

Source: SA5 (Telecom Management)
Title: 6 Rel-6 CR 32.403 Performance Management (PM); Performance measurements - UMTS and combined UMTS/GSM
Document for: Approval
Agenda Item: 7.5.3

Doc-1 st -Level	Doc-2 nd -Level	Spec	CR	Rev	Phase	Subject	Cat	Ver-Cur	Wi
SP-040574	S5-048739	32.403	040	--	Rel-6	Restructure clauses 5 and 6 to follow the style of other clauses related to UTRAN measurements for extensibility	D	6.4.0	OAM-PM
SP-040574	S5-048656	32.403	041	--	Rel-6	Add measurements about Mobility Management	B	6.4.0	OAM-PM
SP-040574	S5-048658	32.403	042	--	Rel-6	Add measurements about iPDP context activation procedures initiated by Network	B	6.4.0	OAM-PM
SP-040574	S5-048655	32.403	043	--	Rel-6	Add measurements about relocation	B	6.4.0	OAM-PM
SP-040574	S5-048740	32.403	044	--	Rel-6	Change of the measurements about iSRNS Relocation	C	6.4.0	OAM-PM
SP-040574	S5-048741	32.403	045	--	Rel-6	Split measurements about successful PDP context deactivation	C	6.4.0	OAM-PM

CHANGE REQUEST

⌘ **32.403 CR 040** ⌘ rev - ⌘ Current version: **6.4.0** ⌘

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:	⌘ Restructure clauses 5 and 6 to follow the style of other clauses related to UTRAN measurements for extensibility		
Source:	⌘ SA5 (llrui@bupt.edu.cn, liyewen@chinamobile.com)		
Work item code:	⌘ OAM-PM	Date:	⌘ 20/08/2004
Category:	⌘ D	Release:	⌘ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ In clause 5 and clause 6, most of the measured procedures have no measurements about failure. In the live network, the operators usually need measurements about failure to analyze the detailed failure reason. Currently, the structure of clause 5 and clause 6 is flat and it is not easy to introduce failure measurements and i(n-1) out of n" approach. In this CR, a new structure of clause 5 and clause 6 is proposed to allow extending and reusing the i(n-1) out of n" approach.
Summary of change:	⌘ Restructure clause 5 and clause 6 to follow the style of other clauses related to UTRAN measurements for extensibility.
Consequences if not approved:	⌘ The structure of clause 5 and clause 6 is flat and it is not easy to introduce failure measurements and i(n-1) out of n" approach.

Clauses affected:	⌘ 5, 6										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications Test specifications O&M Specifications	Y	N	⌘	X	⌘	X	⌘	X	⌘	
Y	N										
⌘	X										
⌘	X										
⌘	X										
Other comments:	⌘										

5 Measurements related to the SGSN

5.1 Mobility Management

5.1.1 GPRS attach procedures

5.1.1.1 Attempted GPRS attach procedures

- a) This measurement provides the number of attempted GPRS attach procedures initiated within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "ATTACH REQUEST" message from the MS, indicating a GPRS attach(TS 24.008; attach type = GPRS attach).
- d) A single integer value per measurement type defined in e).
- e) MM.AttGprsAttach:
 - MM.AttGprsAttach Combined (don't care);
 - MM.AttGprsAttach.G GSM;
 - MM.AttGprsAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.1.2 Successful GPRS attach procedures

- a) This measurement provides the number of successfully performed GPRS attach procedures within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "ATTACH ACCEPT" message to the MS, indicating a GPRS only attached (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccGprsAttach:
 - MM.SuccGprsAttach Combined (don't care);
 - MM.SuccGprsAttach.G GSM;
 - MM.SuccGprsAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.2 Intra-SGSN Routing Area update procedures

5.1.2.13 Attempted intra-SGSN Routing Area update procedures

- a) This measurement provides the number of attempted intra-SGSN Routing Area Update procedures initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "ROUTING AREA UPDATE REQUEST" message from the MS, where the old RA and the new RA are served by this SGSN (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttIntraSgsnRaUpdate:
 - MM.AttIntraSgsnRaUpdate Combined (don't care);
 - MM.AttIntraSgsnRaUpdate.G GSM;
 - MM.AttIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.2.24 Successful intra-SGSN Routing Area update procedures

- a) This measurement provides the number of successfully performed intra-SGSN Routing Area Update procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of "ROUTING AREA UPDATE ACCEPT" message to the MS (TS 24.008).
- d) A single integer value.
- e) MM.SuccIntraSgsnRaUpdate:
 - MM.SuccIntraSgsnRaUpdate Combined (don't care);
 - MM.SuccIntraSgsnRaUpdate.G GSM;
 - MM.SuccIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.3 GPRS detach procedures initiated by MS

5.1.3.15 Attempted GPRS detach procedures initiated by MS

- a) This measurement provides the number of MS initiated GPRS detach procedures within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.

- c) Receipt of a "DETACH REQUEST" message from the MS indicating a GPRS detach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttGprsDetachMs:
 - MM.AttGprsDetachMs Combined (don't care);
 - MM.AttGprsDetachMs.G GSM;
 - MM.AttGprsDetachMs.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.4 GPRS detach procedures initiated by SGSN

5.1.4.16 Attempted GPRS detach procedures initiated by SGSN

- a) This measurement provides the number of attempted GPRS detach procedures initiated by SGSN. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "DETACH REQUEST" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttGprsDetachSgsn:
 - MM.AttGprsDetachSgsn Combined (don't care);
 - MM.AttGprsDetachSgsn.G GSM;
 - MM.AttGprsDetachSgsn.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.4.2 Successful GPRS detach procedures initiated by SGSN

- a) This measurement provides the number of successfully completed GPRS detach procedures SGSN-initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "DETACH ACCEPT" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccGprsDetachSgsn:
 - MM.SuccGprsDetachSgsn Combined (don't care);
 - MM.SuccGprsDetachSgsn.G GSM;
 - MM.SuccGprsDetachSgsn.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.

[g\) Valid for packet switching.](#)

[GSM/UMTS.](#)

[5.1.5 Inter-SGSN Routing Area update procedures](#)

[5.1.5.17](#) Attempted inter-SGSN Routing Area update procedures

- a) This measurement provides the number of attempted inter-SGSN Routing Area Update procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "ROUTING AREA UPDATE REQUEST" message from the MS where the old RA is served by another SGSNs (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttInterSgsnRaUpdate:
 - MM.AttInterSgsnRaUpdate Combined (don't care);
 - MM.AttInterSgsnRaUpdate.G GSM;
 - MM.AttInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

[5.1.5.28](#) Successful inter-SGSN Routing Area update procedures

- a) This measurement provides the number of successfully completed inter-SGSN Routing Area Update procedures in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "ROUTING AREA UPDATE COMPLETE" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccInterSgsnRaUpdate:
 - MM.SuccInterSgsnRaUpdate Combined (don't care);
 - MM.SuccInterSgsnRaUpdate.G GSM;
 - MM.SuccInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.6 GPRS attach procedures with IMSI already attached

5.1.6.19 Attempted GPRS attach procedures with IMSI already attached

- a) This measurement provides the number of attempted GPRS attach procedures, while IMSI is already attached. We count the attempt initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "ATTACH REQUEST" Message from the MS, indicating GPRS attach while IMSI attached (TS 24.008; attach type = GPRS attach while IMSI attached).
- d) A single integer value per measurement type defined in e).
- e) MM.AttImsiAttach:
 - MM.AttImsiAttach Combined (don't care);
 - MM.AttImsiAttach.G GSM;
 - MM.AttImsiAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.6.240 Successful GPRS attach procedures with IMSI already attached

- a) This measurement provides the number of successfully performed GPRS attach procedures, while IMSI is already attached. We count the attempts initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "ATTACH ACCEPT" message to the MS, indicating a GPRS attach while IMSI attached, in response to a previously transmitted "ATTACH REQUEST" indicating a GPRS attach while IMSI attached (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccImsiAttach:
 - MM.SuccImsiAttach Combined (don't care);
 - MM.SuccImsiAttach.G GSM;
 - MM.SuccImsiAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.7 IMSI detach procedures initiated by MS

5.1.7.144 Attempted IMSI detach procedures initiated by MS

- a) This measurement provides the number of attempted IMSI detach procedures MS-initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Receipt of a "DETACH REQUEST" message from the MS, indicating a IMSI detach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttImsiDetachMs:
 - MM.AttImsiDetachMs Combined (don't care);
 - MM.AttImsiDetachMs.G GSM;
 - MM.AttImsiDetachMs.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.8 Combined GPRS/IMSI attach procedures

5.1.8.142 Attempted combined GPRS/IMSI attach procedures

- a) This measurement provides the number of attempts of combined GPRS/IMSI attach procedures initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "ATTACH REQUEST" message from the MS, indicating combined GPRS/IMSI attach (TS 24.008; attach type = Combined GPRS/IMSI attach).
- d) A single integer value per measurement type defined in e) .
- e) MM.AttCombiAttach:
 - MM.AttCombiAttach Combined (don't care);
 - MM.AttCombiAttach.G GSM;
 - MM.AttCombiAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.8.243 Successful combined GPRS/IMSI attach procedures

- a) This measurement provides the number of successfully completed combined GPRS/IMSI attach procedures initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "ATTACH ACCEPT" message to the MS, indicating combined GPRS/IMSI attach, in response to a "ATTACH REQUEST" indicating combined GPRS/IMSI attach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccCombiAttach:
 - MM.SuccCombiAttach Combined (don't care);

- MM.SuccCombiAttach.G GSM;
 - MM.SuccCombiAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.9 Combined GPRS/IMSI detach procedures initiated by MS

5.1.9.144 Attempted combined GPRS/IMSI detach procedures initiated by MS

- a) This measurement provides the number of attempted Combined GPRS/IMSI detach procedures MS-initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "DETACH REQUEST" message from the MS, indicating a Combined GPRS/IMSI detach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttCombiDetachMs:
- MM.AttCombiDetachMs Combined (don't care);
 - MM.AttCombiDetachMs.G GSM;
 - MM.AttCombiDetachMs.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.1.15 Successful GPRS detach procedures initiated by SGSN~~

- ~~a) This measurement provides the number of successfully completed GPRS detach procedures SGSN initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~e) Receipt of "DETACH ACCEPT" message from the MS (TS 24.008).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) MM.SuccGprsDetachSgsn:~~
- ~~— MM.SuccGprsDetachSgsn — Combined (don't care);~~
 - ~~— MM.SuccGprsDetachSgsn.G — GSM;~~
 - ~~— MM.SuccGprsDetachSgsn.U — UMTS.~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM/UMTS.~~

5.1.10 Combined RA/LA intra-SGSN Routing Area update procedures

5.1.10.16 Attempted combined RA/LA intra-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates (intra-SGSN) procedures initiated in this SGSN. These are counted as attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttCombiIntraSgsnRaUpdate:
 - MM.AttCombiIntraSgsnRaUpdate Combined (don't care);
 - MM.AttCombiIntraSgsnRaUpdate.G GSM;
 - MM.AttCombiIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.10.1 Successful combined RA/LA intra-SGSN Routing Area update procedures

- a) This measurement provides the number of success-fully performed combined RA/LA updates (intra-SGSN) procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccCombiIntraSgsnRaUpdate:
 - MM.SuccCombiIntraSgsnRaUpdate Combined (don't care);
 - MM.SuccCombiIntraSgsnRaUpdate.G GSM;
 - MM.SuccCombiIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.11 "Combined RA/LA with IMSI Attach" intra-SGSN Routing Area update procedures

5.1.11.17 Attempted "combined RA/LA with IMSI Attach" intra-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates with IMSI attach (intra-SGSN) procedures initiated in this SGSN. These are counted as attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update with IMSI attach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttImsiCombiIntraSgsnRAUpdate:
 - MM.AttImsiCombiIntraSgsnRAUpdate Combined (don't care);
 - MM.AttImsiCombiIntraSgsnRAUpdate.G GSM;
 - MM.AttImsiCombiIntraSgsnRAUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.1.18 Successful combined RA/LA intra-SGSN Routing Area update procedures~~

- ~~a) This measurement provides the number of success fully performed combined RA/LA updates (intra-SGSN) procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~c) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) MM.SuccCombiIntraSgsnRaUpdate:
 - ~~— MM.SuccCombiIntraSgsnRaUpdate — Combined (don't care);~~
 - ~~— MM.SuccCombiIntraSgsnRaUpdate.G — GSM;~~
 - ~~— MM.SuccCombiIntraSgsnRaUpdate.U — UMTS.~~~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM/UMTS.~~

