP_NCELL_PBCCH_IND) is used to report neighbour PBCCH blocks. Flow chart diagrams in "Packet Paging " section re-worked and comments modified in order to be in line with s922 format.
In section 6 it's specified that L1 associates a **reporting_period** to any measurements reported and not a Frame Number. The choice to use this parameter or not belong to the responsibility of L3. From the fact that **reporting_period** value can be greater than 255 frames, format moved from UWORD8 to WORD16. Note related to **reporting_period** definition moved for clarification.
"rxlev" format in MPHP_CR_MEAS_IND message structure corrected to WORD8 format. In MPHP_CR_MEAS_REQ message, maximum size of frequency_list put to 64 is not an a-priori information but put on the maximum number of channels for Extended measurements equal to 64. MPHP_IDLE_INT_MEAS_xx message name moved in MPHP_INT_MEAS_xx name. This interface is not dedicated to Co-Channel Interference measurements in Packet Idle mode but can also be used in Packet Transfer mode.
Moved **relative_position_array**[10] in **relative_position** in MPHP_NCELL_PBCCH_READ_REQ message structure. This is a mistake correction, only PSI2 position needs to be specified.

MPHP_RA_CON_REQ message name moved in MPHP_RA_CON. The previous name was out of standard name. Modified comment in MPHP_RA_CON message structure: the frame number information put back to L3 is not only for debug but is needed by L3 for the matching request references process. Clarify comments in powerclass_gsm and powerclass_dcs parameters (MPHP_RA_REQ): these fields can be optional if L3 clips the transmit power before any **txpwr** value passed to L1.
Removed the flow chart diagram dedicated to Cell Selection mode (Annex A). All examples related to Circuit Switched flow chart can be found in S922 specification [1].

6. **Section 4**: Add a Note in order to specify that: "In Idle mode, PBCCH has priority over PCCCH reading".
   One more parameter added to MPHP_DATA_IND message: "pccch_lev" (average on 4 bursts) to be used by L3 in control algorithm.
   Modified comment related to frame number in MPHP_DATA_IND message: **fn** is not given only for debug but for "relative frame number" computation.

   Section 5: Remark2 re-worded: only one paging task is processed in L1 for a given moment, it means a Circuit Switched or a Packet Paging and not both simultaneously.
   Add a Note to explain that MPHP_STOP_PCCCH_REQ message can be implicit.
   Add two new parameters: "pb" and "pc_meas_chan" for power control management.

   Section 6: Remark removed and replaced by a new section in S921_bis (cf. v0.4, item 4) relative to "Periodic Measurement" in transfer mode.
   Add a Note in order to describe L1 behavior when L3 send a Periodic Measurement request before **reporting_period** is completed.

   Section 8: it's specified that the frame number given back to L3 (MPHP_RA_CON) is the frame number used to send the burst.

   Section 10: New mechanism for Packet Polling procedure introduced.

7. **Section 6**: For Automatic Gain Control Algorithm reason, the Serving Cell Beacon radio frequency value must be always included in the BA list (cf. Problem Report PB512.doc TI_22).

8. All variables defined in lower case. Only macro are defined in upper case.

   General: T_PACKET_CHANNEL_DESC has been reworked everywhere it appears.

   Section 6: Add information to Note1: a new MPHP_SCELL_PBCCH_REQ message delete the previous PSI requested. Section 4.2 is "Request message" and not

"Reporting message". "**nbr_psi**" range is [1 … 20]. "**psi1_repeat_period**" must be filled also for nbr_psi = 0. Add a note in "**relative_position_array**[]" to specify that relative_position_array[i] = 0 means reading of PSI1 on B0. Align specification with L1 code: "**tsc**" and "**timeslot_no**" included in **packet_chn_desc** and not in chan_sel. "**l2_channel**" type is UWORD8, "**error_flag**" type is BOOL.

Section 5: Packet Paging interface needs (NOT DONE) to be modified in order to cope with new version of power control algorithm specified in ETSI 05.02 v8.0.0: Two new parameters included: P0 (power reduction relative to BCCH) and BTS_PWR_CTRL_MODE (type of method used in the power control algorithm).Align specification with L1 code: "**tsc**" and "**timeslot_no**" included in **packet_chn_desc** and not in chan_sel.

Section 6: Align T_MPHP_CR_MEAS_REQ and IND structures with L1 code. "radio_freq" number is of type UWORD16.

Section 7: Align T_MPHP_INT_MEAS_IND structure with L1 code.

Section 8: MPHP_NCELL_PBCCH_READ_REQ message moved to MPHP_NCELL_PBCCH_REQ. Align T_MPHP_NCELL_PBCCH_REQ structure with L1 code. Correct editorial error.

Section 9: Specify in comments: "for each L3 Packet Access request, L1 sends only 1 access burst".

Section 10: Frame number includes in MPHP_POLLING_IND message is only put back to L3 for debug.

9. **Section 8**: Non serving cell PBCCH task is a one shot process but a stop needs to be defined. A stop message and its associated confirmation message is defined.

   Section 4.3: In MPHP_DATA_IND message, the radio frequency value reported to L3 is always the Serving cell arfcn. This information is related to a Data block. If we need to report the channel from which the bursts were read, up to 4 arfcn have to be reported.

   Section 9: Add a note, in order to specify that monitoring of neighbor BCCH carriers (received signal level measurement) shall be stop before to send a PRACH, i.e a MPHP_CR_MEAS_STOP_REQ message must be sent before a MPHP_RA_REQ message

Section 10: Modify Packet Polling interface in order to be able to send a reponse to a polling request with: 4 identical PRACH or 1 RLC/MAC block.

Section 4 & 5: Add a note in order to specifiy that ETSI specification requires to read PBCCH and PCCCH blocks up to a TBF starting time. In order to satisfy this condition, L3 does not have to stop the PBCCH and/or PCCCH reading before a Packet Assignment request.

Section 4 & 8: Add Power reduction (pb) parameter. This parameter used in Power Control management, is boadcast on BCCH (SI13) and on PBCCH (PSI13).

10. **Section 4.3.1**: Add L2_CHANNEL_PACCH (l2_channel) for second phase of Single block Two Phase access.

    Section 9.1.1: Add comment concerning the 0.5s training session before the 1st PRACH sending.

    Section 4.3.1: Add a note to specify that "**radio_freq"** parameter from MPHP_DATA_IND message, corresponds to the Serving Cell BCCH radio frequency and not to the channel from which the block was read.

11. **Section 7.1.1**: Added **multislot_class** parameter in the MPHP_INT_MEAS_REQ message. This is needed for the Layer 1 to know the mobile multi-slot class in packet idle mode.

    Section 7: Clarified the interference measurement process and its activation in packet transfer or packet idle mode.

    Section 6: New contraints related to Cell Reselection measurement in Packet Idle defined. Frequency list Update, modified **note2**: "In order to avoid measurements being discarded, L3 has to send the MPHP_CR_MEAS_REQ immediately after it had received the report from the previous reporting period".

    Section 4: Modify **Note 4** to explain that PBCCH reading process must be stopped during Connection establishment phase.

12. **Section 7:** Separation of interference measurement processes in packet idle and in packet transfer modes. Changed the MPHP_INT_MEAS_REQ format for channel list structure.

Section 6.3.1: Removed radio_freq parameter from the message (not necessary)

Section 4.3: Detailed comment related to "fn" value reported in MPHP_DATA_IND message. Explain that this value corresponds to the frame number during which the block is read by L1, i.e. one frame after receipt of the 4 burst by the DSP.
Section 10.2: Parameters "timing_advance" and "txpwr" added to MPHP_POLLING_RESPONSE_REQ message

13. **Section 10**: parameter bcch carrier added to MPHP_NCELL_PBCCH_REQ
    note added about IDLE mode to Transfer mode transition

14. **Section 8**: Extended measurements are not handling through "CR meas list" but through the "Power Measurement Process". BA(GPRS) list size decreased therefore from 65 to 33 carriers.

    Section 7: Interference measurements are only handled when the MS is configured on the PBCCH/PCCCH.

    Section 4, 5, 7, 8: Align specification with MCU-L1 SW: Moved in the structure T_MOBILE_ALLOCATION the 2 fields: rf_chn_cnt and the array of 64 bytes by a first field named "rf_chan_cnt" and a structure "T_MA_FIELD" (correction of TI_199).

15. Section 1: update ETSI references

    Section 4: pccch_lev parameter in MPHP_DATA_IND message is normalized to beacon (REQ00831).

16. **Section 5:** pc_meas_chan removed from MPHP_START_PCCCH_REQ (BUG850)
    Section 22: spec error: update types of radio_freq and l2_frame[23] according to the SW.
    Section 4: PBCCH also allowed in cell selection mode (BUG839)
17. Add ANNEX B
18. **Section 31 :** Add a specific chapter for the Extended measurements.
19. **Create ANNEX C:** Transition Rules description. Removed section 4 and 6 replaced by ANNEX A.
    Added Timing advance range value.

20. **Section 4**: Updated in a way which is valid for all L1 phases and not specific to the Cell selection.
    Note3 (section 5.2): Correct statement.
    Replace every occurrence of "MPHC_START_PCCCH_REQ" by "MPHP_START_PCCCH_REQ".
    Section 9.1.1: Update the rand parameter description.
    Annex C, Transition Rules: Update single block description
    Table of contents: Update to latest change, fix title style in Annex C.
    21. Updated Dedicated mode in transition rules to remind that all hand-overs may changer reference timeslot number, not only async hand-over
    22. Referenced missing implicit stops for PCCCH and PBCCH

Table of Contents

1. Reference documents

Reference to the following documents may be made:

[1] S922 v.1.11, Upper Layers / L1 Circuit Switched interfaces
[2] S920 v.2.1 L3/L1 and L2/L1 interface
[3] ETSI GSM 04.08 v.6.7.1: Digital cellular telecommunications (Phase 2+); Mobile radio interface layer 3 specification.
[4] ETSI GSM 04.60 v.6.9.0: Digital cellular telecommunications (Phase 2+); General Packet Radio Service (GPRS); Mobile Station (MS) – Base Station System (BSS) interface; Radio Link Control / Medium Access Control (RLC/MAC) protocol.
[5] ETSI GSM 05.02 v.6.9.0: Digital cellular telecommunications (Phase 2+); Multiplexing and multiple access on the radio path.
[6] ETSI GSM 05.08 v.6.8.0: Digital cellular telecommunications (Phase 2+); Radio subsystem link control.
[7] ETSI GSM 02.60 v.6.2.0: Digital cellular telecommunications (Phase 2+); General Packet Radio Service (GPRS); Service description; stage 1.
[8] ETSI GSM 01.04 v.6.0.0: Digital cellular telecommunications (Phase 2+); Abbreviations and acronyms.
[9] ETSI GSM 05.03 v.6.2.0: Digital cellular telecommunications (Phase 2+); Channel coding.
[10] ETSI GSM 03.60 v.6.7.0: Digital cellular telecommunications (Phase 2+); General Packet Radio Service (GPRS); Service description; Stage 2.
[11] S921bis v2.0, Upper Layers / L1 GPRS interface Packet Transfer mode

2. Scope

This specification details the interface between Layer 1 and upper Layers, only for GPRS features (cf. [1] for details on GSM basic functions: FB/SB search, Synchronization on Serving, Serving/Neighbour BCCH, Full measurements (Cell Selection + PLMN)). The entry point for communicate with L1 is L1A (Layer1 Asynchronous). This is made by message received by L1 and sent from L1 to Upper Layers. Through this specification we mainly cover the different GPRS modes: from Packet idle to Packet transfer mode. We strongly recommend referring to [1] for details related to Cell selection mode, Circuit Switched Idle and Dedicated mode.
Flow chart diagram will be mainly used in this specification in order to describe the interface between L1 and Upper Layers.

3. Definitions, abbreviations and symbols

3.1 Definitions

Main GSM definition could be found in [7] §3

Note: *radio_freq* defines the "Radio Frequency Number" (cf. encoding table in S922).

3.2 Abbreviations

For the purpose of this document, some abbreviations have been introduced. Additional specific GSM abbreviations can be found in ETSI GSM 01.04.

CS: Circuit Switched
HO: HandOver procedure
IE: Information Element
L1: Layer1
L3: Layer3
MF: Multiframe
MFL: MultiFrame Length
MS: Mobile Station
NC: Network Controlled
PSI: Packet System Information
RR: Radio Resource
SI: System Information

3.3 Standard re-definition

In order to homogenize the type used for field message definition, the following symbols have been introduced:

- UWORD8: Unsigned char (8 bit)
- UWORD16: Unsigned short (16 bit)
- UWORD32: Unsigned long (32 bit)
- WORD8 : char
- WORD16: short
- WORD32: long
- BOOL: Unsigned char

3.4 Guideline for message name

Two kinds of prefix are introduced in this specification:

- "MPHP_" for messages between L3 and L1 in Packet mode
- "MPHC_" for " " in Circuit Switched mode

"L1_" prefix is preserved for communication between L1A and L1S.

