TSG RAN Meeting #21 **RP-030536**
Frankfurt, Germany, 16 - 19 September 2003

Title **CRs (Rel-5 only) to TS 25.423, TS 25.433 and TS 25.321 (RAN2) on MAC-hs Reordering**
Source **TSG RAN WG3**
Agenda Item **7.4.6**

RAN3 Tdoc	Spec	curr. Vers.	new Vers.	REL	CR	Rev	Cat	Title	Work item
R3-031137	25.423	5.6.0	5.7.0	REL-5	848	2	F	MAC-hs Reordering Buffer Size	HSDPA-IubIur
R3-031138	25.433	5.5.0	5.6.0	REL-5	875	2	F	MAC-hs Reordering Buffer Size	HSDPA-IubIur
R2-032038	25.321	5.5.0	5.6.0	REL-5	174	2	F	MAC-hs Re-ordering Protocol Correction & MAC-hs window re-ordering	HSDPA-L23

Note: This Tdoc revises Tdoc RP-030450 after the linking with a different RAN2 CR turned out during RAN #21. (To have the correct linking also the 'affected core specification' fields on the CR cover sheets were aligned).
Two RAN3 CRs are linked with a RAN2 CR.

3GPP TSG-RAN2 Meeting #37
Budapest, Hungary, 25th August 2003

Tdoc ⌘R2-032038

CR-Form-v7

CHANGE REQUEST

⌘ **25.321** **CR** **174** ⌘ **rev** **2** ⌘ Current version: **5.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☐ Core Network ☐

Title: ⌘	MAC-hs Re-ordering Protocol Correction & MAC-hs window re-ordering	
Source: ⌘	RAN WG2	
Work item code: ⌘	HSDPA-L23	***Date:*** ⌘ 15/08/2003
Category: ⌘	**F**	***Release:*** ⌘ Rel-5

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

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘	The current specification seems to imply that the data discarded when the window is advanced is not considered in the rest of the algorithm MAC-hs does not have strict memory restrictions as in the case of RLC. It is therefore beneficial to add some notes as to how the UEs can best discard data to reduce the buffer utilization in MAC-hs. Aligning the naming for the disassembly entity and the naming of the state variable next_expected_TSN.
Summary of change: ⌘	We are clarifying that the UE should consider the data that are discarded when the window is moved as having been received. We are improving the wording (consider discarded data as having been received) by making use of the fact that next_expected_TSN indicates up to which SN there may be discarded data that should be considered as having been received. The CR was merged with contents from Tdoc R2-031726. The wording of the added text was modified to eliminate any kind of ambiguity and ensure that data would not be delivered out of sequence.
Consequences if not approved: ⌘	Erroneous triggers of the timer T1 would take place for data that has already been discarded by the window. Protocol errors would occur if next_expected_TSN is allowed to be outside the receive window. UEs in lack of memory could have an erroneous behavior, including potentially delivering data out of order.

	Discrepancy of the naming in the MAC-hs protocol.

Clauses affected:	⌘	11.6.2.3.2, 11.6.2.x			
		Y	**N**		
Other specs	⌘	**X**		Other core specifications	⌘ 25.423 v5.6.0 CR848r2 25.433 v5.5.0 CR875r2
affected:			**X**	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

11.6.2.3 Reordering entity

11.6.2.3.1 Definitions

In the functions described in this section the following definitions apply:

Parameters

- Transmitter window size (TRANSMIT_WINDOW_SIZE)
  TRANSMIT_WINDOW_SIZE is the size of the transmitter window according to the definition below. This is a parameter in the Node B and the value of the parameter is configured by higher layers.

- Receiver window size (RECEIVE_WINDOW_SIZE)
  RECEIVE_WINDOW_SIZE is the size of the receiver window according to the definition below. This is a parameter in the UE and the value of the parameter is configured by higher layers.

State variables

- n~~N~~ext_expected_TSN:
  The next_expected_TSN is the Transmission sequence number (TSN) following the TSN of the last in-sequence MAC-hs PDU received. It shall be updated upon the receipt of the MAC-hs PDU with TSN equal to n~~N~~ext_expected_TSN. The initial value of n~~N~~ext_expected_TSN =0.

- RcvWindow_UpperEdge:
  The RcvWindow_UpperEdge represents the TSN, which is at the upper edge of the receiver window. After the first MAC-hs PDU has been received successfully, it also corresponds to the MAC-hs PDU with the highest TSN of all received MAC-hs PDUs. The initial RcvWindow_UpperEdge equals 63. RcvWindow_UpperEdge is updated based on the reception of new payloads according to the procedure given below.

- T1_TSN:
  The TSN of the latest MAC-hs PDU that cannot be delivered to the disassembly ~~function~~entity, when the timer T1 is started.

Timers

- Re-ordering release timer (T1):
  The Re-ordering release timer T1 controls the stall avoidance in the UE reordering buffer as described below. The value of T1 is configured by upper layers.

Other definitions

- Receiver window:
  The receiver window defines TSNs of those MAC-hs PDUs that can be received in the receiver without causing an advancement of the receiver window according to the procedure below. The size of the receiver window equals RECEIVE_WINDOW_SIZE and spans TSNs going from RcvWindow_UpperEdge – RECEIVE_WINDOW_SIZE + 1 to RcvWindow_UpperEdge included.

11.6.-2.-3.2 Reordering functionality

If no timer T1 is active:

- the timer T1 shall be started when a MAC-hs PDU with TSN~~=SN~~ > next_expected_TSN is correctly received. ~~but can not be delivered to the disassembly function.~~

- T1_TSN shall be set to the TSN of this MAC-hs PDU.

If a timer T1 is already active:

- no additional timer shall be started, i.e. only one timer T1 may be active at a given time.

The timer T1 shall be stopped if:

- the MAC-hs PDU with TSN = T1_TSN can be delivered to the disassembly ~~function~~ entity before the timer expires.

When the timer T1expires and T1_TSN > next_expected_TSN:

- all correctly received MAC-hs PDUs with TSN > next_expected_TSN up to and including T1_TSN-1 shall be delivered to the disassembly ~~function~~entity ~~and they shall be removed from the reordering buffer and be considered as having been received~~;
- all correctly received MAC-hs PDUs up to the next not received MAC-hs PDU shall be delivered to the disassembly ~~function~~entity.
- next_expected_TSN shall be set to the TSN of the next not received MAC-hs PDU.