5.1.12 Combined RA/LA inter-SGSN Routing Area update procedures

5.1.12.19 Attempted combined RA/LA inter-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates (inter-SGSN) procedures initiated in this SGSN. These are counted as attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttCombiInterSgsnRaUpdate:
 - MM.AttCombiInterSgsnRaUpdate Combined (don't care);
 - MM.AttCombiInterSgsnRaUpdate.G GSM;
 - MM.AttCombiInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.12.2 Successful combined RA/LA inter-SGSN Routing Area update procedures

- a) This measurement provides the number of success-fully performed combined RA/LA updates (inter-SGSN) procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccCombiInterSgsnRaUpdate:
 - MM.SuccCombiInterSgsnRaUpdate Combined (don't care);
 - MM.SuccCombiInterSgsnRaUpdate.G GSM;
 - MM.SuccCombiInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.13 "Combined RA/LA with IMSI Attach" inter-SGSN Routing Area update procedures

5.1.13.120 Attempted "combined RA/LA with IMSI Attach" inter-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates with IMSI attach (inter-SGSN) procedures initiated in this SGSN. These are counted as attempts:
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update with IMSI attach.E52.
- d) A single integer value per measurement type defined in e).
- e) MM.AttImsiCombiInterSgsnRAUpdate:
 - MM.AttImsiCombiInterSgsnRAUpdate Combined (don't care);
 - MM.AttImsiCombiInterSgsnRAUpdate.G GSM;
 - MM.AttImsiCombiInterSgsnRAUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.1.21 Successful combined RA/LA inter-SGSN Routing Area update procedures~~

- ~~a) This measurement provides the number of success fully performed combined RA/LA updates (inter-SGSN) procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~c) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) MM.SuccCombiInterSgsnRaUpdate:
 - ~~— MM.SuccCombiInterSgsnRaUpdate — Combined (don't care);~~
 - ~~— MM.SuccCombiInterSgsnRaUpdate.G — GSM;~~
 - ~~— MM.SuccCombiInterSgsnRaUpdate.U — UMTS.~~~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM/UMTS.~~

5.1.1422 Number of received invalid P-TMSI's during detach

- a) This measurement provides the number of received invalid P-TMSI's during detach.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.

- c) Receipt of an "DETACH_REQUEST" with invalid P-TMSI (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.NbrPTMSIDetachFail:
 - MM.NbrPTMSIDetachFail Combined (don't care);
 - MM.NbrPTMSIDetachFail.G GSM;
 - MM.NbrPTMSIDetachFail.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.15 GSM PS paging procedures

5.1.15.1~~23~~ Attempted GSM PS paging procedures

- a) This measurement provides the total number of PS paging procedures that are initiated at the SGSN, over the Gb interface.
- b) CC.
- c) Incremented when a GSM paging procedure is started, i.e. at the transmission of the first BSSGP Paging Request (GSM 08.18) from the SGSN to the MS.
- d) A single integer value.
- e) MM.AttPsPagingProcGb.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM.

5.1.15.2 Successful GSM PS paging procedures

- a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Gb interface.
- b) CC.
- c) when an uplink trigger (any LLC frame) is received by the SGSN from the MS (over the Gb interface) as response to a GSM paging PS procedure (TS 23.060) or during intersystem change UMTS -> GSM.
- d) A single integer value.
- e) MM.SuccPsPagingProcGb.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM.

5.1.16 UMTS PS paging procedures

5.1.16.124 Attempted UMTS PS paging procedures

- a) This measurement provides the total number of PS paging procedures that are initiated at the SGSN, over the Iu interface.
- b) CC.
- c) Incremented when a UMTS paging procedure is started i.e. at the transmission of the first "Paging" message (TS 25.413 [5]) from the SGSN to the MS.
- d) A single integer value.
- e) MM.AttPsPagingProcIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) UMTS.

5.1.16.2 Successful UMTS PS paging procedures

- a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Iu interface.
- b) CC.
- c) When a paging response is received by the SGSN from the MS (over the Iu interface) as response to a UMTS paging PS procedure (Receipt of "Service Request" message (with Service Type = Paging Response) to the MS (TS 24.008)) or during intersystem change GSM -> UMTS.
- d) A single integer value.
- e) MM.SuccPsPagingProcIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) UMTS.

5.1.17 PS paging procedures with unknown access type

5.1.17.125 Attempted PS paging procedures with unknown access type

- a) This measurement provides the total number of PS paging procedures that are initiated at the SGSN, with access type unknown. In this case the paging will be done both over the Gb and the Iu interface.
- b) CC.
- c) Incremented when a paging procedure is started for which MM doesn't know the access type i.e. at the transmission of the first BSSGP Paging Request (GSM 08.18) and/or "Paging" message (TS 25.413 [5]) from the SGSN to the MS.
- d) A single integer value.
- e) MM.AttPsPagingProcGbIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.

h) Combined.

5.1.1826 Number of PS paging message sends from 2G-SGSN to the MS

- a) This measurement provides the Number of PS paging message sends from 2G-SGSN to the MS.
- b) CC.
- c) Transmission of "GMM-PAGING.req" (GSM 08.18) from the SGSN to the MS. Each paging message will be counted separately, addressed to all BSS in this certain RA.
- d) A single integer value.
- e) MM.NbrPsPagingMesGb.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM.

5.1.1927 Number of PS paging message sends from 3G-SGSN to the MS

- a) This measurement provides the Number of PS paging message sends from 3G-SGSN to the MS.
- b) CC.
- c) Transmission of "Paging" message (CN Domain Indicator = PS Domain) from the SGSN to the MS (TS 25.413 [5]). Each paging message will be counted separately, addressed to all RNC in this certain RA.
- d) A single integer value.
- e) MM.NbrPsPagingMesIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) UMTS.

~~5.1.28 Successful GSM PS paging procedures~~

- ~~a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Gb interface.~~
- ~~b) CC.~~
- ~~c) when an uplink trigger (any LLC frame) is received by the SGSN from the MS (over the Gb interface) as response to a GSM paging PS procedure (TS 23.060) or during intersystem change UMTS → GSM.~~
- ~~d) A single integer value.~~
- ~~e) MM.SuccPsPagingProcGb.~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM.~~

~~5.1.29 Successful UMTS PS paging procedures~~

- ~~a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Iu interface.~~

~~b) CC.~~

~~e) When a paging response is received by the SGSN from the MS (over the Iu interface) as response to a UMTS paging PS procedure (Receipt of "Service Request" message (with Service Type = Paging Response) to the MS (TS 24.008)) or during intersystem change GSM → UMTS.~~

~~d) A single integer value.~~

~~e) MM.SuccPsPagingProcIu.~~

~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~

~~g) Valid for packet switching.~~

~~h) UMTS.~~

5.1.320 Number of subscribers in PMM-IDLE state

a) Number of subscribers in PMM-IDLE state.

b) GAUGE.

c) Incremented at PS Signalling Connection Release (Iu Release), decremented at PS Detach or PS Signalling Connection Establish (Service Request).

d) A single integer value.

e) MM.NbrSubPmmIdle.

f) SgsnFunction.

g) Valid for packet switching.

h) UMTS.

5.1.321 Number of subscribers in PMM-CONNECTED state

a) Number of subscribers in PMM-CONNECTED state.

b) GAUGE.

c) Decrement at PS Signalling Connection Release (Iu Release), Detach, PS Attach Reject or RAU Reject, incremented at PS Attach or PS Signalling Connection Establish (Service Request).

d) A single integer value.

e) MM.NbrSubPmmConnected

f) SgsnFunction.

g) Valid for packet switching.

h) UMTS.

5.1.322 Number of attached subscribers

a) This measurement provides the number of attached subscribers within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".

b) GAUGE.

c) Incremented when a subscriber enters the GMM_REGISTERED state in the SGSN Location Register, and decremented when a subscriber leaves the GMM_REGISTERED state.

Note: the GMM state machine in the SGSN Location Register is described in 3GPP TS 24.008 [15], subclause

4.1.3.3 (Figure 4.1c/3GPP TS 24.008: GMM main states on the network side). A single integer value per measurement type defined in e).

- e) MM.NbrActAttachedSub:
 - MM.NbrActAttachedSub Combined (don't care);
 - MM.NbrActAttachedSub.G GSM;
 - MM.NbrActAttachedSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.323 Number of home subscribers

- a) This measurement provides the number of GPRS home subscribers located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or GMM_DEREGISTERED. Only GPRS subscribers that are homed in the same GPRS network are considered. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) Incremented by one when GPRS home subscriber is successfully registered in the SGSN location register and decremented by one when GPRS home subscriber is successfully deregistered out of the SGSN location register (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.NbrHomeSub:
 - MM.NbrHomeSub Combined (don't care);
 - MM.NbrHomeSub.G GSM;
 - MM.NbrHomeSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.324 Number of visiting national subscribers

- a) This measurement provides the number of visiting national GPRS subscribers located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or GMM_DEREGISTERED. Only GPRS subscribers that are homed in a partner GPRS network of the same country are considered. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) This measurement provides the number of visiting national GPRS subscribers located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or GMM_DEREGISTERED. Only GPRS subscribers that are homed in a partner GPRS network of the same country are considered.
- d) A single integer value per measurement type defined in e).
- e) MM.NbrVisitingNatSub:
 - MM.NbrVisitingNatSub Combined (don't care);
 - MM.NbrVisitingNatSub.G GSM;

- MM.NbrVisitingNatSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.325 Number of visiting foreign subscribers

- a) This measurement provides the number of visiting foreign GPRS located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or MM_DEREGISTERED. Only GPRS subscribers that are homed in a GPRS network of a foreign country are considered. The three measurement types defined in e) are subject to the "2 out of 3 approach"..
- b) GAUGE.
- c) Incremented by one when GPRS subscriber is successfully registered in the SGSN location registered and decremented by one when GPRS subscriber is successfully deregistered out of the SGSN location register (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.NbrVisitingForeign:
 - MM.NbrVisitingForeign Combined (don't care);
 - MM.NbrVisitingForeign.G GSM;
 - MM.NbrVisitingForeign.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.326 Mean number of attached subscribers

- a) This measurement provides the arithmetic mean number of the number of attached subscribers within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of subscribers which are attached and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrAttachedSub:
 - MM.MeanNbrAttachedSub Combined (don't care);
 - MM.MeanNbrAttachedSub.G GSM;
 - MM.MeanNbrAttachedSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.327 Mean Number of home subscribers

- a) This measurement provides the arithmetic mean number of GPRS home subscribers located in the SGSN location register.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of GPRS home subscribers located in the SGSN location register and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrHomeSub:
 - MM.MeanNbrHomeSub Combined (don't care);
 - MM.MeanNbrHomeSub.G GSM;
 - MM.MeanNbrHomeSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.328 Mean Number of visiting national subscribers

- a) This measurement provides the arithmetic mean number of visiting national GPRS subscribers located in the SGSN location register.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of visiting national GPRS subscribers located in the SGSN location register and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrVisitingNatSub:
 - MM.MeanNbrVisitingNatSub Combined (don't care);
 - MM.MeanNbrVisitingNatSub.G GSM;
 - MM.MeanNbrVisitingNatSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.329 Mean Number of visiting foreign subscribers

- a) This measurement provides the arithmetic mean number of visiting foreign GPRS located in the SGSN location register.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of visiting foreign GPRS subscribers located in the SGSN location register and then taking the arithmetic mean.

- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrVisitingForeign:
 - MM.MeanNbrVisitingForeign Combined (don't care);
 - MM.MeanNbrVisitingForeign.G GSM;
 - MM.MeanNbrVisitingForeign.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.430 Number of CAMEL subscribers

- a) This measurement provides the number of attached subscriber within this SGSN area with CAMEL service
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) Incremented when a CAMEL subscriber enters the GMM_REGISTERED state in the SGSN Location Register, and decremented when a subscriber leaves the GMM_REGISTERED state.
Note: the GMM state machine in the SGSN Location Register is described in 3GPP TS 24.008 [15], subclause 4.1.3.3 (Figure 4.1c/3GPP TS 24.008: GMM main states on the network side).
- d) A single integer value per measurement type defined in e).
- e) MM.NbrCamelSub:
 - MM.NbrCamelSub Combined (don't care);
 - MM.NbrCamelSub.G GSM;
 - MM.NbrCamelSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.431 Mean Number of CAMEL subscribers

- a) This measurement provides the arithmetic mean number value of attached subscribers with CAMEL service
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of subscribers which are attached using CAMEL service and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrCamelSub:
 - MM.MeanNbrCamelSub Combined (don't care);
 - MM.MeanNbrCamelSub.G GSM;
 - MM.MeanNbrCamelSub.U UMTS.
- f) SgsnFunction.

- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.32 InsertSubscriberData requests received from a HLR during GPRS Update Location procedure

5.1.432.1 Attempted InsertSubscriberData requests received from a HLR during GPRS Update Location procedure

- a) This measurement provides the number of InsertSubscriberData requests received from a HLR during GPRS Update Location procedure.
- b) CC.
- c) Receipt of a "MAP-INSERT-SUBSCRIBER-DATA" service request (TS 29.002) during a GPRS Update Location procedure.
- d) A single integer value.
- e) MM.AttInsertSubscrDataHlrUpdLoc.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.33 Attempted GPRS Update Locations sent to the HLR

5.1.433.1 Attempted GPRS Update Locations sent to the HLR

- a) This measurement provides the number of GPRS Update Locations sent to the HLR.
- b) CC.
- c) Transmission of a 'MAP_UPDATE_LOCATION' service request (TS 29.002).
- d) A single integer value.
- e) MM.AttUpdateGprsLocationHlr.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.33.244 Successful GPRS Update Locations sent to the HLR

- a) This measurement provides the number of successful GPRS Update Locations returned from the HLR.
- b) CC.
- c) Transmission of a 'MAP_UPDATE_LOCATION' service request (TS 29.002).
- d) A single integer value.
- e) MM.SuccUpdateGprsLocationHlr.
- f) SgsnFunction.
- g) Valid for packet switching.

h) Combined.

5.1.34 CancellLocation requests received from an HLR-operator, in case of a HLR-initiated Detach

5.1.34.15 Attempted CancellLocation requests received from an HLR-operator, in case of a HLR-initiated Detach

- a) This measurement provides the number of CancellLocation requests received from an HLR-operator, in case of a HLR-initiated Detach.
- b) CC.
- c) Receipt of a 'MAP_CANCEL_LOCATION' service request (TS 29.002).
- d) A single integer value.
- e) MM.AttCancelLocHlrOp.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.35 CancellLocation requests received from a HLR due to a SGSN-change (previous SGSN)

5.1.35.146 Attempted CancellLocation requests received from a HLR due to a SGSN-change (previous SGSN)

- a) This measurement provides the number of CancellLocation requests received from a HLR due to a SGSN-change(previous SGSN).
- b) CC.
- c) Receipt of a 'MAP_CANCEL_LOCATION' service request (TS 29.002) due to a SGSN-change (previous SGSN).
- d) A single integer value.
- e) MM.AttCancelLocHlrSgsnChg.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.36 Reset requests received from a HLR due to an HLR restart, indicating that a failure occurred

5.1.36.147 Attempted Reset requests received from a HLR due to an HLR restart, indicating that a failure occurred

- a) This measurement provides the number of Reset requests received from a HLR due to an HLR restart, indicating that a failure occurred.
- b) CC.

- c) Receipt of a 'MAP_RESET' service request (TS 29.002) from a HLR.
- d) A single integer value.
- e) MM.AttResetHlr.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.3748 Failed GPRS Attach Procedure

- a) This measurement provides the number of GPRS attach procedures failures. The measurement is split into subcounters per the failure cause. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC
- c) On transmission by the SGSN of the GPRS ATTACH REJECT message to the MS, as defined in TS 23.060 [17], indicating an attach failure, the relevant measurement is incremented according to the cause. Possible causes are included in TS 24.008 [15]. The sum of all supported per cause measurements shall be equal to the total number of GPRS attach failures. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.
- d) A single integer value per measurement type as defined in e). The number of measurements is equal to the number of implemented per cause measurements plus a possible sum value identified by the *.sum* suffix
- e) MM. FailedGprsAttach.*Cause*

MM. FailedGprsAttach. <i>Cause</i>	Combined (don't care)
MM. FailedGprsAttach. <i>Cause.G</i>	GSM
MM. FailedGprsAttach. <i>Cause.U</i>	UMTS

where *Cause* identifies the failure cause
- f) Sgsn function
- g) Valid for packet switching
- h) GSM/UMTS

5.2 Subscriber Management

5.2.1 Insert Subscriber Data requests received from a HLR due to an HLR-operator intervention

5.2.1.1 Attempted Insert Subscriber Data requests received from a HLR due to an HLR-operator intervention

- a) This measurement provides the number of Insert Subscriber Data requests received from a HLR due to an HLR-operator intervention. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "MAP-INSERT-SUBSCRIBER-DATA" service request (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SUB.AttInsertSubscrDataHlrOp:

- SUB.AttInsertSubscrDataHlrOp Combined (don't care);
 - SUB.AttInsertSubscrDataHlrOp.G GSM;
 - SUB.AttInsertSubscrDataHlrOp.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.2.2 Delete Subscriber Data requests received from a HLR due to an HLR-operator intervention

5.2.2.1 Attempted Delete Subscriber Data requests received from a HLR due to an HLR-operator intervention

- a) This measurement provides the number of Delete Subscriber Data requests received from a HLR due to an HLR-operator intervention.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "MAP_DELETE_SUBSCRIBER_DATA" service request (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SUB.AttDeleteSubscrDataHlrOp:
- SUB.AttDeleteSubscrDataHlrOp Combined (don't care);
 - SUB.AttDeleteSubscrDataHlrOp.G GSM;
 - SUB.AttDeleteSubscrDataHlrOp.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.3 SRNS Relocation

5.3.1 Intra/inter 3G-SGSN SRNS Relocation

5.3.1.1 Attempted intra/inter 3G-SGSN SRNS Relocation

- a) This measurement provides the number of attempts intra/inter 3G-SGSN SRNS Relocation.
- b) CC.
- c) Receipt of "Relocation Required" message (TS 25.413 [5]) from SRNC.
- d) A single integer value.
- e) RELOC.AttSGSN.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.2 Intra 3G-SGSN SRNS Relocation

5.3.2.1 Successful intra 3G-SGSN SRNS Relocation

- a) This measurement provides the number of successful intra 3G-SGSN SRNS Relocation.
- b) CC.
- c) Receipt of "Relocation Complete" message (TS 25.413 [5]) from TRNC.
- d) A single integer value.
- e) RELOC.SuccIntraSGSN.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.2.23 Failed intra 3G-SGSN SRNS Relocation, due to internal reasons

- a) This measurement provides the number of failed intra 3G-SGSN SRNS Relocation, due to internal reasons.
- b) CC.
- c) Intra 3G-SGSN SRNS Relocation fails due to reasons located inside this SGSN:- internal resource problem-recovery- ...
- d) A single integer value.
- e) RELOC.FailIntraSGSNInt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.2.34 Failed intra 3G-SGSN SRNS Relocation, due to external reasons

- a) This measurement provides the number of failed intra 3G-SGSN SRNS Relocation, due to external reasons.
- b) CC.
- c) Intra 3G-SGSN SRNS Relocation fails due to reasons located in NE outside this SGSN:- "Relocation Preparation Failure" (TS 25.413 [5]) is sent to the SRNC- "Relocation Failure" (TS 25.413 [5]) is received from the TRNC- "Relocation Cancel" (TS 25.413 [5]) is received from the SRNC- missing expected message from RNC (timer expiry)- ...
- d) A single integer value.
- e) RELOC.FailIntraSGSNext.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.3 Inter 3G-SGSN SRNS Relocation

5.3.3.15 Attempted inter 3G-SGSN SRNS Relocation

- a) This measurement provides the number of attempts inter 3G-SGSN SRNS Relocation.
- b) CC.
- c) Receipt of "Relocation Required" message (TS 25.413 [5]) from SRNC, where the Target ID indicates Inter SGSN SRNS Relocation.
- d) A single integer value.
- e) RELOC.AttInterSGSN.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.3.26 Successful inter 3G-SGSN SRNS Relocation, counted in the old 3G-SGSN

- a) This measurement provides the number of successful Inter 3G-SGSN SRNS Relocation, counted in the old 3G-SGSN.
- b) CC.
- c) Receipt of "Forward Relocation Complete" message (TS 29.060) from the new SGSN.
- d) A single integer value.
- e) RELOC.SuccInterSGSN.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.3.37 Failed inter 3G-SGSN SRNS Relocation, due to internal reasons

- a) This measurement provides the number of failed Inter 3G-SGSN SRNS Relocation, due to internal reasons.
- b) CC.
- c) Inter 3G-SGSN SRNS Relocation fails due to reasons located inside this SGSN:- internal resource problem-recovery- ...
- d) A single integer value.
- e) RELOC.FailInterSGSNInt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.3.48 Failed inter 3G-SGSN SRNS Relocation, due to external reasons

- a) This measurement provides the number of unsuccessful Inter 3G-SGSN SRNS Relocation, due to external reasons.
- b) CC.

- c) Inter 3G-SGSN SRNS Relocation fails due to reasons located in NE outside this SGSN:- the Cause in "Forward Relocation Response" (TS 29.060) from the new 3G-SGSN is not "Request Accepted"- "Relocation Preparation Failure" (TS 25.413 [5]) is sent to the SRNC- "Relocation Failure" (TS 25.413 [5]) is received from the TRNC- "Relocation Cancel" (TS 25.413 [5]) is received from the SRNC- missing expected message from RNC or new 3G-SGSN (timer expiry)- ...
- d) A single integer value.
- e) RELOC.FailInterSGSNext.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.4 Inter 3G-SGSN SRNS Relocation, counted in the new 3G-SGSN

5.3.4.19 Attempted inter 3G-SGSN SRNS Relocation, counted in the new 3G-SGSN

- a) This measurement provides the number of attempts inter 3G-SGSN SRNS Relocation, counted in the new 3G-SGSN.
- b) CC.
- c) Receipt of "Forward Relocation Request" message (TS 29.060) from the old SGSN.
- d) A single integer value.
- e) RELOC.AttInterSGSNNew.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.4.240 Successful Inter 3G-SGSN SRNS Relocation, counted in the new 3G-SGSN

- a) This measurement provides the number of successful Inter 3G-SGSN SRNS Relocation, counted in the new 3G-SGSN.
- b) CC.
- c) Transmission of "Forward Relocation Complete" message (TS 29.060) to the old SGSN.
- d) A single integer value.
- e) RELOC.SuccInterSGSNNew.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.4 Security

5.4.1 P-TMSI reallocation procedures

5.4.1.1 Attempted P-TMSI reallocation procedures

- a) This measurement provides the number of attempted P-TMSI reallocation, or implicitly as part of the Location Updating, procedures in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of "P-TMSI REALLOCATION COMMAND" message by the SGSN (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttPTMSIRealloc:
 - SEC.AttPTMSIRealloc Combined (don't care);
 - SEC.AttPTMSIRealloc.G GSM;
 - SEC.AttPTMSIRealloc.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.1.2 Successful P-TMSI reallocation procedures

- a) This measurement provides the number of successfully performed P-TMSI reallocation procedures in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "P-TMSI REALLOCATION COMPLETE" message by the SGSN (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccPTMSIRealloc:
 - SEC.SuccPTMSIRealloc Combined (don't care);
 - SEC.SuccPTMSIRealloc.G GSM;
 - SEC.SuccPTMSIRealloc.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.2 Identity Request procedures initiated by this SGSN

5.4.2.1~~3~~ Attempted Identity Request procedures initiated by this SGSN

- a) This measurement provides the number of attempted Identity Request procedures initiated by this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Transmission of an "IDENTITY REQUEST" (with Identity Type = IMSI) message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttIdentityReqImsi:
 - SEC.AttIdentityReqImsi Combined (don't care);
 - SEC.AttIdentityReqImsi.G GSM;
 - SEC.AttIdentityReqImsi.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.2.24 Successful completed Identity Request procedures initiated by this SGSN

- a) This measurement provides the number of successfully completed Identity Request procedures initiated by this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "IDENTITY RESPONSE" message with IMSI by the SGSN from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccIdentityReqImsi:
 - SEC.SuccIdentityReqImsi Combined (don't care);
 - SEC.SuccIdentityReqImsi.G GSM;
 - SEC.SuccIdentityReqImsi.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.3 Identification information requests sent to a partner (previous) SGSN for subscribers registering afresh in this SGSN

5.4.3.15 Attempted identification information requests sent to a partner (previous) SGSN for subscribers registering afresh in this SGSN

- a) This measurement provides the number of identification information requests sent to a partner (previous) SGSN for subscribers registering afresh in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of the "Identification Request" message to the old SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttIdentityReqToPsgsn:
 - SEC.AttIdentityReqToPsgsn Combined (don't care);

- SEC.AttIdentityReqToPsgsn.G GSM;
 - SEC.AttIdentityReqToPsgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.3.26 Successful replied identification information requests that were sent to a partner (previous) SGSN