4. Serving Cell PBCCH Reading Interface

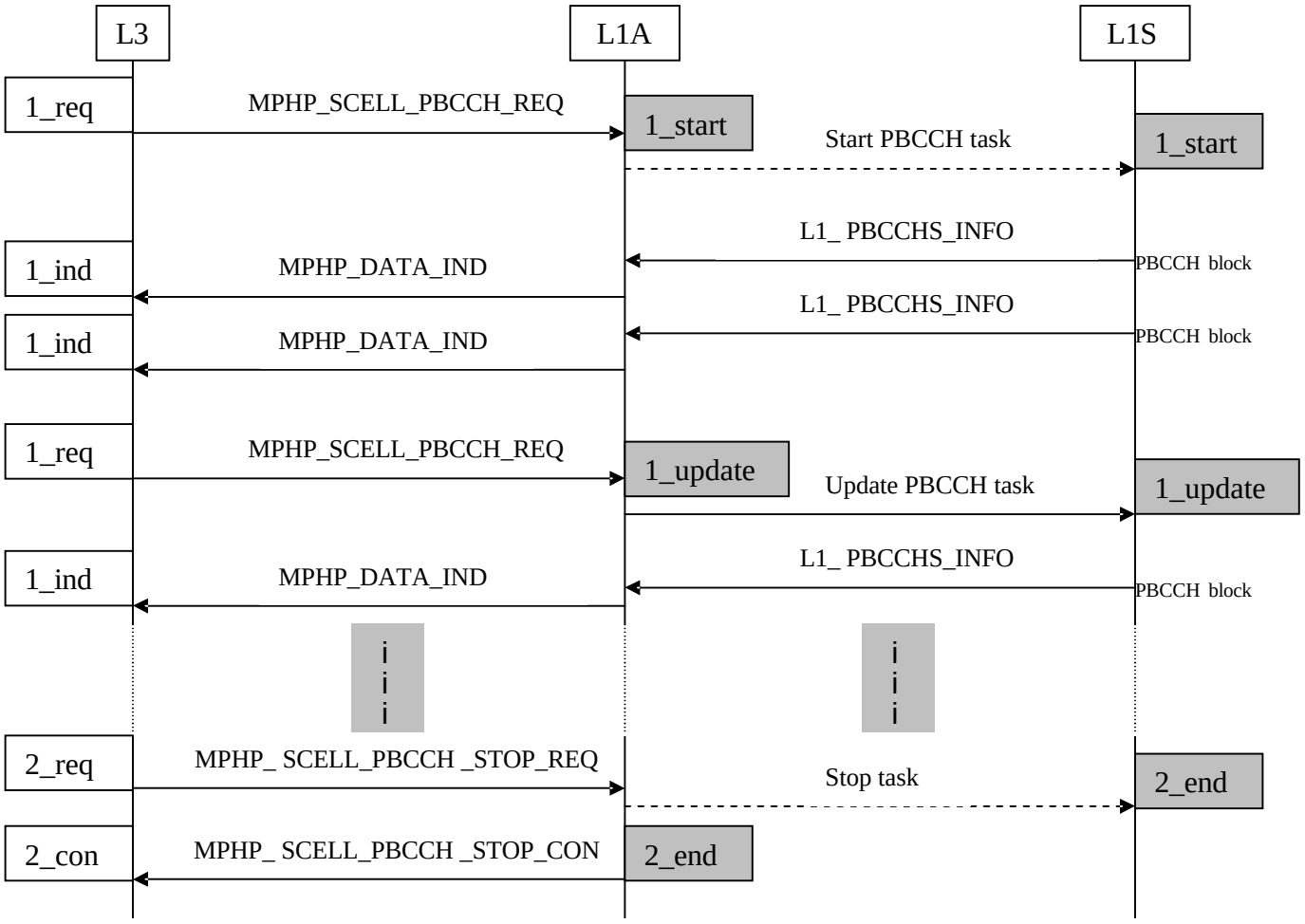
This interface is used to read selected blocks of system information broadcast on the control channel PBCCH of the serving cell. This process is used in:

- Cell Selection,
- Packet Idle,
- and Packet Transfer

It's a periodic process with an occurrence equal to PSI1_REPEAT_PERIOD.
As a prerequisite, L1 must be synchronized with the serving cell before PBCCH blocks can be decoded. The information given by L3 to allow L1 to read PBCCH blocks are:

- a modulus value and
- positions relative to the block including PSI1.

The process stops when L3 sends a MPHP_SCELL_PBCCH_STOP_REQ message.



L3 posts a MPHP_SCELL_PBCCH_REQ message to read PSI. All PSI will be read or only a specific number of PSI.

4.1 Figure comments

1_req: L3 posts a MPHP_SCELL_PBCCH_REQ message in order to read
a) A specific number of Packet System Information (PSI) or
b) All PSI

1_ind: Each PSI read is returned in an individual MPHP_DATA_IND result message. The error_cause flag in the message is set if the PBCCH could not be read. The **relative_position** is included in this message in order to specify which PSI is reported.
2_req: L3 may request at any time L1 to abort the PBCCH reading process by sending a MPHP_SCELL_PBCCH_STOP_REQ message. L1 confirms the stop requested with a MPHP_SCELL_PBCCH_STOP_CON. After sending the confirmation message, no further serving cell PBCCH blocks are returned to L3 until a new PBCCH serving cell reading is requested.

Note1: An update of MPHP_SCELL_PBCCH_REQ parameters can be made on fly. L3 does not need to send a MPHP_SCELL_PBCCH_STOP_REQ message before the new request. The new MPHP_SCELL_PBCCH_REQ will replace the previous PSI requested.

Note2: In Packet transfer mode, PBCCH block reading has priority over packet transfer routine (cf. [4] §5.5.1.2.1: *A MS in packet transfer mode may suspend its TBF in order to attempt to receive PSI1 message*).

Note3: In Idle mode, PBCCH has priority over PCCCH reading

Note4: During Connection Establishment phase, L3 has to stop PBCCH reading process in order to allow execution of Packet Paging Reorganization process.

Note5: MPHP_STOP_PBCCH_REQ message can be implicit. See section 4.4(Stop message)

4.2 Request message

4.2.1 Message structure

MPHP_SCELL_PBCCH_REQ

T_MPHP_SCELL_PBCCH_REQ message structure

UWORD8 **nbr_psi** specifies the number of PSI to read:

0	all PSI read request
n	otherwise. It specifies the "relative position" array size in the range [1 … 20].

UWORD8 **bs_pbcch_blks** defines the number of PBCCH blocks per multiframe (according to the ordered list: B0, B6, B3, B9 cf. [5] §6.3.2.3.4). The field is coded according to the following table (cf. [4] §11.2.18):

0 0	Block B0 used for PBCCH
0 1	Block B0, B6 used for PBCCH
1 0	Block B0, B6, B3 used for PBCCH
1 1	Block B0, B6, B3, B9 used for PBCCH

Note: **bs_pbcch_blks** is extracted from PSI1 read on B0 (cf. [5] §6.3.2.3.3)

UWORD8 **pb**

power reduction value used on PBCCH blocks, relative to the output power used on BCCH. The field is coded according to the following table:

bits 4 3 2 1	
0 0 0 0	Pb = 0 dB
0 0 0 1	Pb = -2 dB
0 0 1 0	Pb = -4 dB
: :	
1 1 1 1	Pb = -30 dB

UWORD8 **psi1_repeat_period**

This field defines the occurrence of PSI1 message (range 1 … 16) and is only applicable to PSI1 reading.

Note: PSI1 message is transmitted at TC = 0 (on block B0 or B0 and B6 if bs_pbcch_blks > 1) with TC defined by:

TC = (FN DIV 52) mod **psi1_repeat_period**

UWORD8 **relative_position_array**[20]

relative_position_array[] it's an array which specifies the position (in term of blocks) of the PSI messages. The position is relative to B0 (starting at TC = 0) and specifies number of PBCCH blocks between B0 and next block including a PSI message. The number of blocks to count is the number of valid PBCCH blocks (specify by bs_pbcch_blks parameter).

Example: bs_pbcch_blks = 00 => number of valid blocks / MF52 = 1
bs_pbcch_blks = 10 => number of valid blocks / MF52 = 3
The range for each array element is [0 … 16x4]. Maximum range is computed according the max period of PSI1 occurrence (= 16) and max number of PBCCH blocks (= 4) (cf. [5] §6.3.2.4).
Note1: The entries of the **relative_position_array**[] do not have to be in a specific order.
Note2: relative_position[i] = 0 means, PSI1 reading on B0.
T_PACKET_CHANNEL_DESC **packet_chn_desc**
T_CHN_SEL packet_chn_desc.**chan_sel**
BOOL **packet_chn_desc.chan_sel.h** This field indicates if hopping is activated or static RF channel 0 static 1 hopping
T_CHN_SEL_CHOICE packet_chn_desc.chan_sel.**rf_channel (union)**
T_SINGLE_RF packet_chn_desc.chan_sel.rf_channel.**single_rf**
UWORD16 packet_chn_desc.chan_sel.rf_channel.single_rf .**radio_freq** Frequency Channel Number
T_HOPPING_RF packet_chn_desc.chan_sel.rf_channel.**hopping_rf**
UWORD8 packet_chn_desc.chan_sel.rf_channel. hopping_rf.**maio** This field provides the binary representation of the Mobile Allocation Index Offset. Range [0, …, 63].
UWORD8 packet_chn_desc.chan_sel.rf_channel. hopping_rf.**hsn** This field provides a Hopping Sequence Number for the physical channel description
UWORD8 packet_chn_desc.**timeslot_no** this field specifies the timeslot number
UWORD8 packet_chn_desc.**tsc** This field defines the Training Sequence Code to select transmit
T_MOBILE_ALLOCATION **frequency_list**
UWORD16 frequency_list.**rf_chan_cnt** **rf_chan_cnt** specifies the number of channels in the MA list
T_MA_FIELD frequency_list.**rf_chan_no**
UWORD16 frequency_list.**rf_chan_no.A[64]** MA list

4.3 Reporting message

4.3.1 Message structure

MPHP_DATA_IND

T_MPHP_DATA_IND message structure
UWORD16 **radio_freq** Serving cell radio frequency information. Note: **radio_freq** corresponds to the Serving Cell BCCH radio frequency and not to the channel from which the block was read. This is due to the fact that PBCCH and PCCCH channels can hop.
UWORD8 **l2_channel** Indicates the MF52 block type read (enum type), maps to L1S msg signal code: L2_PCHANNEL _PCCCH indicates PCCCH block L2_PCHANNEL _PBCCH indicates PBCCH (block B0, B6, B3, B9) L2_PCHANNEL_PPCH indicates PPCH block L2_PCHANNEL_ PEPCH indicates extended PPCH block L2_PCHANNEL_ PACCH indicates PACCH block With channel type macros defined as following: #define L2_PCHANNEL_ PCCCH 1 #define L2_PCHANNEL_ PBCCH 2 #define L2_PCHANNEL_ PPCH 3 #define L2_PCHANNEL_ PEPCH 4 #define L2_PCHANNEL_ PACCH 5
BOOL **error_flag** Indicates if data block is valid: TRUE == invalid block info read FALSE == valid block info read
T_RADIO_FRAME **l2_frame**
UWORD8 **A[23]** Decoded PSI data.
UWORD8 **relative_position** This field specifies the relative position where the PBCCH block has been read.
WORD8 **pccch_lev** **Pccch_lev** encodes the power strength level measured on PCCCH. It's a running average value (without forgetting factor). The average is made on 4 bursts. **pccch_lev** takes into account the BTS power reduction (Pb factor) used on each received burst, so its value is normalized to beacon (corresponds to $C_{block\ n}$ in the formula (2) described in [6] section 10.2.3.1.1). **pccch_lev** is coded as rxlev defined in [6]. Note: **pccch_lev** is encoded without clipping (binary coded ranges -128 to +127 in spite of "0 to

63" range as it is specified in [6]).
UWORD32 **fn** Full frame number of the block read. This value corresponds to the frame number during which the block is read by L1, i.e. one frame after receipt of the 4 burst by the DSP.

4.4 Stop message

MPHP_ SCELL_PBCCH_STOP_REQ

This is a trigger message without parameters. It stops the serving cell PBCCH reading process.

MPHP_ SCELL_PBCCH_STOP_CON

This is a trigger message without parameters. It confirms the stop request.