When the timer T1 is stopped or expires, and there still exist some received MAC-hs PDUs that can not be delivered to higher layer:

- timer T1 is started
- set T1_TSN to the highest TSN among those of the MAC-hs PDUs that can not be delivered.

Transmitter operation:

After the transmitter has transmitted a MAC-hs PDU with TSN=SN, any MAC-hs PDU with TSN ≤ SN – TRANSMIT_WINDOW_SIZE should not be retransmitted to avoid sequence number ambiguity in the receiver.

Receiver operation:

~~- MAC-hs PDUs that have been discarded by the timer based mechanism shall be considered as having been received in the following procedure.~~

When a MAC-hs PDU with TSN = SN is received:

- If SN is within the receiver window:
  - if SN < next_expected_TSN, ~~and~~or this MAC-hs PDU has ~~not~~ previously been received:
    - the MAC-hs PDU shall be discarded.
  - else:
    - the MAC-hs PDU is placed in the reordering buffer at the place indicated by the TSN.

~~- If SN is within the receiver window, and this MAC-hs PDU has been previously received:~~

~~- the MAC-hs PDU shall be discarded.~~

- If SN is outside the receiver window:
  - the received MAC-hs PDU shall be placed above the highest received TSN in the reordering buffer, at the position indicated by SN;
  - RcvWindow_UpperEdge shall be set to SN thus advancing the receiver window;
  - any MAC-hs PDUs with TSN ≤ RcvWindow_UpperEdge – RECEIVE_WINDOW_SIZE, i.e. outside the receiver window after its position is updated, shall be removed from the reordering buffer and be delivered to the disassembly entity;~~.~~
  - next_expected_TSN shall be set to RcvWindow_UpperEdge – RECEIVE_WINDOW_SIZE + 1;
- All received MAC-hs PDUs with consecutive TSNs from next_expected_TSN (included) up to the first not received MAC-hs PDU are delivered to the disassembly entity.
- next_expected_TSN shall be advanced ~~set~~ to the TSN of this first not received MAC-hs PDU.

~~When~~ In case a UE ~~needs to release~~has insufficient memory to process a received MAC-hs PDU, it shall perform the following set of operations:

- select TSN_flush such that: next_expected_TSN < TSN_flush ≤ RcvWindow_UpperEdge + 1;
- deliver all correctly received MAC-hs PDUs with TSN < next_expected_TSN to the disassembly entity;
- set next_expected_TSN to TSN_flush~~.~~.

11.6.2.4 Disassembly entity

For each MAC-hs PDU that is delivered to the disassembly ~~function~~entity, the UE shall:

- remove any padding bits if present;
- remove the MAC-hs header;
- deliver the MAC-d PDUs in the MAC-hs PDU to MAC-d.

11.6.2.5 MAC-hs Reset

If a reset of the MAC-hs entity is requested by upper layers, the UE shall:

- flush soft buffer for all configured HARQ processes;
- stop all active re-ordering release timer (T1) and set all timer T1 to their initial value;
- start TSN with value 0 for the next transmission on every configured HARQ process;
- initialise the variables RcvWindow_UpperEdge and n~~N~~ext_expected_TSN to their initial values;
- disassemble all MAC-hs PDUs in the re-ordering buffer and deliver all MAC-d PDUs to the MAC-d entity;
- flush the re-ordering buffer.

and then:

- indicate to all AM RLC entities mapped on HS-DSCH to generate a status report.

11.6.2.6 Reconfiguration of MAC-hs parameters

The parameters for a MAC-hs entity may be reconfigured (modifed) by upper layers.

When a parameter is reconfigured by the upper layer, the UE shall:

- start using the reconfigured value of the parameter.

If the parameter RECEIVE_WINDOW_SIZE is reconfigured, the UE shall:

- ~~update the reordering receive window while not changing RcvWindow_UpperEdge~~set RECEIVE_WINDOW_SIZE to the new value;
- remove any MAC-hs PDUs with TSN ≤ RcvWindow_UpperEdge – RECEIVE_WINDOW_SIZE (i.e. outside the receiver window after its ~~position~~size is updated) from the reordering buffer and deliver these MAC-hs PDUs to the disassembly entity;~~:~~
- if next_expected_TSN ≤ RcvWindow_UpperEdge – RECEIVE_WINDOW_SIZE:
  - set next_expected_TSN to RcvWindow_UpperEdge – RECEIVE_WINDOW_SIZE + 1;
  - deliver all received MAC-hs PDUs with consecutive TSNs from next_expected_TSN (included) up to the first not received MAC-hs PDU to the disassembly entity;
  - advance next_expected_TSN to the TSN of this first not received MAC-hs PDU.

3GPP TSG-RAN3 Meeting #37
Budapest, Hungary, 25th - 29th August 2003

Tdoc ⌘R3-031137

CR-Form-v7

CHANGE REQUEST

⌘ **25.423** **CR** **848** ⌘ **rev** **2** ⌘ Current version: **5.6.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title:	⌘	MAC-hs Reordering Buffer Size
Source:	⌘	RAN3
Work item code:	⌘	HSDPA-IuBIur
Date:	⌘	28/08/2003
Category:	⌘	**F**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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R96 *(Release 1996)*
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R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘

It is currently not possible to modify the MAC-hs Reordering Buffer Size. There are however situations when this is required. One example is described below.

Step 1: The UE (not in HS-DSCH state) has an Interactive/Background RAB established.

Step 2: The UE is moved to HS-DSCH state (Interactive/Background RAB mapped on HS-DSCH). The *MAC-hs Reordering Buffer Size* IE shall be set to "the total buffer size defined in UE capability minus the RLC AM buffer". Logically, there is no reason to restrict the memory allocated for HS-DSCH operation further than what is needed for the AM RLC entities pertaining to Signalling Radio Bearers and the Interactive/Background RAB.

Step 3: A request to establish a Streaming RAB is received from the SGSN (note that a PS Streaming RAB operates in AM). Furthermore, assume that the Interactive/Background RAB shall remain on HS-DSCH. The Node B needs to be informed that the amount of memory (in the UE) available for HS-DSCH operation shall be reduced (in order to account for the memory required for the AM RLC entity pertaining to PS Streaming).

Summary of change: ⌘

Revision 1: *MAC-hs Reordering Buffer Size* IE has been defined as a single IE and the unit (i.e. kBytes) is added to the description. *HS-DSCH FDD Information* IE, *HS-DSCH Information To Modify* IE and *HS-DSCH TDD Information* IE have been updated with a reference to the *MAC-hs Reordering Buffer Size* IE. ASN.1 has been updated accordingly.