- a) This measurement provides the number of successfully replied identification information requests that were sent to a partner (previous) SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of the "Identification Response" message from the old SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccIdentityReqToPsgsn:
- SEC.SuccIdentityReqToPsgsn Combined (don't care);
 - SEC.SuccIdentityReqToPsgsn.G GSM;
 - SEC.SuccIdentityReqToPsgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.4 Attempted Identity Requests sent to the MS

5.4.4.17 Attempted Identity Requests sent to the MS

- a) This measurement provides the number of Identity Requests sent to the MS.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of an "IDENTITY REQUEST" message (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttIdentityRequest:
- SEC.AttIdentityRequest Combined (don't care);
 - SEC.AttIdentityRequest.G GSM;
 - SEC.AttIdentityRequest.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.4.28 Successful replied Identity Requests from the MS

- a) This measurement provides the number of successfully replied Identity Requests from the MS. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "IDENTITY RESPONSE" message (TS 24.008) from the MS.
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccIdentityRequest:
 - SEC.SuccIdentityRequest Combined (don't care);
 - SEC.SuccIdentityRequest.G GSM;
 - SEC.SuccIdentityRequest.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.5 Authentication procedures that are started within this SGSN area for a subscriber using a SIM

5.4.5.19 Attempted authentication procedures that are started within this SGSN area for a subscriber using a SIM

- a) This measurement provides the number of authentication procedures that are started within this SGSN area for a subscriber using a SIM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of an "AUTHENTICATION AND CIPHERING REQUEST" message to a MS using a SIM (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttAuthProcsSgsnSim:
 - SEC.AttAuthProcsSgsnSim Combined (don't care);
 - SEC.AttAuthProcsSgsnSim.G GSM;
 - SEC.AttAuthProcsSgsnSim.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.5.240 Successful authentication procedures within this SGSN area, for a subscriber using a SIM

- a) This measurement provides the number of successful authentication procedures within this SGSN area, for a subscriber using a SIM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.

- c) Receipt of an "AUTHENTICATION AND CIPHERING RESPONSE" message from the MS, using a SIM, where the receipt SRES parameter value matches the value stored in the SGSN (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccAuthProcsSgsnSim:
 - SEC.SuccAuthProcsSgsnSim Combined (don't care);
 - SEC.SuccAuthProcsSgsnSim.G GSM;
 - SEC.SuccAuthProcsSgsnSim.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.6 Authentication procedures that are started within this SGSN area for a subscriber using a USIM

5.4.6.144 Attempted authentication procedures that are started within this SGSN area for a subscriber using a USIM

- a) This measurement provides the number of authentication procedures that are started within this SGSN area for a subscriber using a USIM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of an "AUTHENTICATION AND CIPHERING REQUEST" message to a MS using a USIM (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttAuthProcsSgsnUsim:
 - SEC.AttAuthProcsSgsnUsim Combined (don't care);
 - SEC.AttAuthProcsSgsnUsim.G GSM;
 - SEC.AttAuthProcsSgsnUsim.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.6.242 Successful authentication procedures within this SGSN area, for a subscriber using a USIM

- a) This measurement provides the number of successful authentication procedures within this SGSN area, for a subscriber using a USIM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "AUTHENTICATION AND CIPHERING RESPONSE" message from the MS , using a USIM, where the receipt RES parameter value matches the value stored in the SGSN (TS 24.008).
- d) A single integer value per measurement type defined in e).

- e) SEC.SuccAuthProcsSgsnUsim:
 - SEC.SuccAuthProcsSgsnUsim Combined (don't care);
 - SEC.SuccAuthProcsSgsnUsim.G GSM;
 - SEC.SuccAuthProcsSgsnUsim.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.6.313 Received ciphering and Authentication failures within this SGSN area

- a) This measurement provides the number of ciphering and Authentication failures within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "AUTHENTICATION AND CIPHERING FAILURE" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SEC.RecPOAuthFailSgsn:
 - SEC.RecPOAuthFailSgsn Combined (don't care);
 - SEC.RecPOAuthFailSgsn.G GSM;
 - SEC.RecPOAuthFailSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.7 Identification information requests that were received from a partner (new) SGSN for subscribers de-registering from this SGSN

5.4.7.114 Attempted identification information requests that were received from a partner (new) SGSN for subscribers de-registering from this SGSN

- a) This measurement provides the number of identification information requests that were received from a partner (new) SGSN for subscribers de-registering from this SGSN. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of the "Identification Request" message from a partner (new) SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttIdentityReqFromPsgsn:
 - SEC.AttIdentityReqFromPsgsn Combined (don't care);
 - SEC.AttIdentityReqFromPsgsn.G GSM;
 - SEC.AttIdentityReqFromPsgsn.U UMTS.
- f) SgsnFunction.

- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.7.245 Successfully replied identification information requests that were received from a partner (new) SGSN

- a) This measurement provides the number of successfully replied identification information requests that were received from a partner (new) SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of the "Identification Response" message to the new SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccIdentityReqFromPsgsn:
 - SEC.SuccIdentityReqFromPsgsn Combined (don't care);
 - SEC.SuccIdentityReqFromPsgsn.G GSM;
 - SEC.SuccIdentityReqFromPsgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.8 SGSN context requests sent to a partner (previous) SGSN for subscribers registering afresh in this SGSN

5.4.8.146 Attempted SGSN context requests sent to a partner (previous) SGSN for subscribers registering afresh in this SGSN

- a) This measurement provides the number of SGSN context requests sent to a partner (previous) SGSN for subscribers registering afresh in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of the "Context Request" message to the previous SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttContextRequestToPsgsn:
 - SEC.AttContextRequestToPsgsn Combined (don't care);
 - SEC.AttContextRequestToPsgsn.G GSM;
 - SEC.AttContextRequestToPsgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.8.217 Successfully replied SGSN context requests that were sent to a partner (previous) SGSN

- a) This measurement provides the number of successfully replied SGSN context requests that were sent to a partner (previous) SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of the "Context Response" message from the previous SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccContextRequestToPsgsn:
 - SEC.SuccContextRequestToPsgsn Combined (don't care);
 - SEC.SuccContextRequestToPsgsn.G GSM;
 - SEC.SuccContextRequestToPsgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.9 SGSN context requests received from a partner (new) SGSN for a subscriber de-registering from this SGSN

5.4.9.148 Attempted SGSN context requests received from a partner (new) SGSN for a subscriber de-registering from this SGSN

- a) This measurement provides the number of SGSN context requests received from a partner (new) SGSN for a subscriber de-registering from this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of the "Context Request" message from the new SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.AttContextRequestFromPsgsn:
 - SEC.AttContextRequestFromPsgsn Combined (don't care);
 - SEC.AttContextRequestFromPsgsn.G GSM;
 - SEC.AttContextRequestFromPsgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4.49.2 Successfully replied SGSN context requests received from a partner (new) SGSN

- a) This measurement provides the number of successfully replied SGSN context requests received from a partner (new) SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Transmission of the "Context Response" message to the new SGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SEC.SuccContextRequestFromPsgsn:
 - SEC.SuccContextRequestFromPsgsn Combined (don't care);
 - SEC.SuccContextRequestFromPsgsn.G GSM;
 - SEC.SuccContextRequestFromPsgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.4. 210 Number of P-TMSI - IMSI correlation failures (User Identity Confidentiality (TS 23.060))

- a) This measurement provides the number of P-TMSI - IMSI correlation failures (User Identity Confidentiality (TS 23.060)).
- b) CC.
- c) This counter is triggered before the handling of the "Security Functions" (TS 23.060), in case of "Attach Request", "Routing Area Update Request", or "Service Request": if the correlation between the received P-TMSI and the stored IMSI is not valid then this counter is incremented.
- d) A single integer value.
- e) SEC.NbrPTMSICorrFailRnc.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.4.11 Security mode control procedures started by the SGSN

5.4.211.1 Attempted security mode control procedures started by the SGSN

- a) This measurement provides the number of security mode control procedures started by the SGSN.
- b) CC.
- c) Transmission of a "SECURITY MODE COMMAND" message to the MS (TS 25.413 [5]).
- d) A single integer value.
- e) SEC.AttSecMode.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.4.11.22 Successful security mode procedures

- a) This measurement provides the number of successful security mode procedures. The Security mode command response from MS starts the uplink integrity protection (and possible ciphering), i.e. also all following messages sent from the MS are integrity protected (and possibly ciphered).
- b) CC.
- c) Receipt of a "SECURITY MODE COMPLETE" message from the MS (TS 25.413 [5]).
- d) A single integer value.
- e) SEC.SuccSecMode.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.4.12 Ciphering procedures started by the SGSN

5.4.12.13 Attempted ciphering procedures started by the SGSN

- a) This measurement provides the number of ciphering procedures started by the SGSN.
- b) CC.
- c) Transmission of a "SECURITY MODE COMMAND" message with ciphering activated ("Encryption Algorithm" is not "no encryption (0)"), to the MS (TS 25.413 [5]).
- d) A single integer value.
- e) SEC.AttCiphering.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.4.12.24 Successful ciphering procedures started by the SGSN

- a) This measurement provides the number of successful ciphering procedures started by the SGSN.
- b) CC.
- c) Receipt of a "SECURITY MODE COMPLETE" message, with ciphering activated, from the MS (TS 25.413 [5]).
- d) A single integer value.
- e) SEC.SuccCiphering.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.4.13 MAP V1 requests for authentication sets

5.4.13.125 Attempted MAP V1 requests for authentication sets, sent to the HLR by SGSN

- a) This measurement provides the number of attempted MAP V1 requests for authentication sets, sent to the HLR by SGSN.
- b) CC.
- c) Transmission of a "MAP V1 SEND_AUTHENTICATION_INFO" service request, requesting authentication sets present (TS 29.002).
- d) A single integer value.
- e) SEC.AttReqAuthSetsHlrV1.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.4.13.226 Successful MAP V1 requests for authentication sets that were sent to the HLR

- a) This measurement provides the number of successful MAP V1 requests for authentication sets that were sent to the HLR.
- b) CC.
- c) Receipt of a "MAP V1 SEND_AUTHENTICATION_INFO" service confirmation, containing requested authentication sets (parameter "AuthenticationSetList" present TS 29.002).
- d) A single integer value.
- e) SEC.SuccReqAuthSetsHlrV1.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.4.13.327 Number of empty responses to the MAP V1 request for authentication sets that were sent to the HLR

- a) This measurement provides the number of empty responses to the MAP V1 request for authentication sets that were sent to the HLR.
- b) CC.
- c) Receipt of a MAP V1 "SEND_AUTHENTICATION_INFO_ACK" service confirmation, no Authentication sets present (TS 29.002).
- d) A single integer value.
- e) SEC.NbrEmptyRespAuthSetsHlrV1.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.4.14 MAP V3 requests for Authentication sets

5.4.14.128 Attempted MAP V3 requests for Authentication sets sent to the HLR by SGSN

- a) This measurement provides the number of attempted MAP V3 requests for Authentication sets sent to the HLR by SGSN.
- b) CC.
- c) Transmission of a MAP V3 "SEND_AUTHENTICATION_INFO" service request, requesting authentication sets present (TS 29.002).
- d) A single integer value.
- e) SEC.AttReqAuthSetsHlrV3.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.4.14.29 Successful MAP V3 requests for authentication sets that were sent to the HLR

- a) This measurement provides the number of successful MAP V3 requests for authentication sets that were sent to the HLR.
- b) CC.
- c) Receipt of a MAP V3 "SEND_AUTHENTICATION_INFO" service confirmation, containing requested authentication sets (parameter "AuthenticationSetList" present TS 29.002).
- d) A single integer value.
- e) SEC.SuccReqAuthSetsHlrV3.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.4.14.30 Number of empty responses to the MAP V3 request for authentication sets that were sent to the HLR

- a) This measurement provides the number of empty responses to the MAP V3 request for authentication sets that were sent to the HLR.
- b) CC.
- c) Receipt of a MAP V3 "SEND_AUTHENTICATION_INFO_ACK" service confirmation, no Authentication sets present (TS 29.002).
- d) A single integer value.
- e) SEC.NbrEmptyRespAuthSetsHlrV3.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.5 SMS

The three measurement groups defined in subclause 5.5.n are subject to the "2 out of 3 approach".

5.5.1 SMS in the CS domain (MSC)

Up to now, no counters are defined for the failure cases. FFS.