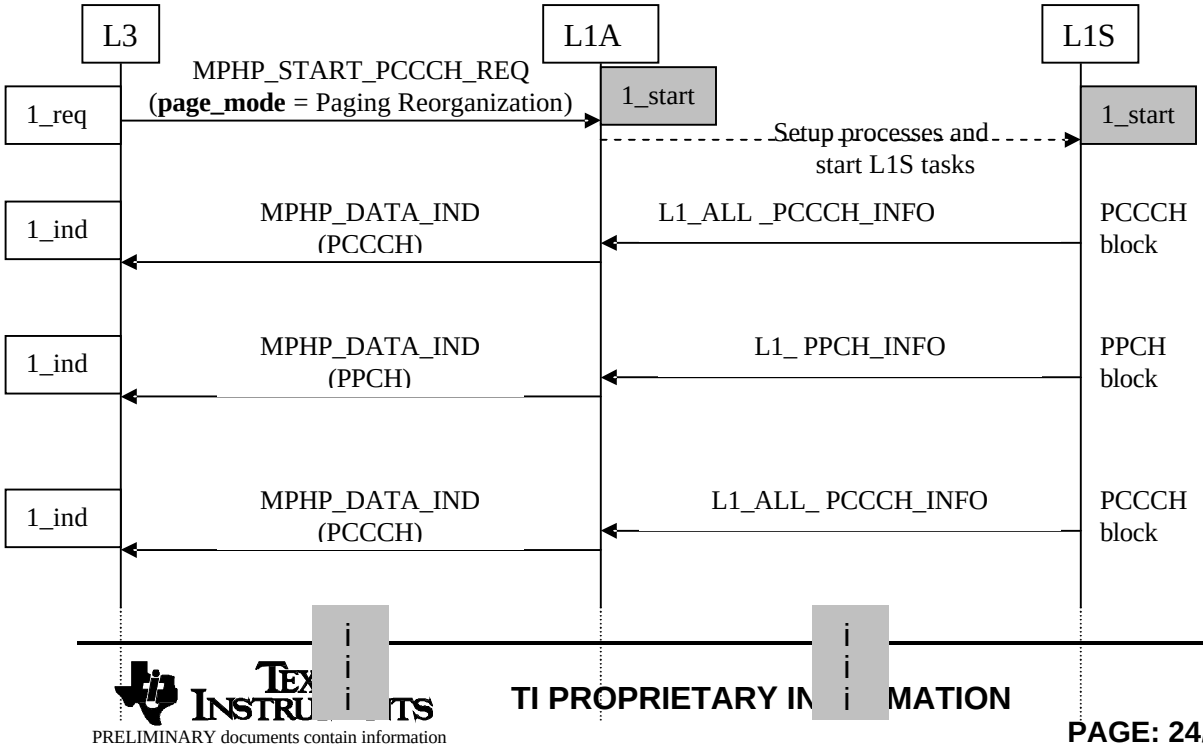
Note: MPHP_STOP_PBCCH_REQ message can be implicit (i.e. L1 stops PBCCH reading) in the case of a TBF release (released all). There is no need for implicit stop for access phases as the transition rules require the PBCCH to be stopped before the access phase.

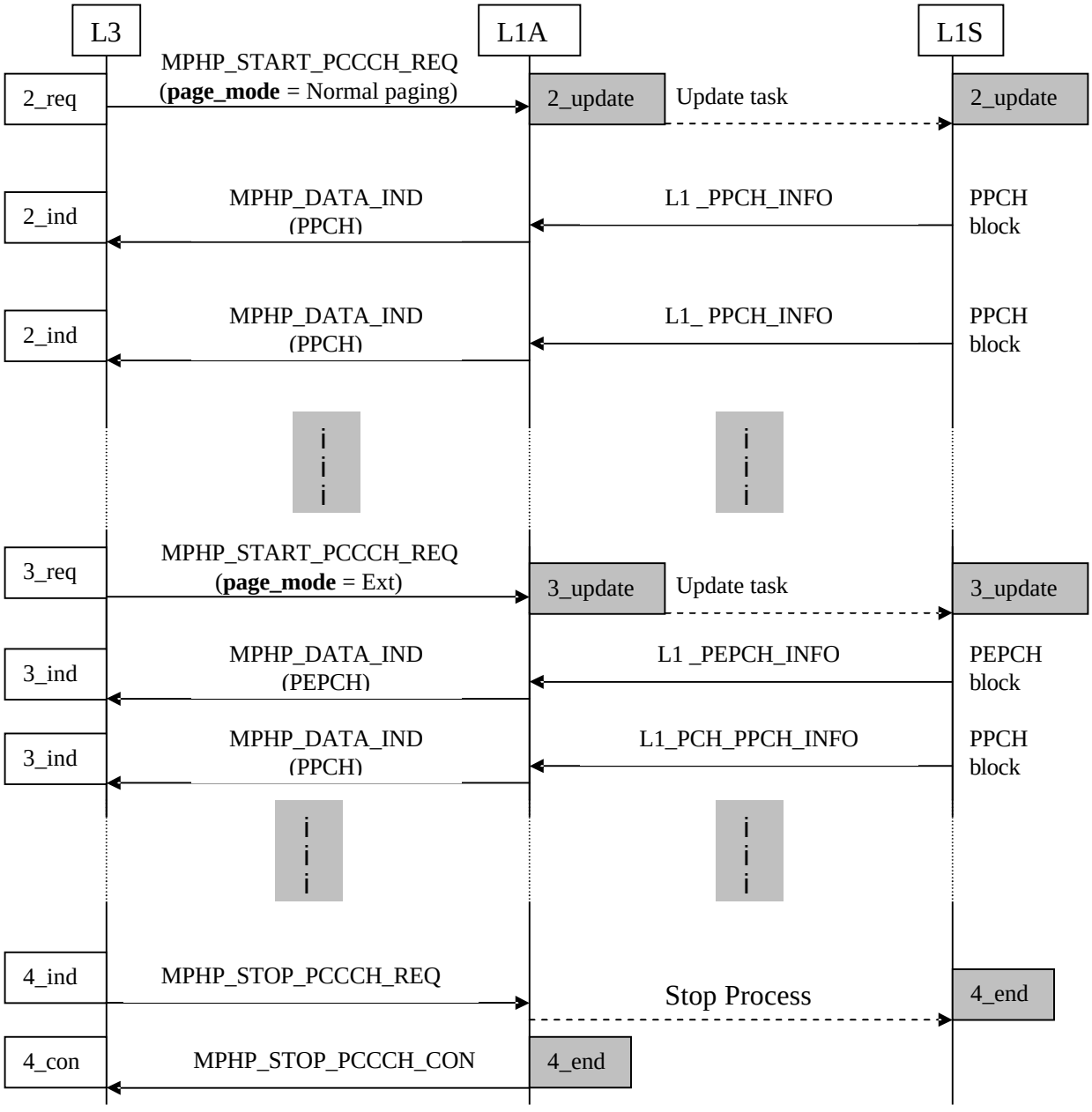
5. Packet Paging reading

Note: In absence of PCCCH, CCCH shall be used in the GPRS attached mode for paging and access. If the determination of the specific paging multiframe and paging block index (as specified in [5] §6.5.6) is not supported on CCCH by either the MS and the BTS, the method defined in [5] §6.5.2 and §6.5.3 shall be used. This is negotiated at GPRS attach.

Remark1: In the current design, if PCCCH is absent, it's decided to not support SPLIT_PG_CYCLE on CCCH (with regard to ETSI specification, support of SPLIT_PG_CYCLE parameter on CCCH is optional cf. [5] and [3] §4.7.3.1.1: *The MS shall also indicate within the DRX parameters whether it supports the split pg cycle option on CCCH. The optional support of the split pg cycle on CCCH by the network is indicated in SI13 or PSI1. Split pg cycle on CCCH is applied by both the network and the MS when the split pg cycle option is supported by both*).

Remark2: L1 does not support Circuit Switched Paging and Packet Paging simultaneously, only one at a time must be installed.
Remark3: Monitoring of PCCCH blocks can be suspended in order to read BCCH blocks of non serving cell.





5.1 Prerequisites

To start Packet Idle mode, L3 must have requested to L1 to camp on the best (suitable or acceptable) cell. Processes that fulfill this prerequisite are:

- a successful Cell selection,
- a successful Cell Re-selection,
- a release of a Circuit Switched Idle mode,
- a release of a Packet transfer mode or
- a release of a Dedicated mode Channel

5.2 Figure comments

1_req: L3 posts a MPHP_START_PCCCH_REQ message to L1 to initialize the paging process. This message contains the "page_mode" information in order to specify the paging mode:

- Paging Reorganization: all PCCCH blocks read.
- Normal Paging: PPCH blocks read
- Extended paging: PPCH + PEPCH blocks read

1_ind:Paging blocks are posted back to L3. The content of each MPHP_DATA_IND message includes:

- one block of data
- the frame number of the block start, the radio_freq
- an error flag: block read successfully or not

1_ind …:Message sequences continue periodically at a rate of SPLIT_PG_CYCLE
2_req: L3 can request L1 to swap to normal paging. L1 ceases to read periodically PCCCH to read only PPCH blocks
3_req: L3 posts a MPHP_START_PCCCH_REQ(**page_mode** = Extented paging) message in order to specify to read periodically PPCH and Extended paging block. L3 can request a Packet Paging reading with a "**page_mode** = Extended paging",after a request with "**page_mode** = Paging Reorganization" or after a "**page_mode** = Normal paging".
4_req: L3 requests to L1 to stop periodic paging process by sending the MPHP_STOP_PCCCH_REQ trigger. If the stop message is received whilst reading a paging block (or in the idle of reading any block), the read is aborted and periodic paging is stopped.

Note1: **error_cause** is sent back to L3 in order to maintain the Downlink Signaling Counter (DSC).

Note2: MPHP_STOP_PCCCH_REQ message can be implicit see section 5.4 (Stop message)

Note3: In connection establishment, ETSI specification (cf. [4] §7.1.2.1, §7.2.1.1) requires the MS to monitor the full PCCCH until the point in time denoted by the TBF starting time.

Starting message

5.2.1 Message structure

MPHP_START_PCCCH_REQ

T_MPHP_START_PCCCH_REQ message structure
UWORD16 **imsimod** This field defines the IMSI number modulo1000 = (IMSI mod 1000) as defined in [5] §6.5.6. Note: **imsimod** field is only used for PAGING_GROUP computation, as a channel description is specified (here after in this message) for PCCH_GROUP description.
UWORD16 **kcn** This field encodes the parameter KC multiply by N as defined in [5] §6.5.6. **kcn** is in the range [1 … 16x9x4], however due to the fact that SPLIT_PG_CYCLE on CCCH is not supported in the current implementation, it implies N = 1 and **kcn** in the range [1 … 16].
UWORD16 **split_pg_cycle** This field corresponds to a MS specific parameter (in the range [1, …, 352] cf. [3] §10.5.5.6). Note: this field encodes the SPLIT_PG_CYCLE value and not the SPLIT_PG_CYCLE code, i.e. L1 will receive a split_pg_cycle = 1, 2, …, 63, 64, 71, 72, 74, …, 288, 320 or 352 value.
UWORD8 **bs_ pag_blks_res** This field indicates the number of blocks on each PDCH carrying the PCCCH per multiframe where neither packet paging nor PBCCH should appear. This number corresponds therefore to the number of blocks reserved for PAGCH, PDTCH and PACCH for MFL52. The field is coded according to the following table: bit 4 3 2 1 0 0 0 0 0 blocks reserved for PAGCH, PDTCH and PACCH 0 0 0 1 1 blocks reserved for PAGCH, PDTCH and PACCH . . . 1 1 0 0 12 blocks reserved for PAGCH, PDTCH and PACCH All other values reserved
UWORD8 **bs_pbcch_blks** The **bs_pbcch_blks** field indicates the number of blocks allocated to the PBCCH in the multiframe. The field is coded according to the following table: bit 2 1

0 0	Block B0 used for PBCCH
0 1	Block B0, B6 used for PBCCH
1 0	Block B0, B6, B3 used for PBCCH
1 1	Block B0, B6, B3, B9 used for PBCCH

UWORD8 **pb**
power reduction value used on PBCCH/PCCCH blocks, relative to the output power used on BCCH. The field is coded according to the following table:

bits 4 3 2 1	
0 0 0 0	Pb = 0 dB
0 0 0 1	Pb = -2 dB
0 0 1 0	Pb = -4 dB
: :	
1 1 1 1	Pb = -30 dB

UWORD8 **page_mode** defines the type of paging:
0 Normal paging
1 Extended paging
2 Paging Reorganization

T_PACKET_CHANNEL_DESC **packet_chn_desc**

T_CHN_SEL packet_chn_desc.**chan_sel**

BOOL **packet_chn_desc.chan_sel.h**
This field indicates if hopping is activated or static RF channel
0 static
1 hopping

T_CHN_SEL_CHOICE packet_chn_desc.chan_sel.**rf_channel (union)**

T_SINGLE_RF packet_chn_desc.chan_sel.rf_channel.**single_rf**

UWORD16 packet_chn_desc.chan_sel.rf_channel.single_rf .**radio_freq**
Frequency Channel Number

T_HOPPING_RF packet_chn_desc.chan_sel.rf_channel.**hopping_rf**

UWORD8 packet_chn_desc.chan_sel.rf_channel. hopping_rf.**maio**
This field provides the binary representation of the Mobile Allocation Index Offset. Range [0, …, 63].

UWORD8 packet_chn_desc.chan_sel.rf_channel. hopping_rf.**hsn**
This field provides a Hopping Sequence Number for the physical channel description

UWORD8 packet_chn_desc.**timeslot_no**
this field specifies the timeslot number

	UWORD8 packet_chn_desc.**tsc** This field defines the Training Sequence Code to select transmit	
T_MOBILE_ALLOCATION **frequency_list**		
	UWORD16 frequenccy_list.**rf_chan_cnt** **rf_chan_cnt** specifies the number of channels in the MA list	
	T_MA_FIELD frequency_list.**rf_chan_no**	
		UWORD16 frequency_list.**rf_chan_no.A[64]** MA list

Note: Paging channel is divided into 64 MFL blocks. Within these 64 MFL blocks, MS reads SPLIT_PG_CYCLE blocks. If SPLIT_PG_CYCLE is greater than total number of paging blocks then MS reads every paging blocks.

5.3 Reporting message

MPHP_DATA_IND
The message structure has been defined previously (cf. §4.3.1)

5.4 Stop message

MPHP_STOP_PCCCH_REQ
This message is a trigger without parameters.

MPHP_STOP_PCCCH_CON
This message is a trigger without parameters. It confirms the stop request.