The *MAC-hs Reordering Buffer Size* IE has been added to the *HS-DSCH*

		Information To Modify IE. Corresponding changes have been done to the ASN.1 code. Impact assessment towards the previous version of the specification (same release): This CR has isolated impact on the previous version of the specification (same release). The impact can be considered isolated because the change only affects HSDPA. This CR has an impact under functional point of view.
Consequences if not approved:	⌘	If the CR is not approved, the procedure for HS-DSCH modification is incomplete.

Clauses affected:	⌘	9.2.1.30Q, 9.2.1.x, 9.2.2.19a, 9.2.3.3aa, 9.3.4			
		Y	**N**		
Other specs	⌘	**X**		Other core specifications	⌘ CR875r2 on TS25.433 v5.5.0 CR174r2 on TS25.321 v5.5.0 (R2-032038)
affected:			**X**	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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9.2.1.30Q HS-DSCH Information To Modify

The *HS-DSCH Information To Modify* IE provides information for HS-DSCH to be modified.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
HS-DSCH MAC-d Flow Specific Information		*0..<maxnoofMACdFlows>*			–	
>HS-DSCH MAC-d Flow ID	M		9.2.1.30O		–	
>Allocation/Retention Priority	O		9.2.1.1		–	
>Transport Bearer Request Indicator	M		9.2.1.61		–	
>Traffic Class	O		9.2.1.58A		–	
>Binding ID	O		9.2.1.3	Shall be ignored if bearer establishment with ALCAP.	–	
>Transport Layer Address	O		9.2.1.62	Shall be ignored if bearer establishment with ALCAP.	–	
>Priority Queue Information		*0..<maxnoofPrioQueues>*			–	
>>Priority Queue ID	M		9.2.1.45A		–	
>>Scheduling Priority Indicator	O		9.2.1.51A		–	
>>T1	O		9.2.1.54A		–	
>>MAC-hs Window Size	O		9.2.1.34C		–	
>>MAC-hs Guaranteed Bit Rate	O		9.2.1.34Aa		–	
>>MAC-d PDU Size Index		*0..<maxnoofMACdPDUindexes>*			–	
>>>SID	M		9.2.1.52D		–	
>>>MAC-d PDU Size	O		9.2.1.34A		–	
MAC-hs Reordering Buffer Size	O		9.2.1.x		–	
CQI Feedback Cycle k	O		9.2.2.24a	For FDD only	–	
CQI Repetition Factor	O		9.2.2.24c	For FDD only	–	
ACK-NACK Repetition Factor	O		9.2.2.a	For FDD only	–	
CQI Power Offset	O		9.2.2.24b	For FDD only	–	
ACK Power Offset	O		9.2.2.b	For FDD only	–	
NACK Power Offset	O		9.2.2.26a	For FDD only	–	
HS-SCCH Power Offset	O		9.2.2.19d	For FDD only	–	
HS-SCCH Code Change Grant	O		9.2.1.30S		–	
TDD ACK NACK Power Offset	O		9.2.3.7I	For TDD only	–	

Range bound	Explanation
maxnoofMACdFlows	Maximum number of MAC-d flows.
maxnoofPrioQueues	Maximum number of Priority Queues.
maxnoofMACdPDUindexes	Maximum number of MAC-d PDU Size Indexes (SIDs).

9.2.1.x MAC-hs Reordering Buffer Size

The *MAC-hs Reordering Buffer Size* IE indicates the total buffer size defined in UE capability minus the RLC AM buffer in kBytes

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
MAC-hs Reordering Buffer Size			INTEGER (1..300,…)	

9.2.2.19a HS-DSCH FDD Information

The *HS-DSCH FDD Information* IE provides information for HS-DSCH MAC-d flows to be established.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
HS-DSCH MAC-d Flow Specific Information		*1..<maxnoofMACdFlows>*			–	
>HS-DSCH MAC-d Flow ID	M		9.2.1.30O		–	
>Allocation/Retention Priority	M		9.2.1.1		–	
>Traffic Class	M		9.2.1.58A		–	
>Binding ID	O		9.2.1.3	Shall be ignored if bearer establishment with ALCAP.	–	
>Transport Layer Address	O		9.2.1.62	Shall be ignored if bearer establishment with ALCAP.	–	
>Priority Queue Information		*1..<maxnoofPrioQueues>*			–	
>>Priority Queue ID	M		9.2.1.45A		–	
>>Scheduling Priority Indicator	M		9.2.1.51A		–	
>>T1	M		9.2.1.54A		–	
>>MAC-hs Window Size	M		9.2.1.34C		–	
>>MAC-hs Guaranteed Bit Rate	O		9.2.1.34Aa		–	
>>MAC-d PDU Size Index		*1..<maxnoofMACdPDUindexes>*			–	
>>>SID	M		9.2.1.52D		–	
>>>MAC-d PDU Size	M		9.2.1.34A		–	
UE Capabilities information		*1*			–	
>HS-DSCH Physical Layer Category	M		9.2.1.30Oa		–	
>MAC-hs reordering buffer size	M		9.2.1.x~~INTEGER (1..300,...)~~	~~The total buffer size defined in UE capability minus the RLC AM buffer~~	–	
CQI Feedback Cycle k	M		9.2.2.24a		–	
CQI Repetition Factor	C-CQICyclek		9.2.2.24c		–	
ACK-NACK Repetition Factor	M		9.2.2.a		–	
CQI Power Offset	M		9.2.2.24b		–	
ACK Power Offset	M		9.2.2.b		–	
NACK Power Offset	M		9.2.2.26a		–	
HS-SCCH Power Offset	O		9.2.2.19d		–	

Condition	Explanation
CQICyclek	The IE shall be present if the *CQI Feedback Cycle k* IE is set to a value greater than 0.

Range bound	Explanation
maxnoofMACdFlows	Maximum number of MAC-d flows.
maxnoofPrioQueues	Maximum number of Priority Queues.
maxnoofMACdPDUindexes	Maximum number of MAC-d PDU Size Indexes (SIDs).