5.5.1.1 CS SMS mobile originating

5.5.1.1.1 Attempted CS SMS mobile originating

- a) This measurement provides the number of CS SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC of "RP-DATA" Message (TS 24.011) from the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMoCS:
 - SMS.AttMoCS Combined (don't care);
 - SMS.AttMoCS.G GSM;
 - SMS.AttMoCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.5.1.1.2 Successful CS SMS mobile originating

- a) This measurement provides the number of successful CS SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC of "RP-ACK" Message (TS 24.011) to the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMoCS:
 - SMS.SuccMoCS Combined (don't care);
 - SMS.SuccMoCS.G GSM;
 - SMS.SuccMoCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.5.1.2 CS SMS mobile terminating

5.5.1.2.13 Attempted CS SMS mobile terminating

- a) This measurement provides the number of CS SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC of "RP-DATA" Message (TS 24.011).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMtCS:
 - SMS.AttMtCS Combined (don't care);
 - SMS.AttMtCS.G GSM;
 - SMS.AttMtCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.5.1.2.24 Successful CS SMS mobile terminating

- a) This measurement provides the number of successful CS SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC of "RP-ACK" Message (TS 24.011).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMtCS:
 - SMS.SuccMtCS Combined (don't care);
 - SMS.SuccMtCS.G GSM;
 - SMS.SuccMtCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.5.1.3 CS ms-Present

5.5.1.3.15 Attempted CS ms-Present

- a) This attribute counts the number of times that a MS (attached to a MSC) send that it is ready to receive SM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = ms-Present to the HLR from the MSC (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMsPresentCS:

- SMS.AttMsPresentCS Combined (don't care);
 - SMS.AttMsPresentCS.G GSM;
 - SMS.AttMsPresentCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.5.1.3.2 Successful CS ms-Present

- a) This attribute counts the number of successful times that a MS (attached to a MSC) send that it is ready to receive SM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the MSC from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMsPresentCS:
- SMS.SuccMsPresentCS Combined (don't care);
 - SMS.SuccMsPresentCS.G GSM;
 - SMS.SuccMsPresentCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.
- h) GSM/UMTS.

5.5.1.4 CS "memory available"

5.5.1.4.16 Attempted CS "memory available"

- a) This attribute counts the number of times that a MS (attached to a MSC) sent a indication of "memory available" to MSC.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = memoryAvailable to the HLR from the MSC (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMemoryAvailableCS:
- SMS.AttMemoryAvailableCS Combined (don't care);
 - SMS.AttMemoryAvailableCS.G GSM;
 - SMS.AttMemoryAvailableCS.U UMTS.
- f) MscFunction.
- g) Valid for circuit switching.

h) GSM/UMTS.

~~5.5.1.7 Successful CS ms Present~~

~~a) This attribute counts the number of successful times that a MS (attached to a MSC) send that it is ready to receive SM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~

~~b) CC.~~

~~e) This counter will be increased when a return result is received by the MSC from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002).~~

~~d) A single integer value per measurement type defined in e).~~

~~e) SMS.SuccMsPresentCS:~~

~~— SMS.SuccMsPresentCS — Combined (don't care);~~

~~— SMS.SuccMsPresentCS.G — GSM;~~

~~— SMS.SuccMsPresentCS.U — UMTS.~~

~~f) MscFunction.~~

~~g) Valid for circuit switching.~~

~~h) GSM/UMTS.~~

5.5.1.4.28 Successful CS "memory available"

a) This attribute counts the number of successful times that a MS (attached to a MSC) sent a indication of "memory available" to MSC.

The three measurement types defined in e) are subject to the "2 out of 3 approach".

b) CC.

c) This counter will be increased when a return result is received by the MSC from the HLR in response to the MAP_READY_FOR_SM with reason = "memory available" (TS 29.002).

d) A single integer value per measurement type defined in e).

e) SMS.SuccMemoryAvailableCS:

- SMS.SuccMemoryAvailableCS Combined (don't care);

- SMS.SuccMemoryAvailableCS.G GSM;

- SMS.SuccMemoryAvailableCS.U UMTS.

f) MscFunction.

g) Valid for circuit switching.

h) GSM/UMTS.

5.5.2 SMS in the PS domain (SGSN)

Up to now, no counters are defined for the failure cases FFS.

5.5.2.1 PS SMS mobile originating

5.5.2.1.1 Attempted PS SMS mobile originating

- a) This measurement provides the number of PS SMS mobile originating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the SGSN of "RP-DATA" Message (TS 24.011) from the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMoPS:
 - SMS.AttMoPS Combined (don't care);
 - SMS.AttMoPS.G GSM;
 - SMS.AttMoPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.5.2.1.2 Successful PS SMS mobile originating

- a) This measurement provides the number of successful PS SMS mobile originating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of "RP-ACK" Message (TS 24.011) to the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMoPS:
 - SMS.SuccMoPS Combined (don't care);
 - SMS.SuccMoPS.G GSM;
 - SMS.SuccMoPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.5.2.2 PS SMS mobile terminating

5.5.2.2.1 Attempted PS SMS mobile terminating

- a) This measurement provides the number of PS SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of "RP-DATA" Message (TS 24.011).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMtPS:

- SMS.AttMtPS Combined (don't care);
 - SMS.AttMtPS.G GSM;
 - SMS.AttMtPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.5.2.2.24 Successful PS SMS mobile terminating

- a) This measurement provides the number of successful PS SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the SGSN of "RP-ACK" Message (TS 24.011).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMtPS:
- SMS.SuccMtPS Combined (don't care);
 - SMS.SuccMtPS.G GSM;
 - SMS.SuccMtPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.5.2.3 PS ms-Present

5.5.2.3.15 Attempted PS ms-Present

- a) This attribute counts the number of times that a MS (attached to a SGSN) send that it is ready to receive SM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = ms-Present to the HLR from the SGSN (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMsPresentPS:
- SMS.AttMsPresentPS Combined (don't care);
 - SMS.AttMsPresentPS.G GSM;
 - SMS.AttMsPresentPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.5.2.3.2 Successful PS ms-Present

- a) This attribute counts the number of successful times that a MS (attached to a SGSN) send that it is ready to receive SM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMsPresentPS:
 - SMS.SuccMsPresentPS Combined (don't care);
 - SMS.SuccMsPresentPS.G GSM;
 - SMS.SuccMsPresentPS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.5.2.4 PS "memory available"

5.5.2.4.16 Attempted PS "memory available"

- a) This attribute counts the number of times that a MS (attached to a SGSN) sent a indication of "memory available" to SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = memoryAvailable to the HLR from the SGSN (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMemoryAvailablePS:
 - SMS.AttMemoryAvailablePS Combined (don't care);
 - SMS.AttMemoryAvailablePS.G GSM;
 - SMS.AttMemoryAvailablePS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.5.2.7 Successful PS ms-Present~~

- ~~a) This attribute counts the number of successful times that a MS (attached to a SGSN) send that it is ready to receive SM.~~
~~The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~c) This counter will be increased when a return result is received by the SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002).~~

~~d) A single integer value per measurement type defined in e).~~

~~e) SMS.SuccMsPresentPS:~~

~~— SMS.SuccMsPresentPS — Combined (don't care);~~

~~— SMS.SuccMsPresentPS.G — GSM;~~

~~— SMS.SuccMsPresentPS.U — UMTS.~~

~~f) SgsnFunction.~~

~~g) Valid for packet switching.~~

~~h) GSM/UMTS.~~

5.5.2.4.28 Successful PS "memory available"

- a) This attribute counts the number of successful times that a MS (attached to a SGSN) sent a indication of "memory available" to SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "memory available" (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMemoryAvailablePS:
 - SMS.SuccMemoryAvailablePS Combined (don't care);
 - SMS.SuccMemoryAvailablePS.G GSM;
 - SMS.SuccMemoryAvailablePS.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.5.3 SMS in the CS/PS domain (MSC/SGSN)

Unlike the measurements in previous clauses, the measurements in this subclause do not differentiate between the PS and the CS domain, and deliver one total count.

Up to now, no counters are defined for the failure cases FFS.

5.5.3.1 SMS mobile originating

5.5.3.1.1 Attempted SMS mobile originating

- a) This measurement provides the number of SMS mobile originating attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC/SGSN of "RP-DATA" Message (TS 24.011) from the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMo:

- SMS.AttMo Combined (don't care);
 - SMS.AttMo.G GSM;
 - SMS.AttMo.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.5.3.1.2 Successful SMS mobile originating

- a) This measurement provides the number of successful SMS mobile originating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC/SGSN of "RP-ACK" Message (TS 24.011) to the MS.
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMo:
- SMS.SuccMo Combined (don't care);
 - SMS.SuccMo.G GSM;
 - SMS.SuccMo.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.5.3.2 SMS mobile terminating

5.5.3.2.13 Attempted SMS mobile terminating

- a) This measurement provides the number of SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the MSC/SGSN of "RP-DATA" Message (TS 24.011).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMt:
- SMS.AttMt Combined (don't care);
 - SMS.AttMt.G GSM;
 - SMS.AttMt.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.5.3.2.24 Successful SMS mobile terminating

- a) This measurement provides the number of successful SMS mobile terminating attempts. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt by the MSC/SGSN of "RP-ACK" Message (TS 24.011).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMt:
 - SMS.SuccMt Combined (don't care);
 - SMS.SuccMt.G GSM;
 - SMS.SuccMt.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.5.3.3 Ms-Present

5.5.3.3.15 Attempted ms-Present

- a) This attribute counts the number of times that a MS (attached to a MSC/SGSN) send that it is ready to receive SM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = ms-Present to the HLR from the MSC/SGSN (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMsPresent:
 - SMS.AttMsPresent Combined (don't care);
 - SMS.AttMsPresent.G GSM;
 - SMS.AttMsPresent.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.5.3.3.2 Successful ms-Present

- a) This attribute counts the number of successful times that a MS (attached to a MSC/SGSN) send that it is ready to receive SM. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the MSC/SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002).
- d) A single integer value per measurement type defined in e).

e) SMS.SuccMsPresent:

- SMS.SuccMsPresent Combined (don't care);
- SMS.SuccMsPresent.G GSM;
- SMS.SuccMsPresent.U UMTS.

f) MscFunction or SgsnFunction.

g) Valid for packet switching and circuit switching.

h) GSM/UMTS.

5.5.3.4 "Memory available"

5.5.3.4.16 Attempted "memory available"

- a) This attribute counts the number of times that a MS (attached to a MSC/SGSN) sent a indication of "memory available" to MSC/SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of MAP-READY-FOR-SM with alertReason = memoryAvailable to the HLR from the MSC/SGSN (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.AttMemoryAvailable:
 - SMS.AttMemoryAvailable Combined (don't care);
 - SMS.AttMemoryAvailable.G GSM;
 - SMS.AttMemoryAvailable.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

~~5.5.3.7 Successful ms-Present~~

- ~~a) This attribute counts the number of successful times that a MS (attached to a MSC/SGSN) send that it is ready to receive SM.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~e) This counter will be increased when a return result is received by the MSC/SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "MS present" (TS 29.002).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) SMS.SuccMsPresent:
 - ~~— SMS.SuccMsPresent — Combined (don't care);~~
 - ~~— SMS.SuccMsPresent.G — GSM;~~
 - ~~— SMS.SuccMsPresent.U — UMTS.~~~~
- ~~f) MscFunction or SgsnFunction.~~

~~g) Valid for packet switching and circuit switching.~~

~~h) GSM/UMTS.~~

5.5.3.4.28 Successful "memory available"

- a) This attribute counts the number of successful times that a MS (attached to a MSC/SGSN) sent a indication of "memory available" to MSC/SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) This counter will be increased when a return result is received by the MSC/SGSN from the HLR in response to the MAP_READY_FOR_SM with reason = "memory available" (TS 29.002).
- d) A single integer value per measurement type defined in e).
- e) SMS.SuccMemoryAvailable:
 - SMS.SuccMemoryAvailable Combined (don't care);
 - SMS.SuccMemoryAvailable.G GSM;
 - SMS.SuccMemoryAvailable.U UMTS.
- f) MscFunction or SgsnFunction.
- g) Valid for packet switching and circuit switching.
- h) GSM/UMTS.