Note: MPHP_STOP_PCCCH_REQ message can be implicit (i.e. L1 stops Packet Paging task) in the case of Starting Time (STI) given to L1 and STI is passed (only L1 knows that STI is passed). The following cases are covered:

- A single block, 2 phase access has been initiated.
- TBF assignment after access phase or idle mode
- Dedicated channel (SDCCH or TCH) establishment

6. Periodic measurements

L3 posts a MPHP_CR_MEAS_REQ message to requests L1 to start a periodic signal strength monitoring of carriers specified in a frequency list.
Periodic measurements interface includes generic message covering:

- Cell Reselection,
- Network Control measurements,

It means that frequency list corresponds to a:

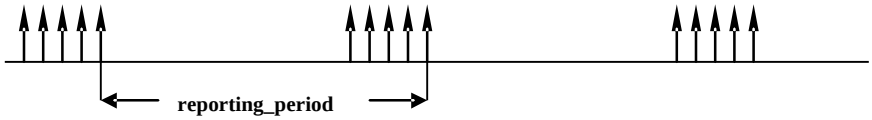
- BA(GPRS) list for Cell reselection,
- NC_FREQUENCY_LIST including frequencies to add/delete from BA(GPRS) list, for NC measurements,

All these measurements follow a set of constrains, managed by L1 as described here below.

Hypothesis:

1. L1 is autonomous for its power measurements scheduling, taking into account the following constrains:
   - At least one measure of each BA BCCH carrier shall be taken for each paging block,
   - A minimum of one measure for each BA BCCH carrier for every 4 second must be performed,
   - MS is not required to take more than one sample per second for each BCCH carrier,
   - At least 5 measures per BA BCCH carrier are required for a valid received level average value (RLA_P),
   - RLA_P shall be based on samples collected over a period of 5s to Max{5s, five consecutive PPCH blocks dedicated to the MS},
   - Samples allocated to each carrier shall as far as possible be uniformly distributed over the evaluation period.
2. In order to allow a running average, L1 associates a **reporting_period** value to any measurements reported (cf. note here below).

Note1: The **reporting_period** defines the period between two sessions of measurements reported to L3.



Reporting period is directly related to the constraints on the measurements (cf. here above hypothesis). Measures on the full frequency list are performed during a reporting period. It means that MPHP_CR_MEAS_IND message includes measures on the complete list.

Note2: A new MPHP_CR_MEAS_REQ will abort the current running process to update immediately the BA list. In order to avoid measurements being discarded, L3 has to send the MPHP_CR_MEAS_REQ immediately after it had received a MPHP_CR_MEAS_IND.

Note3: For Automatic Gain Control Algorithm reason, the Serving Cell Beacon radio frequency value must be always included in the BA list (cf. Problem Report PB512.doc TI_22).

6.1 Extended measurements

The Extended measurements are handled through the "Power Measurement Process" (Cf. S922 document , MPHC_RXLEV_REQ message)

6.2 Starting/Update message

This message configures and start (or update) power monitoring on frequency list. It's sent to L1 for a periodic measurement processing.Message structure

MPHP_CR_MEAS_REQ

T_MPHP_CR_MEAS_REQ message structure
UWORD8 **nb_carrier** This field specifies the number of neighbour cell carriers to measure.
UWORD16 **radio_freq_no[33]** An array containing up to 33 carriers to measure: 32 carriers + the serving carrier. Note: The BA(GPRS) list can carry up to 33. Extended measurement are excluded from BA(GPRS) list.
UWORD8 **list_id** This field allows identifying the list.

6.3 Reporting message

L1 reports a specific number of measurements.

6.3.1 Message structure

MPHP_CR_MEAS_IND

T_MPHP_CR_MEAS_IND message structure
UWORD8 **nmeas** **nmeas** specifies the number of measures reported

T_NCELL_MEAS **ncell_meas[33]**	
	WORD8 **rxlev** rxlew encodes the power strength level, which corresponds to the rxlev defined in [6]. Note1: **rxlev** is encoded without clipping (binary coded ranges -128 to +127 in spite of "0 to 63" range as it is specified in [6]).
UWORD8 **list_id** This field is the message sequence number matching the MPHP_CR_MEAS_REQ request message list_id. Value in the range [0, …, 255].	
UWORD16 **reporting_period** Measures reported have been made during a time frame = **reporting_period**	

6.4 Stop message

MPHP_CR_MEAS_STOP_REQ
This message is a trigger without parameters.

MPHP_CR_MEAS_STOP_CON
This message is a trigger without parameters. It confirms the stop request.

7. Co-channel Interference measurements

7.1 Starting message

This message starts interference signal strength measurements on 2 idle frames (one search frame and one PTCCH frame of MFL52). This message is sent to L1 in order to perform 2 measurements of 1 carrier on specified time slots. This is a one shot process, to 1 request is associated only 1 report.

This process is activated in parallel to the periodic measurement routine.

This process can only be activated in packet idle mode when the MS is configured on PBCCH/PCCCH. The interference measurement process must be stopped before each new configuration of paging block reading. Before entering in packet transfer mode, interference measurement processing must be stopped by a MPHP_INT_MEAS_STOP_REQ message before the new assignment is requested (using MPHP_ASSIGNMENT_REQ message). Possible signal strength values already found by Layer 1 at this moment are lost. Then, interference measurements can be requested after the confirmation of the new assignment or the TBF release (MPHP_TBF_RELEASE_CON or MPHP_ASSIGNMENT_CON message) (see S921_bis).

Note: If the interference measurements conflict with a BSIC decoding or a timing advance procedure, the interference measurements task will be processed with lowest priority.

7.1.1 Message structure

MPHP_INT_MEAS_REQ

T_MPHP_INT _MEAS_REQ message structure
T_PACKET_FREQ_PARAM **packet_intm_freq_param**
T_CHN_SEL packet_intm_chn_desc.**chan_sel**
BOOL packet_intm_chn_desc.chan_sel.**h** This field indicates if hopping is activated or static RF channel 2 Static 3 Hopping
T_CHN_SEL_CHOICE packet_intm_chn_desc.chan_sel.**rf_channel (union)**
T_SINGLE_RF packet_intm_chn_desc.chan_sel.rf_channel.**single_rf**

				UWORD16 packet_intm_chn_desc.chan_sel.rf_channel.single_rf .**radio_freq** Frequency Channel Number
			T_HOPPING_RF packet_intm_chn_desc.chan_sel.rf_channel.**hopping_rf**	
				UWORD8 packet_intm_chn_desc.chan_sel.rf_channel. hopping_rf.**maio** This field provides the binary representation of the Mobile Allocation Index Offset. Range [0, …, 63].
				UWORD8 packet_intm_chn_desc.chan_sel.rf_channel. hopping_rf.**hsn** This field provides a Hopping Sequence Number for the physical channel description
	T_MOBILE_ALLOCATION **frequency_list**			
		UWORD16 frequency_list.**rf_chan_cnt** **rf_chan_cnt** specifies the number of channels in the MA list		
		T_MA_FIELD frequency_list.**rf_chan_no**		
			UWORD16 frequency_list.**rf_chan_no.A[64]** MA list	
UWORD8 **carrier_id** This field allows identifying the carrier.				
UWORD8 **tn** **tn** is a bit map field specifying the timeslots on which the interference measurements are performed.				
UWORD8 **multislot_class** This field specifies the MS multislot class. Range 1 to 12 as specified in GSM05.02, Annex B. (13 to 29 NOT YET SUPPORTED)				

7.2 Reporting message

L1 reports once 1 measurement session is completed (one measurement for each Idle Interference list) and stops automatically its process.

7.2.1 Message structure

MPHP_INT _MEAS_IND

T_MPHP_INT_MEAS_IND message structure		
	T_INT_MEAS **int_meas[8]**	
		WORD8 int_meas.**rxlev[2]**

		rxlew encodes the power strength level, which corresponds to the rxlev defined in [6]. Note: **rxlev** is encoded without clipping (binary coded ranges -128 to +127 in spite of "0 to 63" range as it is specified in [6]). Note: A special default value (0x80) will be put back if no measurement has been performed. This case can occur according MS multislot capability where power measurement cannot be performed.
UWORD8 **id** In packet idle mode, this field is the message sequence number matching the MPHP_INT_MEAS_REQ request message **carrier_id**. Value in the range [0, …, 255]. In packet transfer mode (see S921_bis), this ID corresponds to the assignment_id given in the MPHP_ASSIGNMENT_REQ message.		

7.3 Stop message

MPHP_ INT_MEAS_STOP_REQ
This message is a trigger without parameters. It stops the interference measurement process, i.e. stops measurements on all the carried_id requested.

MPHP_ INT_MEAS_STOP_CON
This message is a trigger without parameters. It confirms the stop request.

8. Non-Serving Cell PBCCH reading interface

Prerequisite: Before to attempt to read non-serving cell PBCCH blocks, L3 has to request L1 to attempt to read non-serving cell's synchronization channel (using for this MPHC_NCELL_SYNC_REQ message).

L3 posts a MPHP_NCELL_PBCCH _REQ message to L1 in order to performed one attempt to read a non-serving cell PBCCH block(s). To do this L3 provides to L1:

- a PSI1 repeat period
- a relative position
- an accurate non-serving cell timing information.

PBCCH reading has priority over all serving cell tasks.

This process is a one shoot process, i.e. to the message posted by L3, L1 puts back only data blocks corresponding to PBCCH blocks requested.

This process is allowed in packet Transfer, packet Idle and Idle Circuit Switched.

If the process is activated in Idle mode, it must be aborted by the L3 before a Packet Transfer assignment.

In Packet Transfer, the process will be aborted by the uplink and downlink TBF released.

8.1 Starting message

8.1.1 Message structure

MPHP_NCELL_PBCCH _REQ

T_MPHP_NCELL_PBCCH _REQ message structure	
UWORD8 **bs_pbcch_blks** defines the number of PBCCH blocks per multiframe (according to the ordered list: B0, B6, B3, B9 cf. [5] §6.3.2.3.4). The field is coded according to the following table (cf. [4] §11.2.18):	
0 0	Block B0 used for PBCCH
0 1	Block B0, B6 used for PBCCH
1 0	Block B0, B6, B3 used for PBCCH
1 1	Block B0, B6, B3, B9 used for PBCCH

UWORD8 **pb**
power reduction value used on PBCCH blocks, relative to the output power used on BCCH. The field is coded according to the following table:

bits 4 3 2 1	
0 0 0 0	Pb = 0 dB
0 0 0 1	Pb = -2 dB
0 0 1 0	Pb = -4 dB
: :	
1 1 1 1	Pb = -30 dB

UWORD8 **psi1_repeat_period**

This field defines the occurrence of the PSI1 message (range 1 … 16) and is only applicable to PSI1 reading.

Note: PSI1 message is transmitted at TC = 0 (on block B0 or B0 and B6 if bs_pbcch_blks > 1) with TC defined by:

TC = (FN DIV 52) mod **psi1_repeat_period**

UWORD8 **relative_position**

relative_position is a parameter which specifies the position (in term of blocks) of the block to read.

The position is relative to B0 (starting at TC = 0, TC defined above) and specifies number of PBCCH blocks between this B0 and the PBCCH block to read. The number of PBCCH blocks within a MF52 is specified by bs_pbcch_blks parameter.

Example: bs_pbcch_blks = 00 => number of valid blocks / MF52 = 1
bs_pbcch_blks = 10 => number of valid blocks / MF52 = 3

The range of relative_position parameter is [0 … 16x4]. Maximum range is computed according the max period of PSI1 occurrence (= 16) and max number of PBCCH blocks per multiframe 52 (= 4) (cf. [5] §6.3.2.4).

T_PACKET_CHANNEL_DESC packet_chn_desc

- T_CHN_SEL packet_chn_desc.**chan_sel**
  - BOOL packet_chn_desc.chan_sel.**h**
    This field indicates if hopping is activated or static RF channel
    4 static
    5 hopping
  - T_CHN_SEL_CHOICE packet_chn_desc.chan_sel.**rf_channel (union)**
    - T_SINGLE_RF packet_chn_desc.chan_sel.rf_channel.**single_rf**

				UWORD16 packet_chn_desc.chan_sel.rf_channel.single_rf .**radio_freq** Frequency Channel Number
			T_HOPPING_RF packet_chn_desc.chan_sel.rf_channel.**hopping_rf**	
				UWORD8 packet_chn_desc.chan_sel.rf_channel. hopping_rf.**maio** This field provides the binary representation of the Mobile Allocation Index Offset. Range [0, …, 63].
				UWORD8 packet_chn_desc.chan_sel.rf_channel. hopping_rf.**hsn** This field provides a Hopping Sequence Number for the physical channel description
	UWORD8 packet_chn_desc.**timeslot_no** this field specifies the timeslot number			
	UWORD8 packet_chn_desc.**tsc** This field defines the Training Sequence Code to select transmit			
T_MOBILE_ALLOCATION **frequency_list**				
	UWORD16 frequenccy_list.**rf_chan_cnt** **rf_chan_cnt** specifies the number of channels in the MA list			
	T_MA_FIELD frequency_list.**rf_chan_no**			
		UWORD16 frequency_list.**rf_chan_no.A[64]** MA list		
UWORD16 **bcch_carrier** This field provides the bcch carrier of the neighbor cell				
UWORD32 **fn_offset** Difference in absolute frame numbers between the serving cell and the non-serving cell. **fn_offset** is in the range 0 - 2715647 (0 to (max GSM frames - 1))				
UWORD32 **time_alignment** Difference in quarter bits between the first bit in a frame of the serving cell and the first bit in the next frame of the non-serving cell. **time_alignment** is in the range 0 - 4999.				