9.2.3.3aa HS-DSCH TDD Information

The *HS-DSCH TDD Information* IE provides information for HS-DSCH to be established.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
HS-DSCH MAC-d Flow Specific Information		*1..<maxnoofMACdFlows>*			–	
>HS-DSCH MAC-d Flow ID	M		9.2.1.30O		–	
>Allocation/Retention Priority	M		9.2.1.1		–	
>Traffic Class	M		9.2.1.58A		–	
>Binding ID	O		9.2.1.3	Shall be ignored if bearer establishment with ALCAP.	–	
>Transport Layer Address	O		9.2.1.62	Shall be ignored if bearer establishment with ALCAP.	–	
>Priority Queue Information		*1..<maxnoofPrioQueues>*			-	
>>Priority Queue ID	M		9.2.1.45A		-	
>>Scheduling Priority Indicator	M		9.2.1.51A			
>>T1	M		9.2.1.54A			
>>MAC-hs Window Size	M		9.2.1.34C		–	
>>MAC-hs Guaranteed Bit Rate	O		9.2.1.34Aa			
>>MAC-d PDU Size Index		*1..<maxnoofMACdPDUindexes>*				
>>>SID	M		9.2.1.52D		-	
>>>MAC-d PDU Size	M		9.2.1.34A		-	
UE Capabilities information		*1*			-	
>HS-DSCH Physical Layer Category	M		9.2.1.30Oa		–	
>MAC-hs reordering buffer size	M		9.2.1.x~~INTEGER (1..300,...)~~	~~The total buffer size defined in UE capability minus the RLC AM buffer~~		
TDD ACK NACK Power Offset	M		9.2.3.7I		–	

Range bound	Explanation
maxnoofMACdFlows	Maximum number of MAC-d flows.
maxnoofPrioQueues	Maximum number of Priority Queues.
maxnoofMACdPDUindexes	Maximum number of MAC-d PDU Size Indexes (SIDs).

9.3.4 Information Element Definitions

```
-- **************************************************************
--
-- Information Element Definitions
--
-- **************************************************************

/* partly omitted */

-- H

HARQ-MemoryPartitioning    ::= CHOICE {
   implicit        HARQ-MemoryPartitioning-Implicit,
   explicit        HARQ-MemoryPartitioning-Explicit,
   ...
   }

HARQ-MemoryPartitioning-Implicit    ::= SEQUENCE {
   number-of-Processes         INTEGER (1..8,...),
   iE-Extensions               ProtocolExtensionContainer { { HARQ-MemoryPartitioning-Implicit-ExtIEs } }
   OPTIONAL,
   ...
}

HARQ-MemoryPartitioning-Implicit-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
   ...
}

HARQ-MemoryPartitioning-Explicit    ::= SEQUENCE {
   hARQ-MemoryPartitioningList        HARQ-MemoryPartitioningList,
   iE-Extensions                      ProtocolExtensionContainer { { HARQ-MemoryPartitioning-Explicit-ExtIEs
}         OPTIONAL,
   ...
}

HARQ-MemoryPartitioning-Explicit-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
   ...
}

HARQ-MemoryPartitioningList    ::= SEQUENCE (SIZE (1..maxNrOfHARQProc)) OF HARQ-MemoryPartitioningItem

HARQ-MemoryPartitioningItem ::= SEQUENCE {
   process-Memory-Size                ENUMERATED {
                                      hms800, hms1600, hms2400, hms3200, hms4000,
                                      hms4800, hms5600, hms6400, hms7200, hms8000,
                                      hms8800, hms9600, hms10400, hms11200, hms12000,
                                      hms12800, hms13600, hms14400, hms15200, hms16000,
                                      hms17600, hms19200, hms20800, hms22400, hms24000,
                                      hms25600, hms27200, hms28800, hms30400, hms32000,
                                      hms36000, hms40000, hms44000, hms48000, hms52000,
                                      hms56000, hms60000, hms64000, hms68000, hms72000,
                                      hms76000, hms80000, hms88000, hms96000, hms104000,
                                      hms112000, hms120000, hms128000, hms136000, hms144000,
                                      hms152000, hms160000, hms176000, hms192000, hms208000,
                                      hms224000, hms240000, hms256000, hms272000, hms288000,
                                      hms304000,...},
   iE-Extensions                      ProtocolExtensionContainer { { HARQ-MemoryPartitioningItem-ExtIEs } }
       OPTIONAL,
   ...
}

HARQ-MemoryPartitioningItem-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
   ...
}
HCS-Prio  ::= INTEGER (0..7)
-- 0 = lowest priority, ...7 = highest priority

HSDSCH-FDD-Information ::= SEQUENCE {
   hSDSCH-MACdFlow-Specific-Info          HSDSCH-MACdFlow-Specific-InfoList,
   uE-Capabilities-Info                   UE-Capabilities-Info,
   cqiFeedback-CycleK                     CQI-Feedback-Cycle,
   cqiRepetitionFactor                    CQI-RepetitionFactor          OPTIONAL,
   -- This IE shall be present if the CQI Feedback Cycle k is greater than 0
   cqiPowerOffset                         CQI-Power-Offset,
   ackNackRepetitionFactor                AckNack-RepetitionFactor,
   ackPowerOffset                         Ack-Power-Offset,
   nackPowerOffset                        Nack-Power-Offset,
```

```
   hsscch-PowerOffset                      HSSCCH-PowerOffset            OPTIONAL,
   iE-Extensions                           ProtocolExtensionContainer { { HSDSCH-FDD-Information-ExtIEs } }
        OPTIONAL,
   ...
}

HSDSCH-FDD-Information-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
   ...
}

HSDSCH-FDD-Information-Response ::= SEQUENCE {
   hSDSCH-MACdFlow-Specific-InfoList-Response     HSDSCH-MACdFlow-Specific-InfoList-Response,
   hSSCCH-Specific-InfoList-Response              HSSCCH-FDD-Specific-InfoList-Response,
   measurement-Power-Offset                       Measurement-Power-Offset        OPTIONAL,
   hARQ-MemoryPartitioning                        HARQ-MemoryPartitioning,
   iE-Extensions                                  ProtocolExtensionContainer { { HSDSCH-FDD-Information-
Response-ExtIEs } }       OPTIONAL,
   ...
}

HSDSCH-FDD-Information-Response-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
   ...
}

HSDSCH-Information-to-Modify ::= SEQUENCE {
   hSDSCH-MACdFlow-Specific-InfoList-to-Modify    HSDSCH-MACdFlow-Specific-InfoList-to-Modify
   OPTIONAL,
   mAChs-Reordering-Buffer-Size                   MAChsReorderingBufferSize              OPTIONAL,
   cqiFeedback-CycleK                             CQI-Feedback-Cycle             OPTIONAL,   -- For FDD only
   cqiRepetitionFactor                            CQI-RepetitionFactor           OPTIONAL,   -- For FDD only
   ackNackRepetitionFactor                        AckNack-RepetitionFactor       OPTIONAL,   -- For FDD only
   cqiPowerOffset                                 CQI-Power-Offset               OPTIONAL,   -- For FDD only
   ackPowerOffset                                 Ack-Power-Offset               OPTIONAL,   -- For FDD only
   nackPowerOffset                                Nack-Power-Offset              OPTIONAL,   -- For FDD only
   hsscch-PowerOffset                             HSSCCH-PowerOffset             OPTIONAL,   -- Only for FDD
   hSSCCH-CodeChangeGrant                         HSSCCH-Code-Change-Grant       OPTIONAL,
   tDDAckNackPowerOffset                          TDD-AckNack-Power-Offset       OPTIONAL,   -- For TDD only
   iE-Extensions                                  ProtocolExtensionContainer { { HSDSCH-Information-to-Modify
ExtIEs } }         OPTIONAL,
   ...
}

HSDSCH-Information-to-Modify-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
   ...
}

/* partly omitted */

-- M

MaxNrOfUL-DPCHs             ::= INTEGER (1..6)

MAC-c-sh-SDU-Length         ::= INTEGER (1..5000)

MAC-c-sh-SDU-LengthList ::= SEQUENCE(SIZE(1..maxNrOfMACcshSDU-Length)) OF MAC-c-sh-SDU-Length

MACdPDU-Size ::= INTEGER (1..5000,...)

MACdPDU-Size-IndexList ::= SEQUENCE (SIZE (1..maxNrOfPDUIndexes)) OF MACdPDU-Size-IndexItem

MACdPDU-Size-IndexItem ::= SEQUENCE {
    sID                                 SID,
    mACdPDU-Size                        MACdPDU-Size,
    iE-Extensions                       ProtocolExtensionContainer { { MACdPDU-Size-IndexItem-ExtIEs } }
    OPTIONAL,
    ...
}

MACdPDU-Size-IndexItem-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
    ...
}

MACdPDU-Size-IndexList-to-Modify ::= SEQUENCE (SIZE (1..maxNrOfPDUIndexes)) OF MACdPDU-Size-IndexItem-to-
Modify

MACdPDU-Size-IndexItem-to-Modify ::= SEQUENCE {
    sID                                 SID,
    mACdPDU-Size                        MACdPDU-Size                            OPTIONAL,
```

```
    iE-Extensions                       ProtocolExtensionContainer { { MACdPDU-Size-IndexItem-to-Modify-ExtIE
} }         OPTIONAL,
    ...
}

MACdPDU-Size-IndexItem-to-Modify-ExtIEs RNSAP-PROTOCOL-EXTENSION ::= {
    ...
}

MAChsGuaranteedBitRate ::= INTEGER (0..16777215,...)

MAChsReorderingBufferSize ::= INTEGER (1..300,...)
-- Unit kBytes

MAC-hsWindowSize        ::= ENUMERATED {v4, v6, v8, v12, v16, v24, v32,...}

MaximumAllowedULTxPower     ::= INTEGER (-50..33)

MaxNrDLPhysicalchannels     ::= INTEGER (1..224)
-- 1.28Mcps TDD 97 – 224 are unused

MaxNrDLPhysicalchannelsTS   ::= INTEGER (1..16)

MaxNrTimeslots              ::= INTEGER (1..14)
-- 1.28Mcps values 7-14 are unused

MaxNrULPhysicalchannels     ::= INTEGER (1..2)

/* partly omitted */

-- U

UARFCN                  ::= INTEGER (0..16383,...)
-- Corresponds to: 0.0Hz..3276.6Mhz. See 25.101, 25.105

UDRE ::= ENUMERATED {
    lessThan1,
    between1-and-4,
    between4-and-8,
    over8,
    ...
}

UE-Capabilities-Info ::= SEQUENCE {
    hSDSCH-Physical-Layer-Category      INTEGER (1..64,...),
    mAChs-Reordering-Buffer-Size        MAChsReorderingBufferSizeINTEGER (1..300,...),
    iE-Extensions                       ProtocolExtensionContainer { { UE-Capabilities-Info-ExtIEs } }
    OPTIONAL,
    ...
}
```