5.6 Session Management

5.6.1 PDP context activation procedures initiated by MS

5.6.1.1 Attempted PDP context activation procedures initiated by MS

- a) This measurement provides the number of attempted PDP context activation procedures. These include the static as well as the dynamic PDP addresses.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "Activate PDP Context Request" message from the MS (TS 24.008).
- d) A single integer value.
- e) SM.AttActPdpContext:
 - SM.AttActPdpContext Combined (don't care);
 - SM.AttActPdpContext.G GSM;
 - SM.AttActPdpContext.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.1.2 Successful PDP context activation procedures initiated by MS

- a) This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "Activate PDP Context Accept" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.SuccActPdpContext:
 - SM.SuccActPdpContext Combined (don't care);
 - SM.SuccActPdpContext.G GSM;
 - SM.SuccActPdpContext.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.1.3 Failed PDP context activation procedures initiated by MS

- a) This measurement provides the number of Failed PDP context activation procedures. These include the static as well as the dynamic PDP addresses. This measurement is split into subcounters per failure cause. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of an ACTIVATE PDP CONTEXT REJECT message indicating a PDP context activation failure, the relevant measurement is incremented according to the failure cause. Possible causes are included in TS 24.008 Annex G. The sum of all supported per cause measurements should equal the total number of PDP context activation failures. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.
- d) A single integer value per measurement type as defined in e). The number of measurements is equal to the number of implemented per cause measurements plus a possible sum value identified by the .sum suffix.
- e) The measurement name has the form SM.FailActPdpCtxtMs.Cause where Cause identifies the failure cause.

<u>SM.FailActPdpCtxtMs.Cause</u>	<u>Combined (don't care)</u>
<u>SM.FailActPdpCtxtMs.Cause.G</u>	<u>GSM</u>
<u>SM.FailActPdpCtxtMs.Cause.U</u>	<u>UMTS</u>

where Cause identifies the failure cause

- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.2 dynamic PDP context activation procedures initiated by MS

5.6.2.1 Attempted dynamic PDP context activation procedures initiated by MS

- a) This measurement provides the number of attempted PDP context activation requests where a dynamic PDP address is required to be used.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "Activate PDP Context Request" message from the MS with an empty PDP address (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.AttActPdpContextDyn:
 - SM.AttActPdpContextDyn Combined (don't care);
 - SM.AttActPdpContextDyn.G GSM;
 - SM.AttActPdpContextDyn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.6.3 Successful PDP context activation procedures initiated by MS~~

- ~~a) This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~c) Transmission of a "Activate PDP Context Accept" message to the MS (TS 24.008).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) SM.SuccActPdpContext:
 - ~~— SM.SuccActPdpContext — Combined (don't care);~~
 - ~~— SM.SuccActPdpContext.G — GSM;~~
 - ~~— SM.SuccActPdpContext.U — UMTS.~~~~
- ~~f) SgsnFunction.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM/UMTS.~~

5.6.2.24 Successful dynamic PDP context activation procedures initiated by MS

- a) This measurement provides the number of successfully completed PDP context activations where a dynamic PDP address is used.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "Activate PDP Context Accept" message to the MS (TS 24.008), the PDP address has been dynamically assigned.

- d) A single integer value per measurement type defined in e).
- e) SM.SuccActPdpContextDyn:
 - SM.SuccActPdpContextDyn Combined (don't care);
 - SM.SuccActPdpContextDyn.G GSM;
 - SM.SuccActPdpContextDyn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.53 Mean number of activated PDP contexts

- a) Mean number of activated PDP contexts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number activated PDP contexts, and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) SM.MeanActPDPContext:
 - SM.MeanActPDPContext Combined (don't care);
 - SM.MeanActPDPContext.G GSM;
 - SM.MeanActPDPContext.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.4 PDP context deactivation procedures initiated by the MS

5.6.4.16 Attempted PDP context deactivation procedures initiated by the MS

- a) This measurement provides the number of PDP context deactivation procedures initiated by the MS.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "Deactivate PDP Context Request" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.AttDeactPdpContextMs:
 - SM.AttDeactPdpContextMs Combined (don't care);
 - SM.AttDeactPdpContextMs.G GSM;
 - SM.AttDeactPdpContextMs.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.

h) GSM/UMTS.

5.6.4.27 Successful PDP context deactivation procedures initiated by the MS

- a) This measurement provides the number of successfully completed PDP context deactivations. For these context deactivations, the GGSN is updated successfully (i.e. deletion of the PDP context).
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "Deactivate PDP Context Accept" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.SuccDeactPdpContextMs:
 - SM.SuccDeactPdpContextMs Combined (don't care);
 - SM.SuccDeactPdpContextMs.G GSM;
 - SM.SuccDeactPdpContextMs.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.58 Number of active PDP context

- a) This measurement provides the number of active PDP context.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) The gauge will be incremented when a PDP context is created and will be decremented when a PDP context is deleted.
- d) A single integer value per measurement type defined in e).
- e) SM.NbrActPdpContext:
 - SM.NbrActPdpContext Combined (don't care);
 - SM.NbrActPdpContext.G GSM;
 - SM.NbrActPdpContext.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.69 Number of mobile subscribers with activated PDP context (i.e. subscribers that can send/receive GPRS packet data)

- a) This measurement provides the number of mobile subscribers with activated PDP context (i.e. subscribers that can send/receive GPRS packet data).
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) Addition of first PDP context or removal of last PDP context in SGSN location register for a particular subscriber.

- d) A single integer value per measurement type defined in e).
- e) SM.NbrActivePdpPerSgsn:
 - SM.NbrActivePdpPerSgsn Combined (don't care);
 - SM.NbrActivePdpPerSgsn.G GSM;
 - SM.NbrActivePdpPerSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.7.10 Mean number of subscribers that have an activated PDP context (i.e. subscribers that can send/receive GPRS packet data)

- a) This measurement provides the arithmetic mean number value of subscribers that have an activated PDP context (i.e. subscribers that can send/receive GPRS packet data).
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of subscribers with activated PDP context in SGSN, and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) SM.MeanActivePdpPerSgsn:
 - SM.MeanActivePdpPerSgsn Combined (don't care);
 - SM.MeanActivePdpPerSgsn.G GSM;
 - SM.MeanActivePdpPerSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.8 PDP context deactivation procedures initiated by the GGSN

5.6.8.14 Attempted PDP context deactivation procedures initiated by the GGSN

- a) This measurement provides the number of PDP context deactivation procedures initiated by the GGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "Delete PDP Context Request" message from the GGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SM.AttDeactPdpContextGgsn:
 - SM.AttDeactPdpContextGgsn Combined (don't care);
 - SM.AttDeactPdpContextGgsn.G GSM;
 - SM.AttDeactPdpContextGgsn.U UMTS.

- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.8.42 Successful PDP context deactivation procedures initiated by the GGSN

- a) This measurement provides the number of successfully handled PDP context deactivations initiated by the GGSN. For these context deactivations, the MS has accepted the PDP context deactivation. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "Delete PDP Context Response" message to the GGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SM.SuccDeactPdpContextGgsn:
 - SM.SsuccDeactPdpContextGgsn Combined (don't care);
 - SM.SsuccDeactPdpContextGgsn.G GSM;
 - SM.SsuccDeactPdpContextGgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.9 PDP context deactivation procedures initiated by the SGSN

5.6.9.13 Attempted PDP context deactivation procedures initiated by the SGSN

- a) This measurement provides the number of PDP context deactivation procedures initiated by the SGSN. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "Delete PDP Context Request" message to the GGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SM.AttDeactPdpContextSgsn:
 - SM.AttDeactPdpContextSgsn Combined (don't care);
 - SM.AttDeactPdpContextSgsn.G GSM;
 - SM.AttDeactPdpContextSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.9.244 Successful PDP context deactivations initiated by the SGSN

- a) This measurement provides the number of successfully handled PDP context deactivations initiated by the SGSN. The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Receipt of a "deactivate PDP Context Accept" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.SuccDeactPdpContextSgsn:
 - SM.SuccDeactPdpContextSgsn Combined (don't care);
 - SM.SuccDeactPdpContextSgsn.G GSM;
 - SM.SuccDeactPdpContextSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.9.3 Abnormal PDP context Deactivation procedures

- a) This measurement provides the number of PDP context deactivation procedures initiated by the SGSN. This measurement is split into subcounters per cause.
- b) CC.
- c) Transmission of a "Delete PDP Context Request" message to the GGSN (TS 29.060). the measurement is incremented according to the deletion cause. Possible causes are included in TS 24.008. The sum of all supported per cause measurements should equal the total number of PDP context activation failures.
- d) A single integer value.
- e) SM.AttDeactPdpContextSgsn.cause
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.10 SGSN-Initiated PDP context update procedures

5.6.10.15 Attempted SGSN-Initiated PDP context update procedures

- a) This measurement provides the number of attempted SGSN-Initiated PDP context update procedures. An Update PDP Context Request message shall be sent from a SGSN to a GGSN as part of the GPRS Inter SGSN Routing Update procedure or the PDP Context Modification procedure or to redistribute contexts due to load sharing. It shall be used to change the QoS and the path. The message shall be sent by the new SGSN at the Inter SGSN Routing Update procedure.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of an "Update PDP Context Request" message to the GGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).

- e) SM.AttUpdPdpContextSgsn:
 - SM.AttUpdPdpContextSgsn Combined (don't care);
 - SM.AttUpdPdpContextSgsn.G GSM;
 - SM.AttUpdPdpContextSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.10.26 Successful SGSN-Initiated PDP context update procedures

- a) This measurement provides the number of successfully handled SGSN-Initiated PDP context update procedures. These updates are performed successfully when a positive update PDP context response is received from the GGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "Update PDP Context Response" message from the GGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SM.SsuccUpdPdpContextSgsn:
 - SM.SsuccUpdPdpContextSgsn Combined (don't care);
 - SM.SsuccUpdPdpContextSgsn.G GSM;
 - SM.SsuccUpdPdpContextSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.11 GGSN-Initiated PDP context update procedures

5.6.11.17 Attempted GGSN-Initiated PDP context update procedures

- a) This measurement provides the number of attempted GGSN-Initiated PDP context update procedures. An Update PDP Context Request may also be sent from a GGSN to a SGSN to re-negotiate the QoS of a PDP context. This GGSN-initiated Update PDP Context Request can also be used to provide a PDP address to the SGSN (and MS). The latter shall be used by GGSN when it acts as a DHCP Relay Agent or Mobil IP Foreign Agent.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "Update PDP Context Request" message from the GGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SM.AttUpdPdpContextGgsn:
 - SM.AttUpdPdpContextGgsn Combined (don't care);
 - SM.AttUpdPdpContextGgsn.G GSM;
 - SM.AttUpdPdpContextGgsn.U UMTS.

- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.11.28 Successful GGSN-Initiated PDP context update procedures

- a) This measurement provides the number of successfully handled GGSN-Initiated PDP context update procedures. These updates are performed successfully when a positive update PDP context response is received from the SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of an "Update PDP Context Response" message to the GGSN (TS 29.060).
- d) A single integer value per measurement type defined in e).
- e) SM.SuccUpdPdpContextGgsn:
 - SM.SuccUpdPdpContextGgsn Combined (don't care);
 - SM.SuccUpdPdpContextGgsn.G GSM;
 - SM.SuccUpdPdpContextGgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.12 SGSN-Initiated PDP context modifications procedures

5.6.12.19 Attempted SGSN-Initiated PDP context modifications procedures

- a) This measurement provides the number of attempted SGSN-Initiated PDP context modifications procedures. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of an "Modify PDP Context Request" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.AttModPdpContextSgsn:
 - SM.AttModPdpContextSgsn Combined (don't care);
 - SM.AttModPdpContextSgsn.G GSM;
 - SM.AttModPdpContextSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.12.20 Successfully SGSN-Initiated PDP context modifications procedures

- a) This measurement provides the number of successfully handled SGSN-Initiated PDP context modifications procedures. These modifications are performed successfully when a positive Modify PDP Context Accept is

received from the MS.