8.2 Reporting message

MPHP_NCELL_PBCCH_IND (cf. §4.3.1)

The message structure is same as MPHP_DATA_IND message, previously defined in §4.3.1.

8.3 Stop message

MPHP_ NCELL_PBCCH_STOP_REQ

This is a trigger message without parameters. It stops the Non Serving cell PBCCH reading process.

MPHP_ NCELL_PBCCH_STOP_CON

This is a trigger message without parameters. It confirms the stop request.

9. Packet Access

9.1 Start message

Prerequisite: MPHP_RA_REQ message shall be sent after

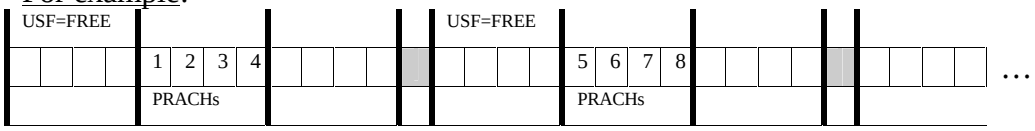
- MPHP_START_PCCCH_REQ(**page_mode** = Reorg) in order to activate PCCCH reading process (to decode the USF and to be accurate (frequency and time)). It means all 12 blocks of MFL52 is read.

L3 posts a MPHP_RA_REQ message to requests L1 to send a PRACH.
First MPHP_RA_REQ resets a counter and initializes a continuous task dedicated to increment a counter each time it's possible to send a PRACH.
A confirmation message is put back to L3 immediately after transmitting the Packet RA burst.
The counter is still running until a MPHP_RA_STOP_REQ message is received.
For each L3 request, L1 sends only 1 access burst.

Note1: PRACH block numbers are defined according to USF value, in dynamic mode. The numbers of PRACH blocks in a MFL is dynamic due to the fact that a block of 4 PRACH are defined only if in the previous block USF = FREE.

Note2: Monitoring of neighbor BCCH carriers (received signal level measurement) shall be stop before to send a PRACH, i.e a MPHP_CR_MEAS_STOP_REQ message must be sent before a MPHP_RA_REQ message.

For example:



Remark: There is no possible conflict between PBCCH + PCCCH and PRACH due to the fact that none PBCCH monitoring is allowed during Packet Access.

9.1.1 Message structure

MPHP_RA_REQ

T_MPHP_RA_REQ message structure
UWORD8 **txpwr** **txpwr** corresponds to the maximum TX power level the MS may use when accessing on a packet control channel.
UWORD16 **rand** The **rand** parameter defines the number of TDMA frames belonging to the PRACH (on the PDCH defined by the PCCCH group for the mobile station) between two successive attempts to send a PACKET CHANNEL REQUEST message, excluding the TDMA frames potentially containing the messages themselves. This random value is drawn for each transmission with uniform probability distribution in the set {S, S + 1, ..., S + T - 1}. Note: first PRACH is sent by L1 0.5s after reception of the first MPHP_RA_REQ, no matter of the rand value. These 0.5s are used as a frequency and timing training session by L1.
UWORD16 **channel_request_data** Message information of the RA burst coded on 8 or 11 bits.
UWORD8 **bs_prach_blks** The bs_prach_blks field indicates the number of blocks reserved in a fixed way to the PRACH channel on any PDCH carrying PCCCH and PBCCH (Only for 52 type PCCCH). The field is coded according to the following table: bit 0 0 0 0 No block reserved for PRACH (default) 0 0 0 1 Block B0 reserved for PRACH 0 0 1 0 Block B0, B6 reserved for PRACH 0 0 1 1 Block B0, B6, B3 reserved for PRACH 0 1 0 0 Block B0, B6, B3, B9 reserved for PRACH 0 1 0 1 Block B0, B6, B3, B9, B1 reserved for PRACH 0 1 1 0 Block B0, B6, B3, B9, B1, B7 reserved for PRACH 0 1 1 1 Block B0, B6, B3, B9, B1, B7, B4 reserved for PRACH 1 0 0 0 Block B0, B6, B3, B9, B1, B7, B4, B10 reserved for PRACH 1 0 0 1 Block B0, B6, B3, B9, B1, B7, B4, B10, B2 reserved for PRACH 1 0 1 0 Block B0, B6, B3, B9, B1, B7, B4, B10, B2, B8 reserved for PRACH 1 0 1 1 Block B0, B6, B3, B9, B1, B7, B4, B10, B2, B8, B5 reserved for PRACH 1 1 0 0 Block B0, B6, B3, B9, B1, B7, B4, B10, B2, B8, B5, B11 reserved for PRACH

All other values reserved. Note: bs_prach_blks specifies the number of blocks per MF52 reserved to PRACH. It has the priority over the USF decoding result.
UWORD8 **access_burst_type** This field indicates if 8 or 11 bit access burst shall be used. The field is coded according to the following table: 0 8 bit access burst shall be used 1 11 bit access burst shall be used

9.2 Reporting message

MPHP_RA_CON

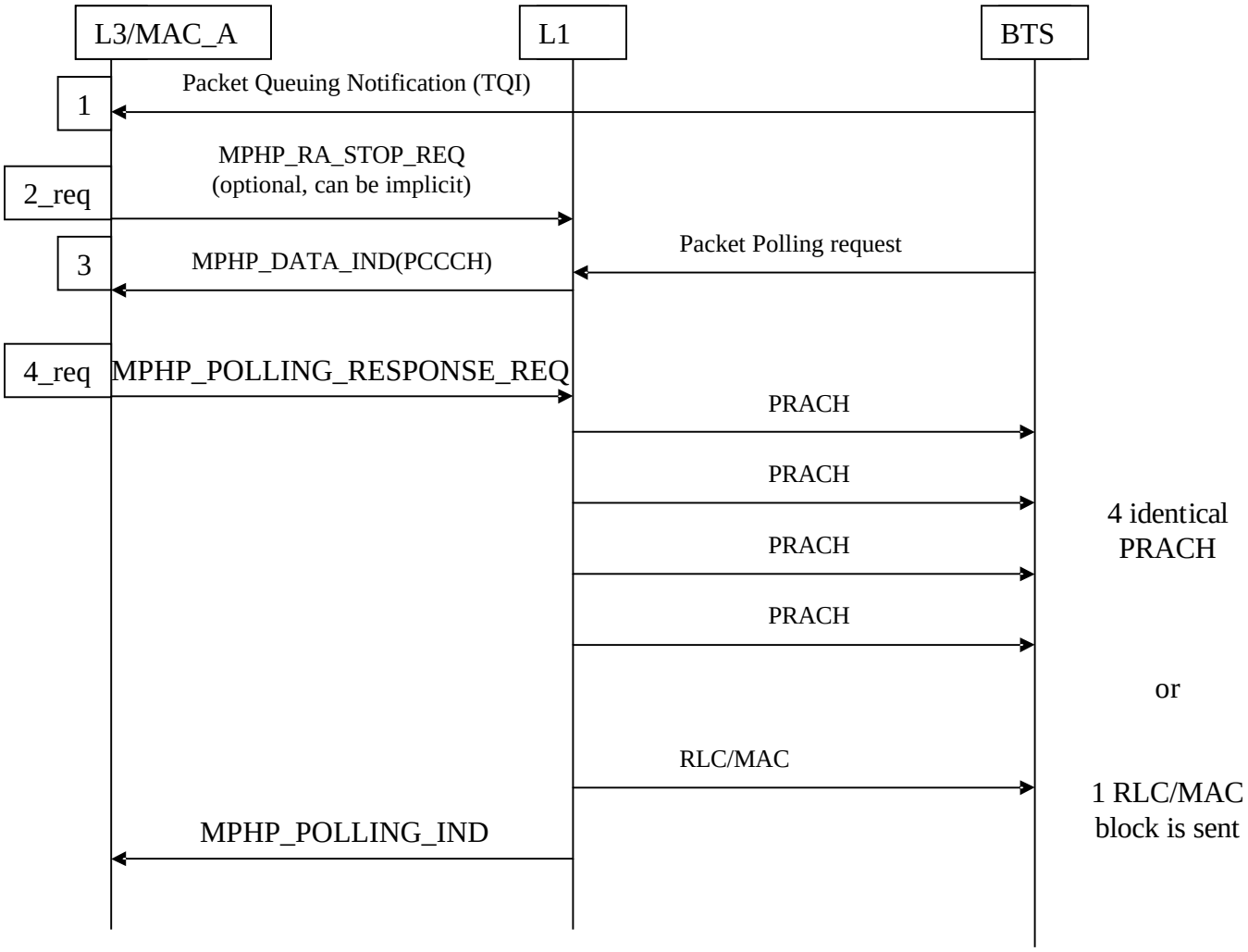
T_MPHP_RA_CON message structure
UWORD32 **fn** Full frame number of the transmit burst. "**fn**" corresponds to the frame used to send the burst.
UWORD16 **channel_request_data** Data of the RA burst.

9.3 Stop message

MPHP_RA_STOP_REQ
This is a trigger message to stop sending PRACH.

MPHP_RA_STOP_CON
This is a trigger message to confirm the stop message.

10. Packet Polling procedure



10.1 Figure comments

1: L3/MAC_A receives the Packet Queuing Notification from the network.
2req: L3 request L1 to stop the sending of PRACH.
3: L3 continues to receive and process PCCCH blocks. If it receives a Packet Polling Request directed to the MS, it will use the RRBP field and the frame number of the MPHP_DATA_IND message to calculate the frame number of the response.
4_req: L3/MAC_A sends a MPHP_POLLING_RESPONSE_REQ in order to send Packet Control Ack in Access burst format on a given frame.

Note: MPHP_POLLING_RESPONSE_REQ message can implicitly stop PRACH sending procedure. This message is not acknowledged.

10.2 Starting message

10.2.1 Message structure

MPHP_POLLING_RESPONSE_REQ

T_ MPHP_POLLING_RESPONSE_REQ message structure
UWORD8 **pol_resp_type** **pol_resp_type** specifies the way to respond to a polling request: by 4 identical access bursts or 1 RLC/MAC block . **if** 4 PRACH are sent type of access burst is specified, i.e. access bursts coded on 8 or 11 bits **else** channel coding type is specified. Bits 3.2.1 0 0 0 0 0 None 0 0 0 1 Not Applicable 0 0 1 0 Not Applicable 0 0 1 1 CS1 – Poll response 0 1 0 0 Not applicable 0 1 0 1 Not applicable 0 1 1 0 Not applicable. 0 1 1 1 PRACH 8 bits 1 0 0 0 PRACH 11 bits
UWORD8 **channel_request_data[24]** **channel_request_data[24]** is the data to transmit. Meaningful block size is function of the **pol_res_type**: CS1: 12 UWORD16 PRACH 8 bits: 1 UWORD16 PRACH 11 bits: 1 UWORD16 Note: size of **channel_request_data[ ]** is 24 bytes, i.e. 23 bytes for CS1 data + 1 additional byte due to byte shifted operation.
UWORD32 **fn**

This field specifies the frame number on which the bursts need to be sent.
UWORD8 **timing_advance** Valid timing advance information needs to be available for polling response type = CS1. Range: [0…63] bits
UWORD8 **txpwr** Corresponds to the maximum TX power level the MS may use when accessing on a packet control channel.

10.3 Reporting message

MPHP_POLLING_IND

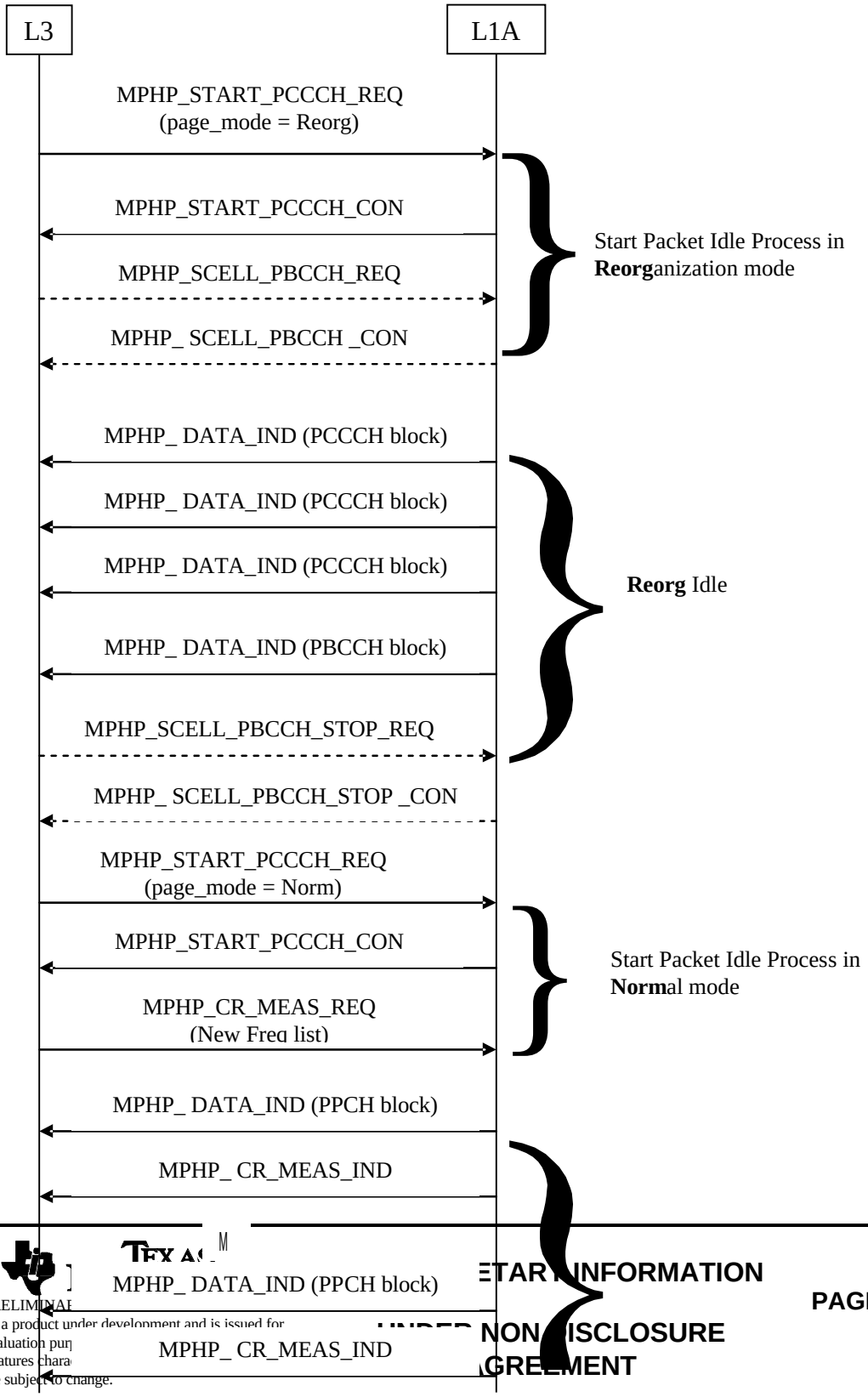
T_ MPHP_POLLING_IND message structure
UWORD32 **fn** Full frame number of the transmit burst, used only for debug.. "**fn**" corresponds to the frame used to send the last PRACH burst.