3GPP TSG-RAN3 Meeting #37
Budapest, Hungary, 25th - 29th August 2003

Tdoc ⌘R3-031138

CR-Form-v7

CHANGE REQUEST

⌘ **25.433** **CR** **875** ⌘ **rev** **2** ⌘ Current version: **5.5.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☒ Core Network ☐

Title: ⌘	MAC-hs Reordering Buffer Size	
Source: ⌘	RAN3	
Work item code: ⌘	HSDPA-IuBIur	***Date:*** ⌘ 28/08/2003
Category: ⌘	**F**	***Release:*** ⌘ Rel-5

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

Use one of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change: ⌘

It is currently not possible to modify the MAC-hs Reordering Buffer Size. There are however situations when this is required. One example is described below.

Step 1: The UE (not in HS-DSCH state) has an Interactive/Background RAB established.

Step 2: The UE is moved to HS-DSCH state (Interactive/Background RAB mapped on HS-DSCH). The *MAC-hs Reordering Buffer Size* IE shall be set to "the total buffer size defined in UE capability minus the RLC AM buffer". Logically, there is no reason to restrict the memory allocated for HS-DSCH operation further than what is needed for the AM RLC entities pertaining to Signalling Radio Bearers and the Interactive/Background RAB.

Step 3: A request to established a Streaming RAB is received from the SGSN (note that a PS Streaming RAB operates in AM). Furthermore, assume that the Interactive/Background RAB shall remain on HS-DSCH. The Node B need to be informed that the amount of memory (in the UE) available for HS-DSCH operation shall be reduced (in order to account for the memory required for the AM RLC entity pertaining to PS Streaming).

Summary of change: ⌘

Revision 1: *MAC-hs Reordering Buffer Size* IE has been defined as a single IE and the unit (i.e. kBytes) is added to the description. *HS-DSCH FDD Information* IE, *HS-DSCH Information To Modify* IE and *HS-DSCH TDD Information* IE have been updated with a reference to the *MAC-hs Reordering Buffer Size* IE. ASN.1 has been updated accordingly.

The *MAC-hs Reordering Buffer Size* IE has been added to the *HS-DSCH*

		Information To Modify IE. Corresponding changes have been done to the ASN.1 code. Impact assessment towards the previous version of the specification (same release): This CR has isolated impact on the previous version of the specification (same release). The impact can be considered isolated because the change only affects HSDPA. This CR has an impact under functional point of view.
Consequences if not approved:	⌘	If the CR is not approved, the procedure for HS-DSCH modification is incomplete.