The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Receipt of an "Modify PDP Context Accept" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.SuccModPdpContextSgsn:
 - SM.SuccModPdpContextSgsn Combined (don't care);
 - SM.SuccModPdpContextSgsn.G GSM;
 - SM.SuccModPdpContextSgsn.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.13 MS-Initiated PDP context modifications procedures

5.6.13.124 Attempted MS-Initiated PDP context modifications procedures

- a) This measurement provides the number of attempted MS-Initiated PDP context modifications procedures. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "Modify PDP Context Request" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.AttModPdpContextMs:
 - SM.AttModPdpContextMs Combined (don't care);
 - SM.AttModPdpContextMs.G GSM;
 - SM.AttModPdpContextMs.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.13.22 Successfully MS-Initiated PDP context modifications procedures

- a) This measurement provides the number of successfully handled MS-Initiated PDP context modifications procedures. These modifications are performed successfully when a positive Modify PDP Context Accept is received from the MS. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of an "Modify PDP Context Accept" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.SsuccModPdpContextMs:
 - SM.SsuccModPdpContextMs Combined (don't care);

- SM.SsuccModPdpContextMs.G GSM;
 - SM.SsuccModPdpContextMs.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.14 Secondary PDP context activation procedures

5.6.14.123 Attempted Secondary PDP context activation procedures

- a) This measurement provides the number of attempted Secondary PDP context activation procedures. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "Activate Secondary PDP Context Request" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.AttActSecondPdpContext:
- SM.AttActSecondPdpContext Combined (don't care);
 - SM.AttActSecondPdpContext.G GSM;
 - SM.AttActSecondPdpContext.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.14.24 Successful Secondary PDP context activations

- a) This measurement provides the number of successfully completed Secondary PDP context activations. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "Activate Secondary PDP Context Accept" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) SM.SuccActSecondPdpContext:
- SM.SuccActSecondPdpContext Combined (don't care);
 - SM.SuccActSecondPdpContext.G GSM;
 - SM.SuccActSecondPdpContext.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.25 ~~Failed PDP context activation procedures initiated by MS~~

- ~~a) This measurement provides the number of Failed PDP context activation procedures. These include the static as well as the dynamic PDP addresses. This measurement is split into subcounters per failure cause. The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~e) Transmission by the SGSN of an ACTIVATE PDP CONTEXT REJECT message indicating a PDP context activation failure, the relevant measurement is incremented according to the failure cause. Possible causes are included in TS 24.008 Annex G. The sum of all supported per cause measurements should equal the total number of PDP context activation failures. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.~~
- ~~d) A single integer value per measurement type as defined in e). The number of measurements is equal to the number of implemented per cause measurements plus a possible sum value identified by the *.sum* suffix.~~
- ~~e) The measurement name has the form SM.FailActPdpCtxtMs.Cause where Cause identifies the failure cause.~~

SM.FailActPdpCtxtMs.Cause	Combined (don't care)
SM.FailActPdpCtxtMs.Cause.G	GSM
SM.FailActPdpCtxtMs.Cause.U	UMTS

~~where Cause identifies the failure cause~~

~~f) SgsnFunction.~~

~~g) Valid for packet switching.~~

~~h) GSM/UMTS.~~

5.6.15 PDP context activation procedures initiated by Network

5.6.15.126 Failed PDP context activation procedures initiated by Network

- a) This measurement provides the number of Failed PDP context activation procedures. These include the static as well as the dynamic PDP addresses. This measurement is split into subcounters per failure cause.
- b) CC.
- c) Receipt of a "REQUEST PDP CONTEXT ACTIVATION REJECT" message from the MS (TS 24.008) message indicating a PDP context activation failure, the measurement is incremented according to the failure cause. Possible causes are included in TS 24.008. The sum of all supported per cause measurements should equal the total number of PDP context activation failures.
- d) A single integer value.
- e) The measurement name has the form SM.FailActPdpCtxtNtwk.Cause where Cause identifies the failure cause.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.27 ~~Abnormal PDP context Deactivation procedures~~

- ~~a) This measurement provides the number of PDP context deactivation procedures initiated by the SGSN. This measurement is split into subcounters per cause.~~

~~b) CC.~~

~~e) Transmission of a "Delete PDP Context Request" message to the GGSN (TS 29.060). the measurement is incremented according to the deletion cause. Possible causes are included in TS 24.008. The sum of all supported per cause measurements should equal the total number of PDP context activation failures.~~

~~d) A single integer value.~~

~~e) SM.AttDeactPdpContextSgsn.cause~~

~~f) SgsnFunction.~~

~~g) Valid for packet switching.~~

~~h) GSM/UMTS.~~

5.6. ~~1628~~ PDP Context set-up time, initiated by MS (Mean)

- a) This measurement provides the mean time it takes for the SGSN to establish a PDP context during each collection interval. The measurement is split into subcounters per traffic class per APN (see TS 23.003 for APN definition), these measurements will only be provided for a subset of all APNs. The way the list of monitored APNs is configured is outside the scope of this TS.
- b) DER (n=1).
- c) This measurement is obtained by accumulating the time intervals for each successful mobile originated PDP context activation between the receipt by the SGSN of an "ACTIVATE PDP CONTEXT REQUEST" from the MS and the corresponding transmission by the SGSN to the MS of an "ACTIVATE PDP CONTEXT" message over a granularity period using DER, see TS 29.060, TS 24.008 and TS 23.107 [8] for service class definitions. This end value of the time will then be divided by the number of successful mobile originated PDP context activations observed in the granularity period to give the arithmetic mean, the accumulator shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) SM. SuccActPdpContextAPNTimeMOMean.Conv
SM. SuccActPdpContextAPNTimeMOMean.Strm
SM. SuccActPdpContextAPNTimeMOMean.Intact
SM. SuccActPdpContextAPNTimeMOMean.Bgrd
- f) SgsnFunction, per APN.
- g) Valid for packet switched traffic.
- h) GSM/UMTS

5.6. ~~1729~~ PDP Context set-up time, initiated by MS (Max)

- a) This measurement provides the maximum time it takes for the SGSN to establish a PDP context during each collection interval. The measurement is split into subcounters per traffic class per APN (see TS 23.003 for APN definition), these measurements will only be provided for a subset of all APNs. The way the list of monitored APNs is configured is outside the scope of this TS.
- b) GAUGE
- c) This measurement is obtained by monitoring the time intervals for each successful mobile originated PDP context activation between the receipt by the SGSN of an "ACTIVATE PDP CONTEXT REQUEST" from the MS and the corresponding transmission by the SGSN to the MS of an "ACTIVATE PDP CONTEXT" message over a granularity period using DER, see TS 29.060, TS 24.008 and TS 23.107 [8] for service class definitions. The high tide mark of this time will be stored in a gauge, the gauge shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).

- e) SM. SuccActPdpContextAPNTimeMOMax.Conv
SM. SuccActPdpContextAPNTimeMOMax.Strm
SM. SuccActPdpContextAPNTimeMOMax.Intact
SM. SuccActPdpContextAPNTimeMOMax.Bgrd
- f) SgsnFunction, per APN.
- g) Valid for packet switched traffic.
- h) GSM/UMTS

5.6.1830 PDP Context set-up time, initiated by Network (Mean)

- a) This measurement provides the mean time it takes for the SGSN to establish a PDP context initiated by the network during each collection interval. The measurement is split into subcounters per traffic class per APN (see TS 23.003 for APN definition), these measurements will only be provided for a subset of all APNs. The way the list of monitored APNs is configured is outside the scope of this TS.
- b) DER (n=1).
- c) This measurement is obtained by accumulating the time intervals for each successful mobile terminated PDP context activation between the transmission by the SGSN of a "REQUEST PDP CONTEXT ACTIVATION" for the MS and the corresponding transmission by the SGSN to the MS of an "ACTIVATE PDP CONTEXT" message over a granularity period using DER, see TS 29.060, TS 24.008 and TS 23.107 [8] for service class definitions. This end value of the time will then be divided by the number of successful mobile originated PDP context activations observed in the granularity period to give the arithmetic mean, the accumulator shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) SM. SuccActPdpContextAPNTimeMTMean.Conv
SM. SuccActPdpContextAPNTimeMTMean.Strm
SM. SuccActPdpContextAPNTimeMTMean.Intact
SM. SuccActPdpContextAPNTimeMTMean.Bgrd
- f) SgsnFunction, per APN.
- g) Valid for packet switched traffic.
- h) GSM/UMTS

5.6.1934 PDP Context set-up time, initiated by Network (Max)

- a) This measurement provides the maximum time it takes for the SGSN to establish a PDP context initiated by the network during each collection interval. The measurement is split into subcounters per traffic class per APN (see TS 23.003 for APN definition), these measurements will only be provided for a subset of all APNs. The way the list of monitored APNs is configured is outside the scope of this TS.
- b) GAUGE
- c) This measurement is obtained by monitoring the time intervals for each successful mobile terminated PDP context activation between the transmission by the SGSN of a "REQUEST PDP CONTEXT ACTIVATION" for the MS and the corresponding transmission by the SGSN to the MS of an "ACTIVATE PDP CONTEXT" message over a granularity period using DER, see TS 29.060, TS 24.008 and TS 23.107 [8] for service class definitions. The high tide mark of this time will be stored in a gauge, the gauge shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) SM. SuccActPdpContextAPNTimeMTMax.Conv
SM. SuccActPdpContextAPNTimeMTMax.Strm
SM. SuccActPdpContextAPNTimeMTMax.Intact
SM. SuccActPdpContextAPNTimeMTMax.Bgrd

- f) SgsnFunction, per APN.
- g) Valid for packet switched traffic.
- h) GSM/UMTS

5.7 CAMEL Measurements

5.7.1 CAMEL dialogues

5.7.1.1 Attempted CAMEL dialogues

- a) Total number of CAMEL dialogue attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Incremented when a TDP (Trigger Detection Point) is reached and CAP is informed.
- d) A single integer value per measurement type defined in e).
- e) CAM.AttCamelDialogues:
 - CAM.AttCamelDialogues Combined (don't care);
 - CAM.AttCamelDialogues.G GSM;
 - CAM.AttCamelDialogues.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.7.1.2 Failed CAMEL dialogues, aborted locally by gprsSSF

- a) Number of failed CAMEL dialogues, aborted locally by gprsSSF.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Incremented when a CAMEL dialogue is aborted locally by SSF.
- d) A single integer value per measurement type defined in e).
- e) CAM.FailDialoguesSsf:
 - CAM.FailDialoguesSsf Combined (don't care);
 - CAM.FailDialoguesSsf.G GSM;
 - CAM.FailDialoguesSsf.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.7.1.3 Failed CAMEL dialogues, error or reject from gsmSCF

- a) Number of failed CAMEL dialogues, error or reject from gsmSCF.
The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Incremented when a CAMEL dialogue is aborted by SCF.
- d) A single integer value per measurement type defined in e).
- e) CAM.FailDialoguesScf:
 - CAM.FailDialoguesScf Combined (don't care);
 - CAM.FailDialoguesScf.G GSM;
 - CAM.FailDialoguesScf.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.8 UMTS-GSM Intersystem Change

5.8.1 Intra SGSN inter system changes from UMTS to GSM

5.8.1.1 Attempted intra SGSN inter system changes from UMTS to GSM

- a) Number of attempted intra SGSN inter system changes from UMTS to GSM.
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, where the SGSN determines that it concerns a intra SGSN inter system changes from UMTS to GSM. (TS 24.008).
- d) A single integer value.
- e) ISYSC.AttIntraSgsnUmtsGsmRau.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.8.1.2 Successful intra SGSN inter system changes from UMTS to GSM

- a) Successful intra SGSN inter system changes from UMTS to GSM.
- b) CC.
- c) Transmission of "ROUTING AREA UPDATE ACCEPT" message to the MS (TS 24.008). Only the cases where this message is sent for "UMTS to GSM Intra SGSN Change" are counted.
- d) A single integer value.
- e) ISYSC.SuccIntraSgsnUmtsGsmRau.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.8.1.3 Failed intra SGSN inter system changes UMTS to GSM RAU, due to internal reasons

- a) Number of failed intra SGSN inter system UMTS to GSM RAU, due to internal reasons.
- b) CC.
- c) "UMTS to GSM Intra SGSN Change" fails due to reasons located inside this 2G+3G-SGSN:- internal resource problem- recovery- ...
- d) A single integer value.
- e) ISYSC.FailIntraSgsnUmtsGsmRauInt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.8.1.4 Failed intra SGSN inter system changes UMTS to GSM RAU, due to external reasons

- a) Number of failed intra SGSN inter system UMTS to GSM RAU, due to external reasons.
- b) CC.
- c) "UMTS to GSM Intra SGSN Change" fails due to reasons located in NE outside this 2G+3G-SGSN, such as abnormal (reject, failure,...)/missing responses from SRNS, MSC/VLR, HLR, ...
- d) A single integer value.
- e) ISYSC.FailIntraSgsnUmtsGsmRauExt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.8.2 Intra SGSN inter system changes from GSM to UMTS

5.8.2.15 Attempted intra SGSN inter system changes from GSM to UMTS

- a) Number of attempted intra SGSN inter system changes from GSM to UMTS.
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, where the SGSN determines that it concerns a intra SGSN inter system changes from GSM to UMTS (TS 24.008).
- d) A single integer value.
- e) ISYSC.AttIntraSgsnGsmUmtsRau.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.8.2.26 Successful intra SGSN inter system changes from GSM to UMTS

- a) Successful intra SGSN inter system changes from GSM to UMTS.