Annex A

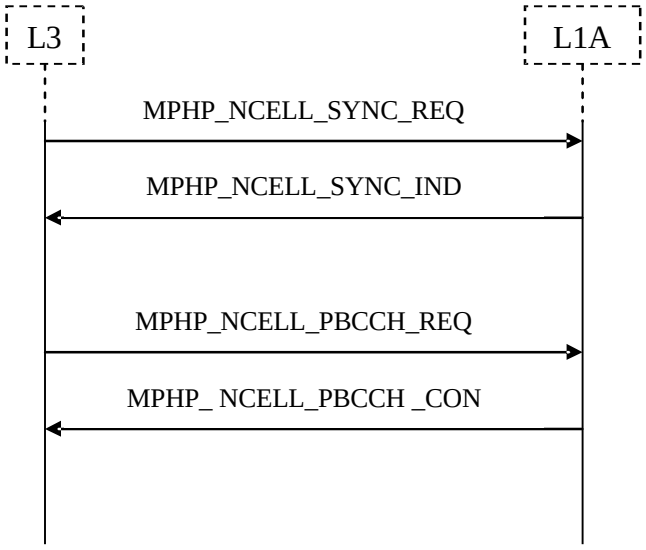
This annex is informative and gives some examples of flow chart diagram for:

- Cell Selection mode (cf. S922 flow chart),
- Packet Idle mode,
- Cell Reselection (cf. S922 flow chart),
- Connection Establishment,
- … (will be completed with Packet Transfer mode)

Packet Idle



Normal Idle


L3
L1A
MPHP_NCELL_SYNC_REQ
MPHP_NCELL_SYNC_IND
MPHP_NCELL_PBCCH_REQ
MPHP_ NCELL_PBCCH _CON

Annex B

This annex gives the GPRS L1 message identifier. `#define P_GPRS 2`

```
// Messages Packet Transfer <-> L1A
#define MPHP_SINGLE_BLOCK_REQ             ( ( P_GPRS << 8 ) | 1  )
#define MPHP_SINGLE_BLOCK_CON             ( ( P_GPRS << 8 ) | 2  )
#define MPHP_STOP_SINGLE_BLOCK_REQ        ( ( P_GPRS << 8 ) | 3  )
#define MPHP_STOP_SINGLE_BLOCK_CON        ( ( P_GPRS << 8 ) | 4  )
#define L1P_SINGLE_BLOCK_CON              ( ( P_GPRS << 8 ) | 5  )

#define MPHP_ASSIGNMENT_REQ               ( ( P_GPRS << 8 ) | 6  )
#define MPHP_ASSIGNMENT_CON               ( ( P_GPRS << 8 ) | 7  )

#define MPHP_TBF_RELEASE_REQ              ( ( P_GPRS << 8 ) | 8  )
#define MPHP_TBF_RELEASE_CON              ( ( P_GPRS << 8 ) | 9  )

#define MPHP_REPEAT_UL_FIXED_ALLOC_REQ    ( ( P_GPRS << 8 ) | 10 )
#define MPHP_REPEAT_UL_FIXED_ALLOC_CON    ( ( P_GPRS << 8 ) | 11 )

#define MPHP_PDCH_RELEASE_REQ             ( ( P_GPRS << 8 ) | 12 )
#define MPHP_PDCH_RELEASE_CON             ( ( P_GPRS << 8 ) | 13 )

#define MPHP_TIMING_ADVANCE_REQ           ( ( P_GPRS << 8 ) | 14 )
#define MPHP_TIMING_ADVANCE_CON           ( ( P_GPRS << 8 ) | 15 )

#define MPHP_UPDATE_PSI_PARAM_REQ         ( ( P_GPRS << 8 ) | 16 )
#define MPHP_UPDATE_PSI_PARAM_CON         ( ( P_GPRS << 8 ) | 17 )

#define MPHP_RA_REQ                       ( ( P_GPRS << 8 ) | 18 )
#define MPHP_RA_CON                       ( ( P_GPRS << 8 ) | 19 )
#define MPHP_RA_STOP_REQ                  ( ( P_GPRS << 8 ) | 20 )
#define MPHP_RA_STOP_CON                  ( ( P_GPRS << 8 ) | 21 )

#define MPHP_POLLING_RESPONSE_REQ         ( ( P_GPRS << 8 ) | 22 )
#define MPHP_POLLING_IND                  ( ( P_GPRS << 8 ) | 23 )

#define L1P_RA_DONE                       ( ( P_GPRS << 8 ) | 24 )

// Messages Packet Idle <-> L1A
#define MPHP_START_PCCCH_REQ              ( ( P_GPRS << 8 ) | 25 )
#define MPHP_STOP_PCCCH_REQ               ( ( P_GPRS << 8 ) | 26 )
#define MPHP_STOP_PCCCH_CON               ( ( P_GPRS << 8 ) | 27 )
#define MPHP_SCELL_PBCCH_REQ              ( ( P_GPRS << 8 ) | 28 )
#define MPHP_SCELL_PBCCH_STOP_REQ         ( ( P_GPRS << 8 ) | 29 )
#define MPHP_SCELL_PBCCH_STOP_CON         ( ( P_GPRS << 8 ) | 30 )
#define MPHP_CR_MEAS_REQ                  ( ( P_GPRS << 8 ) | 31 )
#define MPHP_CR_MEAS_STOP_REQ             ( ( P_GPRS << 8 ) | 32 )
#define MPHP_CR_MEAS_STOP_CON             ( ( P_GPRS << 8 ) | 33 )
#define MPHP_INT_MEAS_REQ                 ( ( P_GPRS << 8 ) | 34 )
#define MPHP_INT_MEAS_STOP_REQ            ( ( P_GPRS << 8 ) | 35 )
```

```
#define MPHP_INT_MEAS_STOP_CON          ( ( P_GPRS << 8 ) | 36 )
#define MPHP_NCELL_PBCCH_REQ            ( ( P_GPRS << 8 ) | 37 )
#define MPHP_NCELL_PBCCH_STOP_REQ       ( ( P_GPRS << 8 ) | 38 )
#define MPHP_NCELL_PBCCH_STOP_CON       ( ( P_GPRS << 8 ) | 39 )

#define MPHP_DATA_IND                   ( ( P_GPRS << 8 ) | 40 )
#define MPHP_CR_MEAS_IND                ( ( P_GPRS << 8 ) | 41 )
#define MPHP_INT_MEAS_IND               ( ( P_GPRS << 8 ) | 42 )
#define MPHP_TINT_MEAS_IND              ( ( P_GPRS << 8 ) | 43 )
#define MPHP_NCELL_PBCCH_IND            ( ( P_GPRS << 8 ) | 44 )
#define MPHP_TCR_MEAS_REQ               ( ( P_GPRS << 8 ) | 45 )
#define MPHP_TCR_MEAS_IND               ( ( P_GPRS << 8 ) | 46 )
#define MPHP_TCR_MEAS_STOP_REQ          ( ( P_GPRS << 8 ) | 47 )
#define MPHP_TCR_MEAS_STOP_CON          ( ( P_GPRS << 8 ) | 48 )

/*** L1S -> L1A communication ***/
#define L1P_PALLC_INFO                  ( ( P_GPRS << 8)  | 49)
#define L1P_PNP_INFO                    ( ( P_GPRS << 8)  | 50)
#define L1P_PEP_INFO                    ( ( P_GPRS << 8)  | 51)
#define L1P_PBCCHS_INFO                 ( ( P_GPRS << 8)  | 52)
#define L1P_PACCH_INFO                  ( ( P_GPRS << 8)  | 53)
#define L1P_CR_MEAS_DONE                ( ( P_GPRS << 8)  | 54)
#define L1P_TRANSFER_DONE               ( ( P_GPRS << 8)  | 55)
#define L1P_TCR_MEAS_DONE               ( ( P_GPRS << 8)  | 56)
#define L1P_TBF_RELEASED                ( ( P_GPRS << 8)  | 57)
#define L1P_ITMEAS_IND                  ( ( P_GPRS << 8)  | 58)
#define L1P_POLL_DONE                   ( ( P_GPRS << 8)  | 59)
#define L1P_PDCH_RELEASED               ( ( P_GPRS << 8)  | 60)
#define L1P_TA_CONFIG_DONE              ( ( P_GPRS << 8)  | 61)
#define L1P_PBCCHN_INFO                 ( ( P_GPRS << 8)  | 62)
#define L1P_REPEAT_ALLOC_DONE           ( ( P_GPRS << 8)  | 63)
#define L1P_ALLOC_EXHAUST_DONE          ( ( P_GPRS << 8)  | 64)
```

Annex C – Transition Rules

Definition

Purpose of this section is to define rules to respect when switching from a phase to another.

These rules are due to L1 specific constraints, more specifically timing constraints:

- All L1 processes are anchored on a Time Base Reference i.e. a L1 Reference Timeslot Number,
- This timing reference is only updated on receipt of some specific primitives (as it will be detailed here after),

- L3 needs to have full visibility on active processes running within L1. As far it's possible, L1 has to avoid implicit start and stop of tasks.

L1 Reference Timeslot Number definition: this is to link with L1S in charge to schedule and to execute processes requested by upper layers. Choice made in MCU-L1 S/W has been to synchronize all L1 activities on the Downlink slot. From L1 point of view, It means that Frame Interrupt starts on the Receive Timeslot Number. This corresponds to the "L1 Reference Timeslot Number".

Convention used

In the graph presented in this document, the following convention is used:

A circle is used to represent the current active phase in L1.
In red, it is specified the value of the internal mode of L1:

This represents a transition allowing to evolved to a new state. A transition is crossed only on receipt of a L3 or L1S message

MPHC_RA_REQ

This represents the message leading to a new state.

Summary of all possible phase transitions

On Figure 1, it's summarised all phase transitions when running in:

- Circuit Switched mode (Idle, Access, Dedicated),
- Packet Switched mode (Packet Idle, Packet Access, Packet Transfer) or
- When switching from Circuit Switched (CS) to Packet Switched (PS) or from PS to CS.

For the reason given during the "L1 Reference Timeslot Number" definition and in order to keep L1S synchronised with the BTS, the following rules have to be respected:

Rule1:
All Serving cell running processes must be stopped when a modification of Serving Timeslot number is requested. This rule does not apply to neighbor cells processes.

Rule2:

All running processes must be stopped before switching from one phase to another.