Clauses affected:	⌘	9.2.1.31H, 9.2.1.x, 9.2.2.18D, 9.2.3.5F, 9.3.4			
		Y	**N**		
Other specs affected:	⌘	**X**		Other core specifications	⌘ CR848r2 on TS25.423 v5.6.0 CR174r2 on TS25.321 v5.5.0 (R2-032038)
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

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

9.2.1.31H HS-DSCH Information To Modify

The HS-DSCH Information To Modify provides information for HS-DSCH to be modified.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
HS-DSCH MAC-d Flow Specific Information		*0..<maxnoofMACdFlows>*			–	
>HS-DSCH MAC-d Flow ID	M		9.2.1.31I		–	
>Allocation/Retention Priority	O		9.2.1.1A		–	
>Transport Bearer Request Indicator	M		9.2.1.62A		–	
>Binding ID	O		9.2.1.4	Shall be ignored if bearer establishment with ALCAP.	–	
>Transport Layer Address	O		9.2.1.63	Shall be ignored if bearer establishment with ALCAP.	–	
>Priority Queue Information		*0..<maxnoofPrioQueues>*			–	
>>Priority Queue ID	M		9.2.1.49C		–	
>>Scheduling Priority Indicator	O		9.2.1.53H		–	
>>T1	O		9.2.1.56a		–	
>>MAC-hs Window Size	O		9.2.1.38B		–	
>>MAC-hs Guaranteed Bit Rate	O		9.2.1.38Aa		–	
>>MAC-d PDU Size Index		*0..<maxnoofMACdPDUindexes>*			–	
>>>SID	M		9.2.1.53I		–	
>>>MAC-d PDU Size	O		9.2.1.38A		–	
MAC-hs Reordering Buffer Size	O		9.2.1.x		–	
CQI Feedback Cycle k	O		9.2.2.21B	For FDD only	–	
CQI Repetition Factor	O		9.2.2.4Cb	For FDD only	–	
ACK-NACK Repetition Factor	O		9.2.2.a	For FDD only	–	
CQI Power Offset	O		9.2.2.4Ca	For FDD only	–	
ACK Power Offset	O		9.2.2.b	For FDD only	–	
NACK Power Offset	O		9.2.2.23a	For FDD only	–	
HS-SCCH Power Offset	O		9.2.2.18I	For FDD only	–	
Measurement Power Offset	O		9.2.2.21C	For FDD only	–	
HS-SCCH Code Change Grant	O		9.2.1.31L		–	
TDD ACK NACK Power Offset	O		9.2.3.18F	For TDD only	–	

9.2.1.x MAC-hs Reordering Buffer Size

The *MAC-hs Reordering Buffer Size* IE indicates the total buffer size defined in UE capability minus the RLC AM buffer in kBytes

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
MAC-hs Reordering Buffer Size			INTEGER (1..300,…)	

9.2.2.18D HS-DSCH FDD Information

The HS-DSCH Information provides information for HS-DSCH MAC-d flows to be established.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
HS-DSCH MAC-d Flow Specific Information		*1..<maxnoofMACdFlows>*			–	
>HS-DSCH MAC-d Flow ID	M		9.2.1.31I		–	
>Allocation/Retention Priority	M		9.2.1.1A		–	
>Binding ID	O		9.2.1.4	Shall be ignored if bearer establishment with ALCAP.	–	
>Transport Layer Address	O		9.2.1.63	Shall be ignored if bearer establishment with ALCAP.	–	
>Priority Queue Information		*1..<maxnoofPrioQueues>*			–	
>>Priority Queue ID	M		9.2.1.49C		–	
>>Scheduling Priority Indicator	M		9.2.1.53H		–	
>>T1	M		9.2.1.56a		–	
>>MAC-hs Window Size	M		9.2.1.38B		–	
>>MAC-hs Guaranteed Bit Rate	O		9.2.1.38Aa		–	
>>MAC-d PDU Size Index		*1..<maxnoofMACdPDUIndexes>*			–	
>>>SID	M		9.2.1.53I		–	
>>>MAC-d PDU Size	M		9.2.1.38A		–	
UE Capabilities Information		*1*			–	
>HS-DSCH Physical Layer Category	M		9.2.1.31Ia		–	
>MAC-hs Reordering Buffer Size	M		9.2.1.x~~INTEGER (1..300,...)~~	~~The total buffer size defined in UE capability minus the RLC AM buffer.~~	–	
CQI Feedback Cycle k	M		9.2.2.21B		–	
CQI Repetition Factor	C-CQICyclek		9.2.2.4Cb		–	
ACK-NACK Repetition Factor	M		9.2.2.a		–	
CQI Power Offset	M		9.2.2.4Ca		–	
ACK Power Offset	M		9.2.2.b		–	
NACK Power Offset	M		9.2.2.23a		–	
HS-SCCH Power Offset	O		9.2.2.18I		–	
Measurement Power Offset	O		9.2.2.21C		–	

Condition	Explanation
CQICyclek	The IE shall be present if the *CQI Feedback Cycle k* IE is set to a value greater than 0.

Range Bound	Explanation
maxnoofMACdFlows	Maximum number of HS-DSCH MAC-d flows
maxnoofPrioQueues	Maximum number of Priority Queues
maxnoofMACdPDUindexes	Maximum number of different MAC-d PDU SIDs

9.2.3.5F HS-DSCH TDD Information

The HS-DSCH TDD Information provides information for HS-DSCH MAC-d flows to be established.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
HS-DSCH MAC-d Flow Specific Information		*1..<maxnoofMACdFlows>*			–	
>HS-DSCH MAC-d Flow ID	M		9.2.1.31I		–	
>Allocation/Retention Priority	M		9.2.1.1A		–	
>Binding ID	O		9.2.1.4	Shall be ignored if bearer establishment with ALCAP.	–	
>Transport Layer Address	O		9.2.1.63	Shall be ignored if bearer establishment with ALCAP.	–	
>Priority Queue Information	M	*1..<maxnoofPrioQueues>*			–	
>>Priority Queue ID	M		9.2.1.49C		–	
>>Scheduling Priority Indicator	M		9.2.1.53H		–	
>>T1	M		9.2.1.56a		–	
>>MAC-hs Window Size	M		9.2.1.38B		–	
>>MAC-hs Guaranteed Bit Rate	O		9.2.1.38Aa		–	
>>MAC-d PDU Size Index		*1..<maxnoofMACdPDUindexes>*			–	
>>>SID	M		9.2.1.53I		–	
>>>MAC-d PDU Size	M		9.2.1.38A		–	
UE Capabilities Information		*1*			–	-
>HS-DSCH Physical Layer Category	M		9.2.1.31Ia		–	
>MAC-hs Reordering Buffer Size	M		9.2.1.x~~INTEGER (1..300,...)~~	~~The total buffer size defined in UE capability minus the RLC AM buffer.~~	–	
TDD ACK NACK Power Offset	M		9.2.3.18F		–	