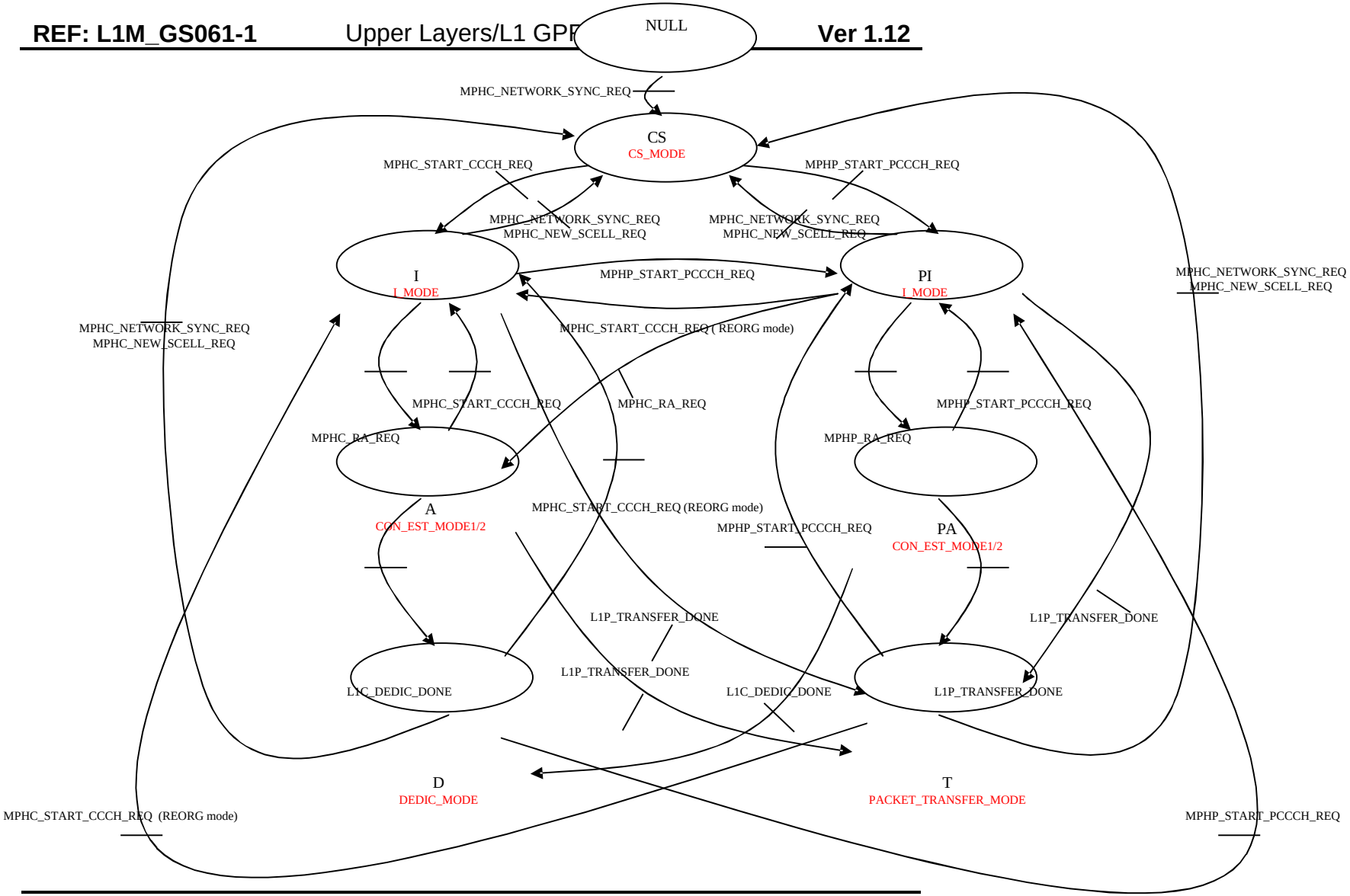


Figure 1: Transition phase summary

Figure 1 comments

Through the comments made here below on each transition of Figure 1, examples of "how the rules have to be applied" are given.
We also detail the primitives leading to a modification of the "L1 Reference Timeslot Number" as those implying a change of the phase. The strict rule is "All processes must be stopped". However, some cases require certain processes to be running and some others are implicitly stopped by the layer1 (and not Layer3). We will therefore mention exceptions when processes should not be stopped for Rule1 or Rule2.

Each time, an example for entering and leaving the phase will be given as an example for a L1 Reference Timeslot Number change.

Finally, all the primitives, which can be potentially sent during a phase are summarized.

Cell Selection

Entering in CS

o L1 switches to Cell Selection phase on receipt of a:

- **MPHC_NETWORK_SYNC_REQ,**
- **MPHC_NEW_SCELL_REQ**

Leaving CS

o L1 leaves Cell Selection1 phase on receipt of a:

- **MPHC_START_CCCH_REQ** (to enter in Idle phase),
- **MPHP_START_PCCCH_REQ** (to enter in Packet Idle phase)

Note: All processes must be stopped before sending these messages.

Update of "l1 Reference Timeslot Number"

o "L1 Reference Timeslot Number" is changed on receipt of a:

- **MPHC_NETWORK_SYNC_REQ**,
- **MPHC_NEW_SCELL_REQ**

Note: All processes must be stopped before sending these messages.

All primitives while running in CS

CS:

MPHC_RXLEV_REQ / MPHC_STOP_RXLEV_REQ
MPHC_NETWORK_SYNC_REQ /
MPHC_STOP_NETWORK_SYNC_REQ
MPHC_NEW_SCELL_REQ
MPHC_SCELL_NBCCH_REQ / MPHC_STOP_SCELL_BCCH_REQ
MPHC_SCELL_EBCCH_REQ
MPHP_SCELL_PBCCH_REQ / MPHP_SCELL_PBCCH_STOP_REQ

Idle

Entering in Idle

o L1 switches to Idle phase only on receipt of a:

- **MPHC_START_CCCH_REQ**

Note: It means that, if BCCH and PBCCH processes are running, they have to be stopped (application of rule2) and re-started only after start of CCCH.

Leaving Idle

o L1 leaves Idle phase on receipt of a:

- **MPHP_START_PCCCH_REQ** (to enter in Packet Idle phase),

Note: Leaving Idle for Packet Idle implies to stop all current tasks (application of rule2) before to start PCCCH and to re-start requested PI activities.

- **MPHC_RA_REQ** (to enter in Access phase),

Note1: In this specific case, **full CCCH** (Paging in Reorganization mode) and **Serving Cell BCCH** have to be enabled before sending of the first RACH in order to achieve an accurate TOA value. All other processes must be stopped, **except Idle BA List measurements**.

- **L1P_TRANSFER_DONE** (to enter in Packet Transfer phase),

Going from Idle to Packet Transfer does not always require going to Access mode. In GSM, it is used to get timing advance. In GPRS, the value can be obtained during the polling.
Note1: There is a special case, which occurs when the Packet Assignment is requested through a PDCH Assignment Command, broadcast on a SDCCH channel. In this case, L1 does not allow switching directly from Dedicated to Packet transfer. It's mandatory to firstly send a stop dedicated, then to switch to Idle and to switch to Packet transfer by one or two Packet Assignment request (the necessity to send two MPHP_ASSIGNMENT_REQ corresponds to the presence of a before and after channel configuration, see [3] note3 §3).
Note2: **Serving cell BCCH, CCCH and Idle BA List measurements** activities are implicitly stopped by layer1. Layer3 must stop all other processes **before MPHP_ASSIGNMENT_REQ** (see 0).

- **MPHC_NETWORK_SYNC_REQ/MPHC_NEW_SCELL_REQ** (to come back in Cell Selection)

Note: All processes must be stopped before sending these messages.

Update of "l1 Reference Timeslot Number"

o "L1 Reference Timeslot Number" is changed on receipt of a:

- **MPHC_ START_CCCH_REQ**

Note: While running in Idle with all Idle tasks enabled the change of Paging mode (Reorganization to Normal) can be done directly (no stop nor re-start requested). However if a change of Timeslot Number is requested (ccch_group is different) then all Idle processes need to be stopped (application of Rule1) **except Idle BA List** and re-started after receipt of the MPHC_START_CCCH_REQ including the new Timeslot Number.

All primitives while running in Idle

I:

MPHC_START_CCCH_REQ / MPHC_STOP_CCCH_REQ
MPHC_SCELL_NBCCH_REQ
MPHC_SCELL_EBCCH_REQ / MPHC_STOP_SCELL_BCCH_REQ
MPHC_NCELL_BCCH_REQ /
MPHC_STOP_NCELL_BCCH_REQ
MPHC_NCELL_SYNC_REQ /
MPHC_STOP_NCELL_SYNC_REQ
MPHC_RXLEV_PERIODIC_REQ
/MPHC_STOP_RXLEV_PERIODIC_REQ
MPHC_RXLEV_REQ / MPHC_STOP_RXLEV_REQ
MPHC_CONFIG_CBCH_REQ
MPHC_CBCH_SCHEDULE_REQ
MPHC_CBCH_UPDATE_REQ
MPHC_CBCH_INFO_REQ / MPHC_STOP_CBCH_REQ
MPHP_POLLING_RESPONSE_REQ
MPHP_ASSIGNMENT_REQ
MPHP_SINGLE_BLOCK_REQ (Downlink)/
MPHP_STOP_SINGLE_BLOCK_REQ

Special case

- **MPHP_SINGLE_BLOCK_REQ**

In the specific case of a “Single block Downlink without TBF establishment” granted by the network while MS camps on CCCH, layer1 disables running activities before managing single block and resumes them once single block is handled [11].

Packet Idle

Entering in PI

o L1 switches to Packet Idle phase only on receipt of a:

- **MPHP_START_PCCCH_REQ**

Note1: If it's requested to read BCCH or PBCCH before PCCCH reading, this can be done during CS or Idle phase.
Note2: MPHP_CR_MEAS_REQ primitive can't be sent to L1 before a MPHP_START_PCCCH_REQ, from the fact that CR_MEAS algorithm is dependent of Normal Paging period.

Leaving PI

o L1 leaves Packet Idle phase on receipt of a:

- **MPHC_START_CCCH_REQ** (REORG MODE only) (to enter in Idle phase),

NOTE1: LEAVING PI FOR IDLE, ALL PI ACTIVITIES MUST BE STOPPED, INCLUDING PBCCH.
Note2: MPHC_START_CCCH_REQ (NORMAL MODE) is possible during packet idle mode to support Network mode of operation II and III.

- **MPHP_RA_REQ** (to enter in Packet Access phase),

Note: In this specific case, **full PCCCH** (Reorg mode) activity has to be enabled before the PRACH sending (i.e. MPHP_START_PCCCH_REQ sent before MPHP_RA_REQ) in order to decode the USF.

- **MPHC_NETWORK_SYNC_REQ/MPHC_NEW_SCELL_REQ** (to come back in Cell Selection)

- **L1P_TRANSFER_DONE** (to enter in Packet Transfer phase),

Note1: Going from Packet Idle to Packet Transfer does not always require going to Packet Access mode. In GPRS, the timing advance value can be obtained during the polling.
Note2: **Serving cell PBCCH and PCCCH** are implicitly stopped by layer1. Layer3 must stop all other processes **before MPHP_ASSIGNMENT_REQ** (see 0).

Update of "l1 Reference Timeslot Number"

o "L1 Reference Timeslot Number" is changed on receipt of a:

- **MPHP_START_PCCCH_REQ**

Note: While running in Packet Idle with all Packet Idle tasks enabled, the change of Packet Paging mode (Reorganization to Normal) can be done directly (no stop nor re-start requested). However if a change of Timeslot Number (field packet_chan_desc.timeslot_no) is requested then all Packet Idle processes need to be stopped (application of Rule1) and re-started after receipt of the MPHP_START_PCCCH_REQ including the new Timeslot Number.

All primitives while running in PI

PI:
MPHP_START_PCCCH_REQ / MPHP_STOP_PCCCH_REQ
MPHP_SCELL_PBCCH_REQ /
MPHP_SCELL_PBCCH_STOP_REQ
MPHP_CR_MEAS_REQ / MPHP_CR_MEAS_STOP_REQ
MPHP_INT_MEAS_REQ / MPHP_INT_MEAS_STOP_REQ
MPHP_NCELL_PBCCH_REQ /
MPHP_NCELL_PBCCH_STOP_REQ
MPHP_POLLING_RESPONSE_REQ
MPHC_NCELL_BCCH_REQ / MPHC_STOP_NCELL_BCCH_REQ
MPHC_NCELL_SYNC_REQ / MPHC_STOP_NCELL_SYNC_REQ
MPHC_RXLEV_REQ / MPHC_STOP_RXLEV_REQ
MPHC_START_CCCH_REQ (NORMAL mode) /
MPHC_STOP_CCCH_REQ
MPHC_CONFIG_CBCH_REQ
MPHC_CBCH_SCHEDULE_REQ
MPHC_CBCH_UPDATE_REQ
MPHC_CBCH_INFO_REQ / MPHC_STOP_CBCH_REQ

Access:

Entering in A

o L1 switches to Access phase only on receipt of a:

- **MPHC_RA_REQ**

Leaving A

o L1 leaves Access phase on receipt of a:

- **L1C_DEDIC_DONE** (to enter in Dedicated phase),

Note1: L1C_DEDIC_DONE is an internal L1 message (sent from L1S to L1A). On receipt of a MPHC_IMMED_ASSIGN_REQ and once Starting time expires (if it's present), L1S inform L1A that a Dedicated channel has been allocated by sending a L1C_DEDIC_DONE.
Note2: **Before sending MPHC_IMMED_ASSIGN_REQ**, Layer3 should stop all running processes (See 0) **except CCCH reading, Serving Cell BCCH and Idle BA list measurements**, which are stopped implicitly by L1.

- **MPHC_START_CCCH_REQ** (to come back to Idle mode)

Note: Idle BA List measurements need not be stopped before entering Idle Phase.

- **L1P_TRANSFER_DONE** (to enter in Packet Transfer phase),

Note: Before sending MPHP_ASSIGNMENT_REQ, Layer3 must stop all running processes except CCCH reading, Serving Cell BCCH and Idle BA list measurements, which are stopped implicitly by L1.

Update of "l1 Reference Timeslot Number"

o "L1 Reference Timeslot Number" can't be modified while running in Access phase

All primitives while running in Access

A:

MPHC_RA_REQ / MPHC_STOP_RA_REQ
MPHC_IMMED_ASSIGN_REQ
MPHP_ASSIGNMENT_REQ
MPHC_START_CCCH_REQ /
MPHC_STOP_CCCH_REQ
MPHC_SCELL_NBCCH_REQ /
MPHC_STOP_SCELL_BCCH_REQ
RXLEV_PERIODIC_REQ /
STOP_RXLEV_PERIODIC_REQ

MPHP_SINGLE_BLOCK_REQ
MPHP_POLLING_RESPONSE_REQ

Special case

- **MPHP_SINGLE_BLOCK_REQ**

In the specific case of a request for "Uplink Single block without TBF establishment" (MS on CCCH), layer1 disables running activities before managing single block and resumes them once single block is handled [11].

Packet Access:

Entering in PA

o L1 switches to Packet Access phase only on receipt of a:

- **MPHP_RA_REQ**

Leaving PA

o L1 leaves Packet Access phase on receipt of a:

- **L1P_TRANSFER_DONE** (to enter in Packet transfer phase),

Note1: L1P_TRANSFER_DONE is an internal L1 message (sent from L1S to L1A). On receipt of a MPHP_ASSIGNMENT_REQ or a MPHP_SINGLE_BLOCK (2 phase access) and once Starting time expires (if it's present), L1S inform L1A that Packet channels have been allocated by sending a L1P_TRANSFER_DONE.
Note2: Before sending MPHP_ASSIGNMENT_REQ, Layer3 must stop all running processes except PCCCH reading, which is stopped implicitly by L1.

- **MHP_START_PCCCH_REQ** (to come back in Packet Idle),

- **L1C_DEDIC_DONE** (to enter in Dedicated mode)

Note: Before sending MPHC_IMMED_ASSIGN_REQ, Layer3 should stop all running processes (See 0) except PCCCH reading, which is stopped implicitly by L1.

Update of "l1 Reference Timeslot Number"

o "L1 Reference Timeslot Number" can't be modified while running in Packet Access phase

Special case

- **L1P_SINGLE_BLOCK_CON**

Note:

In case of "Uplink Single block without TBF establishment" (MS in Packet Idle: camping on PCCCH), L1 does not stop PCCCH activity on receipt of the L1P_SINGLE_BLOCK_CON primitive (i.e. STI has expired).

In case of "Two-Phase Access" [11]:

- The PCCCH task is implicitly stopped by L1 on receipt of L1P_SINGLE_BLOCK_CON. No confirmation is sent to L3.
- If 2-phase access has to be aborted before packet transfer mode is entered, then L3 must first stop the single block task using MPHP_STOP_SINGLE_BLOCK_REQ (even if MPHP_SINGLE_BLOCK_CON was received). Furthermore, if a TBF task was pending (L3 waiting for MPHP_ASSIGNMENT_CON), it must be aborted too, using MPHP_TBF_RELEASE_REQ.

It is important to ensure both SINGLE and TBF tasks are stopped before going back to (packet) idle mode.

All primitives while running in PA

o L1 switches to Packet Access phase only on receipt of a MPHP_RA_REQ.

PA:

MPHP_RA_REQ / MPHP_RA_STOP_REQ
MPHP_POLLING_RESPONSE_REQ

MPHP_CR_MEAS_REQ / MPHP_CR_MEAS_STOP_REQ MPHP_SINGLE_BLOCK_REQ MPHP_START_PCCCH_REQ / MPHP_STOP_PCCCH_REQ MPHP_ASSIGNMENT_REQ MPHC_IMMED_ASSIGN_REQ

Dedicated:

Entering in Dedicated

o L1 switches to Dedicated phase only on receipt of a:

- **L1C_DEDIC_DONE**

Note: From L3 point of view, the first step to enter in Dedicated mode is to send a MPHC_IMMED_ASSIGN_REQ to L1. Once Starting Time (STI) expires, L1S informs L1A that a channel is allocated.

Leaving Dedicated

o L1 leaves Dedicated phase on receipt of a MPHC_STOP_DEDICATED followed by a:

- **MPHC_START_CCCH_REQ** (REORG Mode) (to enter in Idle phase) or,
- **MPHP_START_PCCCH_REQ** (to enter in Packet Idle phase) or,
- **MPHC_NETWORK_SYNC_REQ** (to enter in CS phase) or,
- **MPHC_NEW_SCELL_REQ** (to enter in CS phase)

See 0 for more details.
Note1: In the specific case of a PDCH Assignment command received during the Immediate Assignment, it's not allowed to switch directly from Dedicated to Packet transfer. A transition to Idle has to be firstly done followed by a switch to Packet Transfer (cf. "**Leaving Idle** phase").
Note2: From L1 point of view, on receipt of a MPHC_STOP_DEDICATED, L1 stays in Dedicated phase. He leaves it on receipt of one of here above primitives.

Update of "l1 Reference Timeslot Number"

o "L1 Reference Timeslot Number" is changed on receipt of a:

- **MPHC_IMMED_ASSIGN_REQ**,
- **MPHC_CHANNEL_ASSIGN_REQ**,
- **MPHC_..._HO_REQ**, (any hand-over)
- **MPHC_HANDOVER_FAIL_REQ**

Note: BA List measurements, Neighbour Cell Synchro and BCCH reading are implicitly handled by layer1, which restarts them if any handover occurs.

All primitives while running in Dedicated

D:

MPHC_CHANNEL_ASSIGN_REQ
MPHC_ASYNC_HO_REQ
MPHC_SYNC_HO_REQ
MPHC_PRE_SYNC_HO_REQ
MPHC_STOP_DEDICATED
MPHC_CHANGE_FREQUENCY
MPHC_CHANNEL_MODE_MODIFY_REQ
MPHC_HANDOVER_FAIL_REQ
MPHC_SET_CIPHERING_REQ
MPHC_UPDATE_BA_LIST
MPHC_NCELL_FB_SB_READ
MPHC_NCELL_SB_READ

Packet Transfer:

Entering in Transfer

o L1 switches to Packet Transfer phase only on receipt of a:

- **L1P_TRANSFER_DONE**

Note1: From L3 point of view, the first step to enter in Packet Transfer is to send a MPHP_ASSIGNMENT_REQ or a MPHP_SINGLE_BLOK_REQ(2 phase

access) to L1. Once the TBF Starting Time (STI) expires, L1S informs L1A that Packet channel are allocated.
Note2: On receipt of L1P_TRANSFER_DONE, L1 stops automatically PCCCH & CCCH & BCCH & CS Idle and Packet Idle BA list measurements processes.

Leaving Transfer

o L1 leaves Packet Transfer phase on emission of a MPHP_TBF_RELEASE_CON (including all current running TBF) followed by a:

- **MPHP_START_PCCCH_REQ** (to enter in Packet Idle phase) or,
- **MPHC_START_CCCH_REQ (REORG mode)** (to enter in Idle phase) or,
- **MPHC_NETWORK_SYNC_REQ** (to enter in CS phase) or,
- **MPHC_NEW_SCELL_REQ** (to enter in CS phase)

Note1: From L1 point of view, on receipt of MPHP_TBF_RELEASE_REQ(all), L1 stays in Transfer phase. He leaves it on receipt of one of here above primitives.
Note2: To manage specificity of Network mode operation II, on request of MPHC_START_CCCH_REQ(NORMAL mode) L1 stays in PACKET TRANSFER.

Update of "l1 Reference Timeslot Number"

o "L1 Reference Timeslot Number is changed on receipt of a:

- **MPHP_ASSIGNMENT_REQ**,
- **MPHP_SINGLE_BLOCK_REQ**,
- **MPHP_TBF_RELEASE_REQ**,
- **MPHP_PDCH_RELEASE_REQ**,
- **L1P_REPEAT_ALLOC_DONE**,
- **L1P_ALLOC_EXHAUST_DONE**

All primitives while running in Transfer

T:

MPHP_ASSIGNMENT_REQ
MPHP_ASSIGNMENT_REQ (with interf_meas_enable = 1)
MPHP_TBF_RELEASE_REQ
MPHP_REPEAT_UL_FIXED_ALLOC_REQ
MPHP_PDCH_RELEASE_REQ
MPHP_TIMING_ADVANCE_REQ
MPHP_UPDATE_PSI_PARAM_REQ

MPHP_TCR_MEAS_REQ / MPHP_TCR_MEAS_STOP_REQ
L1P_REPEAT_ALLOC_DONE
L1P_ALLOC_EXHAUST_DONE
MPHP_NCELL_PBCCH_REQ /
MPHP_NCELL_PBCCH_STOP_REQ
MPHC_NCELL_FB_SB_READ / MPHC_NCELL_SB_READ
MPHC_NCELL_BCCH_REQ /
MPHC_STOP_NCELL_BCCH_REQ
MPHP_SCELL_PBCCH_REQ /
MPHP_SCELL_PBCCH_STOP_REQ
MPHC_SCELL_NBCCH_REQ
MPHC_SCELL_EBCCH_REQ /
MPHC_STOP_SCELL_BCCH_REQ
MPHC_START_CCCH_REQ (NORMAL mode) /
MPHC_STOP_CCCH_REQ

Dedicated and Packet Transfer Modes

Entering Dedicated Mode

Transition to Dedicated mode starts when MPHC_IMMED_ASSIGN_REQ is received. When Layer1 finally enters Dedicated mode, **all processes must have been stopped** and L1S message L1C_DEDIC_DONE is sent to L1A, which sends a confirmation MPHC_IMMED_ASSIGN_CON to L3. However, Layer3 is not aware of the time when Layer1 enters Dedicated Mode. That's why Layer1 implicitly stops some processes initialized by the following messages:

- MPHC_RXLEV_PERIODIC_REQ
- MPHC_SCELL_N(E)BCCH_REQ
- MPHC_START_CCCH_REQ
- MPHP_START_PCCCH

The solution for other processes, which are not implicitly stopped, is to **request Layer3 to stop processes before sending MPHC_IMMED_ASSIGN_REQ.**

Leaving Dedicated mode

Dedicated mode includes 3 processes:

- The main one handles dedicated mode setup, i.e. handovers, channel parameters, ciphering…
- The second one handles neighbor cell measurement process and allows updating the BA list.
- The last one handles the 6 strongest neighbor cells management (synchro monitoring and BCCH reading).

When the MPHC_STOP_DEDICATED message is received, 3 actions are taken:

- reset active channel parameters and disable L1S tasks without any other action from L3 (done in L1S).
- reset and stop automatically BA List measurements in Dedicated mode (done in L1A).
- reset neighbor cells management if the process had been started (done in L1A). If process is still in WAIT_INIT phase waiting for a Start message, no action is needed as this process only accepts Start messages in Dedicated mode.

As a conclusion, MPHC_STOP_DEDICATED stops all possible running processes.

Entering Packet Transfer mode

Packet Transfer mode follows same mechanism as Dedicated mode. Layer1 implicitly stops processes initialized by the following messages:

- MPHC_RXLEV_PERIODIC_REQ
- MPHC_SCELL_N(E)BCCH_REQ
- MPHC_START_CCCH_REQ
- MPHP_START_PCCCH

Layer3 must stop other processes before sending MPHP_ASSIGNMENT_REQ.

For example, for transition from Idle mode to Transfer mode, all neighbor cell activities (BCCH, SYNCHRO, CBCH…) must be stopped before assignment request.

Leaving Packet Transfer mode

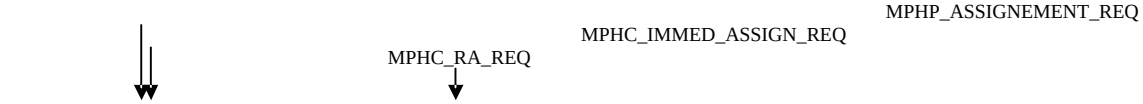
The transfer mode includes several processes:

- The main one handles the transfer mode, i.e. new assignment requests, Uplink Fixed Allocation, Timing Advance, PSI parameters, tbf release…
- Neighbor cells measurements are automatically started when entering Packet Transfer mode.
- Serving and Neighbor cells management for Packet (PBCCH reading) are handled by L1A state machines. Serving and Neighbor cells management for Circuit Switched (synchro monitoring, BCCH reading and CCCH reading) can also be active.

When a TBF_RELEASE_REQ leads to a release of all TBF, the main packet transfer processes are stopped. L1S implicitly stops Uplink Fixed Allocation (repeat_allocation = FALSE) and Timing Advance (PTCCH task). All state machines for Neighbor Cells measurements and Serving and Neighbor cells management are also reset when L1P_TBF_RELEASED (with release_all = TRUE) is received in L1A.

As a conclusion, TBF_RELEASE_REQ stops all possible running processes.

Leaving Idle mode:



Idle tasks	To Access	To Dedicated	To Packet Transfer
MPHC_NCELL_BCCH_REQ	**Stop by L3**	**Stop by L3**	**Stop by L3**
MPHC_NCELL_SYNC_REQ	**Stop by L3**	**Stop by L3**	**Stop by L3**
MPHC_RXLEV_REQ	**Stop by L3**	**Stop by L3**	**Stop by L3**
MPHC_CBCH_INFO_REQ	**Stop by L3**	**Stop by L3**	**Stop by L3**
MPHC_SCELL_N(E)BCCH_REQ	*Updated*	Implicit stop	Implicit stop
MPHC_RXLEV_PERIODIC_REQ	**Stop by L3**	Implicit stop	Implicit stop
MPHC_START_CCCH_REQ	*Updated*	Implicit stop	Implicit stop