Range Bound	Explanation
maxnoofMACdFlows	Maximum number of HS-DSCH MAC-d flows
maxnoofPrioQueues	Maximum number of Priority Queues
maxnoofMACdPDUindexes	Maximum number of different MAC-d PDU SIDs

9.3.4 Information Elements Definitions

```
--**************************************************************************
--
-- Information Element Definitions
--
--**************************************************************************

/* partly omitted */

-- ==========================================
--  H
-- ==========================================


HARQ-MemoryPartitioning ::= CHOICE {
    implicit        HARQ-MemoryPartitioning-Implicit,
    explicit        HARQ-MemoryPartitioning-Explicit,
    ...
    }

HARQ-MemoryPartitioning-Implicit    ::= SEQUENCE {
    number-of-Processes         INTEGER (1..8,...),
    iE-Extensions               ProtocolExtensionContainer { { HARQ-MemoryPartitioning-Implicit-ExtIEs } }
    OPTIONAL,
    ...
}

HARQ-MemoryPartitioning-Implicit-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HARQ-MemoryPartitioning-Explicit    ::= SEQUENCE {
    hARQ-MemoryPartitioningList         HARQ-MemoryPartitioningList,
    iE-Extensions                       ProtocolExtensionContainer { { HARQ-MemoryPartitioning-Explicit-ExtIE
} }         OPTIONAL,
    ...
}

HARQ-MemoryPartitioning-Explicit-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HARQ-MemoryPartitioningList ::= SEQUENCE (SIZE (1..maxNrOfHARQProcesses)) OF HARQ-MemoryPartitioningItem

HARQ-MemoryPartitioningItem ::= SEQUENCE {
    process-Memory-Size                 ENUMERATED {
                                        hms800, hms1600, hms2400, hms3200, hms4000,
                                        hms4800, hms5600, hms6400, hms7200, hms8000,
                                        hms8800, hms9600, hms10400, hms11200, hms12000,
                                        hms12800, hms13600, hms14400, hms15200, hms16000,
                                        hms17600, hms19200, hms20800, hms22400, hms24000,
                                        hms25600, hms27200, hms28800, hms30400, hms32000,
                                        hms36000, hms40000, hms44000, hms48000, hms52000,
                                        hms56000, hms60000, hms64000, hms68000, hms72000,
                                        hms76000, hms80000, hms88000, hms96000, hms104000,
                                        hms112000, hms120000, hms128000, hms136000, hms144000,
                                        hms152000, hms160000, hms176000, hms192000, hms208000,
                                        hms224000, hms240000, hms256000, hms272000, hms288000,
                                        hms304000,...},
    iE-Extensions                       ProtocolExtensionContainer { { HARQ-MemoryPartitioningItem-ExtIEs } }
        OPTIONAL,
    ...
}

HARQ-MemoryPartitioningItem-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HS-DSCHProvidedBitRate ::= SEQUENCE (SIZE (1..16)) OF HS-DSCHProvidedBitRate-Item

HS-DSCHProvidedBitRate-Item ::= SEQUENCE {
    schedulingPriorityIndicator         SchedulingPriorityIndicator,
    hS-DSCHProvidedBitRateValue         HS-DSCHProvidedBitRateValue,
    iE-Extensions                       ProtocolExtensionContainer { { HS-DSCHProvidedBitRate-Item-ExtIEs} }
    ...
}
```

```
HS-DSCHProvidedBitRate-Item-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HS-DSCHProvidedBitRateValue ::= INTEGER(0..16777215,...)
-- Unit bit/s, Range 0..2^24-1, Step 1 bit


HS-DSCHRequiredPower ::= SEQUENCE (SIZE (1..16)) OF HS-DSCHRequiredPower-Item

HS-DSCHRequiredPower-Item ::= SEQUENCE {
    schedulingPriorityIndicator             SchedulingPriorityIndicator,
    hS-DSCHRequiredPowerValue               HS-DSCHRequiredPowerValue,
    hS-DSCHRequiredPowerPerUEInformation    HS-DSCHRequiredPowerPerUEInformation,
    iE-Extensions                           ProtocolExtensionContainer { { HS-DSCHRequiredPower-Item-ExtIEs}
    ...
}

HS-DSCHRequiredPower-Item-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HS-DSCHRequiredPowerValue ::= INTEGER(0..1000)
-- Unit %, Range 0 ..1000, Step 0.1%

HS-DSCHRequiredPowerPerUEInformation ::= SEQUENCE (SIZE (1.. maxNrOfContextsOnUeList)) OF HS-
DSCHRequiredPowerPerUEInformation-Item


HS-DSCHRequiredPowerPerUEInformation-Item ::= SEQUENCE {
    cRNC-CommunicationContextID             CRNC-CommunicationContextID,
    hS-DSCHRequiredPowerPerUEWeight         HS-DSCHRequiredPowerPerUEWeight     OPTIONAL,
    iE-Extensions                           ProtocolExtensionContainer { { HS-
DSCHRequiredPowerPerUEInformation-Item-ExtIEs} }        OPTIONAL,
    ...
}

HS-DSCHRequiredPowerPerUEInformation-Item-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HS-DSCHRequiredPowerPerUEWeight ::= INTEGER(0..100)
-- Unit %, Range 0 ..100, Step 1%


HSDSCH-FDD-Information ::= SEQUENCE {
    hsDSCH-MACdFlow-Specific-Info       HSDSCH-MACdFlow-Specific-InfoList,
    ueCapability-Info                   UE-Capability-Information,
    cqiFeedback-CycleK                  CQI-Feedback-Cycle,
    cqiRepetitionFactor                 CQI-RepetitionFactor            OPTIONAL,
    -- This IE shall be present if the CQI Feedback Cycle k is greater than 0
    ackNackRepetitionFactor             AckNack-RepetitionFactor,
    cqiPowerOffset                      CQI-Power-Offset,
    ackPowerOffset                      Ack-Power-Offset,
    nackPowerOffset                     Nack-Power-Offset,
    hsscch-PowerOffset                  HSSCCH-PowerOffset              OPTIONAL,
    measurement-Power-Offset            Measurement-Power-Offset        OPTIONAL,
    iE-Extensions                       ProtocolExtensionContainer { { HSDSCH-FDD-Information-ExtIEs} }
    ...
}

HSDSCH-FDD-Information-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HSDSCH-TDD-Information ::= SEQUENCE {
    hsDSCH-MACdFlow-Specific-Info       HSDSCH-MACdFlow-Specific-InfoList,
    ueCapability-Info                   UE-Capability-Information,
    tDD-AckNack-Power-Offset            TDD-AckNack-Power-Offset,
    iE-Extensions                       ProtocolExtensionContainer { { HSDSCH-TDD-Information-ExtIEs} }
    ...
}

HSDSCH-TDD-Information-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
HSDSCH-MACdFlow-Specific-InfoList ::= SEQUENCE (SIZE (1..maxNrOfMACdFlows)) OF HSDSCH-MACdFlow-Specific-
InfoItem

HSDSCH-MACdFlow-Specific-InfoItem ::= SEQUENCE {
    hsDSCH-MACdFlow-ID                  HSDSCH-MACdFlow-ID,
    allocationRetentionPriority         AllocationRetentionPriority,
    bindingID                           BindingID                   OPTIONAL,
    transportLayerAddress               TransportLayerAddress       OPTIONAL,
    priorityQueueInfo                   PriorityQueue-InfoList,
    iE-Extensions                       ProtocolExtensionContainer { { HSDSCH-MACdFlow-Specific-InfoItem-
ExtIEs} }       OPTIONAL,
    ...
}

HSDSCH-MACdFlow-Specific-InfoItem-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

HSDSCH-Information-to-Modify ::= SEQUENCE {
    hsDSCH-MACdFlow-Specific-Info-to-Modify         HSDSCH-MACdFlow-Specific-InfoList-to-Modify
    mAChs-Reordering-Buffer-Size                    MAChsReorderingBufferSize       OPTIONAL,
    cqiFeedback-CycleK                              CQI-Feedback-Cycle              OPTIONAL,   -- For FDD
only
    cqiRepetitionFactor                             CQI-RepetitionFactor            OPTIONAL,   -- For FDD
only
    ackNackRepetitionFactor                         AckNack-RepetitionFactor        OPTIONAL,   -- For FDD
only
    cqiPowerOffset                                  CQI-Power-Offset                OPTIONAL,   -- For FDD
only
    ackPowerOffset                                  Ack-Power-Offset                OPTIONAL,   -- For FDD
only
    nackPowerOffset                                 Nack-Power-Offset               OPTIONAL,   -- For FDD
only
    hsscch-PowerOffset                              HSSCCH-PowerOffset              OPTIONAL,   -- only for
FDD
    measurement-Power-Offset                        Measurement-Power-Offset        OPTIONAL,   -- For FDD
only
    hSSCCHCodeChangeGrant                           HSSCCH-Code-Change-Grant        OPTIONAL,
    tDDAckNackPowerOffset                           TDD-AckNack-Power-Offset        OPTIONAL,   -- For TDD
only
    iE-Extensions                                   ProtocolExtensionContainer { { HSDSCH-Information-to-
Modify-ExtIEs} }        OPTIONAL,
    ...
}

HSDSCH-Information-to-Modify-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

/* partly omitted */

-- ==========================================
--  M
-- ==========================================

MACdPDU-Size ::= INTEGER (1..5000,...)

MACdPDU-Size-Indexlist ::= SEQUENCE (SIZE (1..maxNrOfMACdPDUIndexes)) OF MACdPDU-Size-IndexItem

MACdPDU-Size-IndexItem ::= SEQUENCE {
    sID                                 INTEGER (0..7),
    macdPDU-Size                        MACdPDU-Size,
    iE-Extensions                       ProtocolExtensionContainer { { MACdPDU-Size-IndexItem-ExtIEs} }
    ...
}

MACdPDU-Size-IndexItem-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

MACdPDU-Size-Indexlist-to-Modify ::= SEQUENCE (SIZE (1..maxNrOfMACdPDUIndexes)) OF MACdPDU-Size-IndexItem-to-
Modify

MACdPDU-Size-IndexItem-to-Modify ::= SEQUENCE {
    sID                                 INTEGER (0..7),
    macdPDU-Size                        MACdPDU-Size
    iE-Extensions                       ProtocolExtensionContainer { { MACdPDU-Size-IndexItem-to-Modify-
ExtIEs} }       OPTIONAL,
```

```
    ...
}

MACdPDU-Size-IndexItem-to-Modify-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

MAChsGuaranteedBitRate ::= INTEGER (0..16777215,...)

MAChsReorderingBufferSize ::= INTEGER (1..300,...)
-- Unit kBytes

MAC-hsWindowSize        ::= ENUMERATED {v4, v6, v8, v12, v16, v24, v32,...}

MaximumDL-PowerCapability ::=  INTEGER(0..500)
-- Unit dBm, Range 0dBm .. 50dBm, Step +0.1dB

/* partly omitted */

-- ==========================================
--  U
-- ==========================================

UARFCN ::= INTEGER (0..16383, ...)
-- corresponds to 1885.2MHz .. 2024.8MHz

UC-Id ::= SEQUENCE {
    rNC-ID              RNC-ID,
    c-ID                C-ID,
    iE-Extensions           ProtocolExtensionContainer { {UC-Id-ExtIEs} } OPTIONAL,
    ...
}
UC-Id-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

UDRE ::= ENUMERATED {
    udre-minusequal-one-m,
    udre-betweenoneandfour-m,
    udre-betweenfourandeight-m,
    udre-greaterequaleight-m
}


UE-Capability-Information ::= SEQUENCE {
    hSDSCH-Physical-Layer-Category          INTEGER (1..64,...),
    mAChs-Reordering-Buffer-Size            MAChsReorderingBufferSizeINTEGER (1..300,...),
    iE-Extensions                       ProtocolExtensionContainer { { UE-Capability-Information-ExtIEs } }
        OPTIONAL,
    ...
}

UE-Capability-Information-ExtIEs NBAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-CapacityCredit ::= INTEGER (0..65535)

UL-DL-mode ::= ENUMERATED {
    ul-only,
    dl-only,
    both-ul-and-dl
}
```