- b) CC.
- c) Transmission of "ROUTING AREA UPDATE ACCEPT" message to the MS (TS 24.008). Only the cases where this message is sent for "GSM to UMTS Intra SGSN Change" are counted.
- d) A single integer value.
- e) ISYSC.SuccIntraSgsnGsmUmtsRau.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.8.2.37 Failed intra SGSN inter system changes GSM to UMTS RAU, due to internal reasons

- a) Number of failed intra SGSN inter system GSM to UMTS RAU, due to internal reasons.
- b) CC.
- c) "GSM to UMTS Intra SGSN Change" fails due to reasons located inside this 2G+3G-SGSN:- internal resource problem- recovery- ...
- d) A single integer value.
- e) ISYSC.FailIntraSgsnGsmUmtsRauInt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.8.2.48 Failed intra SGSN inter system changes GSM to UMTS RAU, due to external reasons

- a) Number of failed intra SGSN inter system GSM to UMTS RAU, due to external reasons.
- b) CC.
- c) "GSM to UMTS Intra SGSN Change" fails due to reasons located in NE outside this 2G+3G-SGSN, such as abnormal (reject, failure,...)/missing responses from SRNS, MSC/VLR, HLR, ...
- d) A single integer value.
- e) ISYSC.FailIntraSgsnGsmUmtsRauExt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.9 UMTS GTP Measurements

5.9.1 GTP-U Iu

5.9.1.1 Number of outgoing GTP data packets on the Iu interface

- a) This measurement provides the number of GTP data PDUs which have been generated by the GTP-U protocol entity on the Iu interface.

- b) CC.
- c) Transmission by the SGSN of a GTP data PDU on the Iu interface to the MS.
- d) A single integer value.
- e) GTP.GtpuOutDataPktIu.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.9.1.2 Number of incoming GTP data packets on the Iu interface

- a) This measurement provides the number of GTP data PDUs which have been accepted and processed by the GTP-U protocol entity on the Iu interface.
- b) CC.
- c) Reception by the SGSN of a GTP data PDU on the Iu interface from the MS.
- d) A single integer value.
- e) GTP.GtpuInDataPktIu.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.9.1.3 Number of octets of outgoing GTP data packets on the Iu interface

- a) This measurement provides the byte number of outgoing data packets on the Iu interface without the GTP-U header.
- b) CC.
- c) Transmission by the SGSN of an GTP-Data-PDU (T-PDU) on the Iu interface to the MS.
- d) A single integer value.
- e) GTP.GtpuOutDataOctIu.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.9.1.4 Number of octets of incoming GTP data packets on the Iu interface

- a) This measurement provides the byte number of incoming data packets on the Iu interface without the GTP-U header.
- b) CC.
- c) Reception by the SGSN of an GTP-Data-PDU (T-PDU) on the Iu interface from the MS.
- d) A single integer value.
- e) GTP.GtpuInDataOctIu.
- f) SgsnFunction.

- g) Valid for packet switching.
- h) UMTS.

5.9.2 GTP Gn

5.9.2.1 Number of outgoing GTP data packets on the Gn interface

- a) This measurement provides the number of GTP data PDUs which have been generated by the GTP protocol entity on the Gn interface.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of a GTP data PDU on the Gn interface to the GGSN.
- d) A single integer value per measurement type defined in e).
- e) GTP.OutDataPktGn:
 - GTP.OutDataPktGn the total regardless of the GTP version used;
 - GTP.OutDataPktGn.v0 only the GTPv0 part;
 - GTP.OutDataPktGn.v1 only the GTPv1 part.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.9.2.2 Number of incoming GTP data packets on the Gn interface

- a) This measurement provides the number of GTP Data PDUs which have been accepted and processed by the GTP protocol entity on the Gn interface.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Reception by the SGSN of a GTP data PDU on the Gn interface from the GGSN.
- d) A single integer value per measurement type defined in e).
- e) GTP.InDataPktGn:
 - GTP.InDataPktGn the total regardless of the GTP version used;
 - GTP.InDataPktGn.v0 only the GTPv0 part;
 - GTP.InDataPktGn.v1 only the GTPv1 part.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.9.2.3 Number of octets of outgoing GTP data packets on the Gn interface

- a) This measurement provides the number of octets of outgoing GTP data packets on the Gn interface.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.

- c) Transmission by the SGSN of an GTP-Data-PDU (T-PDU) on the Gn interface to the GGSN.
- d) A single integer value per measurement type defined in e).
- e) GTP.OutDataOctGn:
 - GTP.OutDataOctGn the total regardless of the GTP version used;
 - GTP.OutDataOctGn.v0 only the GTPv0 part;
 - GTP.OutDataOctGn.v1 only the GTPv1 part.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.9.2.4 Number of octets of incoming GTP data packets on the Gn interface

- a) This measurement provides the number of octets of incoming GTP data packets on the Gn interface. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Reception by the SGSN of an GTP-Data-PDU (T-PDU) on the Gn interface from the GGSN.
- d) A single integer value per measurement type defined in e).
- e) GTP.InDataOctGn:
 - GTP.InDataOctGn the total regardless of the GTP version used;
 - GTP.InDataOctGn.v0 only the GTPv0 part;
 - GTP.InDataOctGn.v1 only the GTPv1 part.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.9.2.5 Number of outgoing GTP signalling packets on the Gn interface

- a) This measurement provides the number of GTP signalling PDUs which have been generated by the GTP protocol entity on the Gn interface. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of a GTP signalling PDU on the Gn interface to the GGSN.
- d) A single integer value per measurement type defined in e).
- e) GTP.OutSigPktGn:
 - GTP.OutSigPktGn the total regardless of the GTP version used;
 - GTP.OutSigPktGn.v0 only the GTPv0 part;
 - GTP.OutSigPktGn.v1 only the GTPv1 part.
- f) SgsnFunction.
- g) Valid for packet switching.

h) Combined.

5.9.2.6 Number of incoming GTP signalling packets on the Gn interface

a) This measurement provides the number of GTP signalling PDUs which have been accepted and processed by the GTP protocol entity on the Gn interface.

The three measurement types defined in e) are subject to the "2 out of 3 approach".

b) CC.

c) Reception by the SGSN of a GTP signalling PDU on the Gn interface from the GGSN.

d) A single integer value per measurement type defined in e).

e) GTP.InSigPktGn:

- GTP.InSigPktGn the total regardless of the GTP version used;
- GTP.InSigPktGn.v0 only the GTPv0 part;
- GTP.InSigPktGn.v1 only the GTPv1 part.

f) SgsnFunction.

g) Valid for packet switching.

h) Combined.

5.9.2.7 Number of octets of outgoing GTP signalling packets on the Gn interface

a) This measurement provides the number of octets of outgoing GTP signalling packets on the Gn interface. The three measurement types defined in e) are subject to the "2 out of 3 approach".

b) CC.

c) Transmission by the SGSN of an GTP-Signalling-PDU on the Gn interface to the GGSN.

d) A single integer value per measurement type defined in e).

e) GTP.OutSigOctGn:

- GTP.OutSigOctGn the total regardless of the GTP version used;
- GTP.OutSigOctGn.v0 only the GTPv0 part;
- GTP.OutSigOctGn.v1 only the GTPv1 part.

f) SgsnFunction.

g) Valid for packet switching.

h) Combined.

5.9.2.8 Number of octets of incoming GTP signalling packets on the Gn interface

a) This measurement provides the number of octets of incoming GTP signalling packets on the Gn interface. The three measurement types defined in e) are subject to the "2 out of 3 approach".

b) CC.

c) Reception by the SGSN of an GTP-Signalling-PDU on the Gn interface from the GGSN.

d) A single integer value per measurement type defined in e).

e) GTP.InSigOctGn:

- GTP.InSigOctGn the total regardless of the GTP version used;
 - GTP.InSigOctGn.v0 only the GTPv0 part;
 - GTP.InSigOctGn.v1 only the GTPv1 part.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.10 UMTS Bearer Service

5.10.1 UMTS Bearer Service CS time to register (Mean)

- a) This measurement provides the mean time it takes for the subscribers to register with the network for circuit switched (CS) services during each granularity period.
- b) DER (n=1)
- c) This measurement is obtained by accumulating the time intervals for each successful attach between the receipt by the VLR of an "ATTACH REQUEST" from the MS and the corresponding receipt by the VLR of an "ATTACH COMPLETE" message over a granularity period using DER, see TS 24.008. This end value of the time will then be divided by the number of successful attach requests for CS domain observed in the granularity period to give the arithmetic mean, the accumulator shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) UBS.TimeToRegisterCSMean
- f) VlrFunction
- g) Valid for circuit switched traffic.
- h) UMTS.

5.10.2 UMTS Bearer Service CS time to register (Max)

- a) This measurement provides the maximum time it takes for the subscribers to register with the network for circuit switched (CS) services during each granularity period.
- b) GAUGE
- c) This measurement is obtained by monitoring the time intervals for each successful attach between the receipt by the VLR of an "ATTACH REQUEST" from the MS and the corresponding receipt by the VLR of an "ATTACH COMPLETE" message over a granularity period, see TS 24.008. The high tide mark of this time will be stored in a gauge, the gauge shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) UBS.TimeToRegisterCSMax
- f) VlrFunction
- g) Valid for circuit switched traffic.
- h) UMTS.

5.10.3 UMTS Bearer Service PS time to register (Mean)

- a) This measurement provides the mean time it takes for the subscribers to register with the network for packet switched (PS) services during each granularity period.
- b) DER (n=1)
- c) This measurement is obtained by accumulating the time intervals for each successful attach between the receipt by the SGSN of an "ATTACH REQUEST" from the MS and the corresponding receipt by the SGSN of an "ATTACH COMPLETE" message over a granularity period using DER, see TS 24.008. This end value of the time will then be divided by the number of successful attach requests for PS domain observed in the granularity period to give the arithmetic mean.
- d) Each measurement is an integer value.(in milliseconds).
- e) UBS.TimeToRegisterPSMean
- f) SgsnFunction
- g) Valid for packet switched traffic.
- h) UMTS.

5.10.4 UMTS Bearer Service PS time to register (Max)

- a) This measurement provides the maximum time it takes for the subscribers to register with the network for packet switched (PS) services during each granularity period.
- b) GAUGE
- c) This measurement is obtained by monitoring the time intervals for each successful attach between the receipt by the SGSN of an "ATTACH REQUEST" from the MS and the corresponding receipt by the SGSN of an "ATTACH COMPLETE" message over a granularity period using DER, see TS 24.008. The high tide mark of this time will be stored in a gauge, the gauge shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) UBS.TimeToRegisterPSMax
- f) SgsnFunction
- g) Valid for packet switched traffic.
- h) UMTS.

5.10.5 UMTS Bearer Service time to establish Communications Management (CM) radio access connectivity (Mean)

- a) This measurement provides the mean time it takes for the radio access network to establish a service connection (for circuit switched connection establishment, supplementary services activation, short message transfer, location services) during each granularity period.
- b) DER (n=1).
- c) This measurement is obtained by accumulating the time intervals for each successful service request between the receipt by the MSC of a "CM SERVICE REQUEST" from the MS and the corresponding receipt by the MSC of an "CM SERVICE ACCEPT" message over a granularity period using DER, see TS 24.008. This end value of the time will then be divided by the number of successful service requests observed in the granularity period to give the arithmetic mean, the accumulator shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) UBS.TimeForCMConnectRANMean

- f) MscFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

5.10.6 UMTS Bearer Service time to establish Communications Management (CM) radio access connectivity (Max)

- a) This measurement provides the maximum time it takes for the radio access network to establish a service connection (for circuit switched connection establishment, supplementary services activation, short message transfer, location services) during each granularity period.
- b) GAUGE.
- c) This measurement is obtained by monitoring the time intervals for each successful service request between the receipt by the MSC of a "CM SERVICE REQUEST" from the MS and the corresponding receipt by the MSC of an "CM SERVICE ACCEPT" message over a granularity period, see TS 24.008. The high tide mark of this time will be stored in a gauge, the gauge shall be reinitialised at the beginning of each granularity period.
- d) Each measurement is an integer value.(in milliseconds).
- e) UBS.TimeForCMConnectRANMax
- f) MscFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

End of Change in Clause 5

Change in Clause 6

6 Measurements related to the GGSN

6.1 Session Management

6.1.1 Session establishments

The performance counters presented in this subclause are mainly intended to:

- monitor the session establishment success at the GGSN level
- identify the main causes for GGSN originating session establishment failures
- and study the repartition of the different traffic classes within session establishment attempts and successes.

These counters are associated to GPRS Tunnelling Protocol signalling (GTP-C for the control plane), between the SGSN and the GGSN, and defined in TS 23.060 and TS 29.060.

The figure below, from TS 23.060, recalls the sequence of messages exchanged for a primary PDP context activation and a subsequent secondary PDP context activation and details the events triggering the update of the counters values.

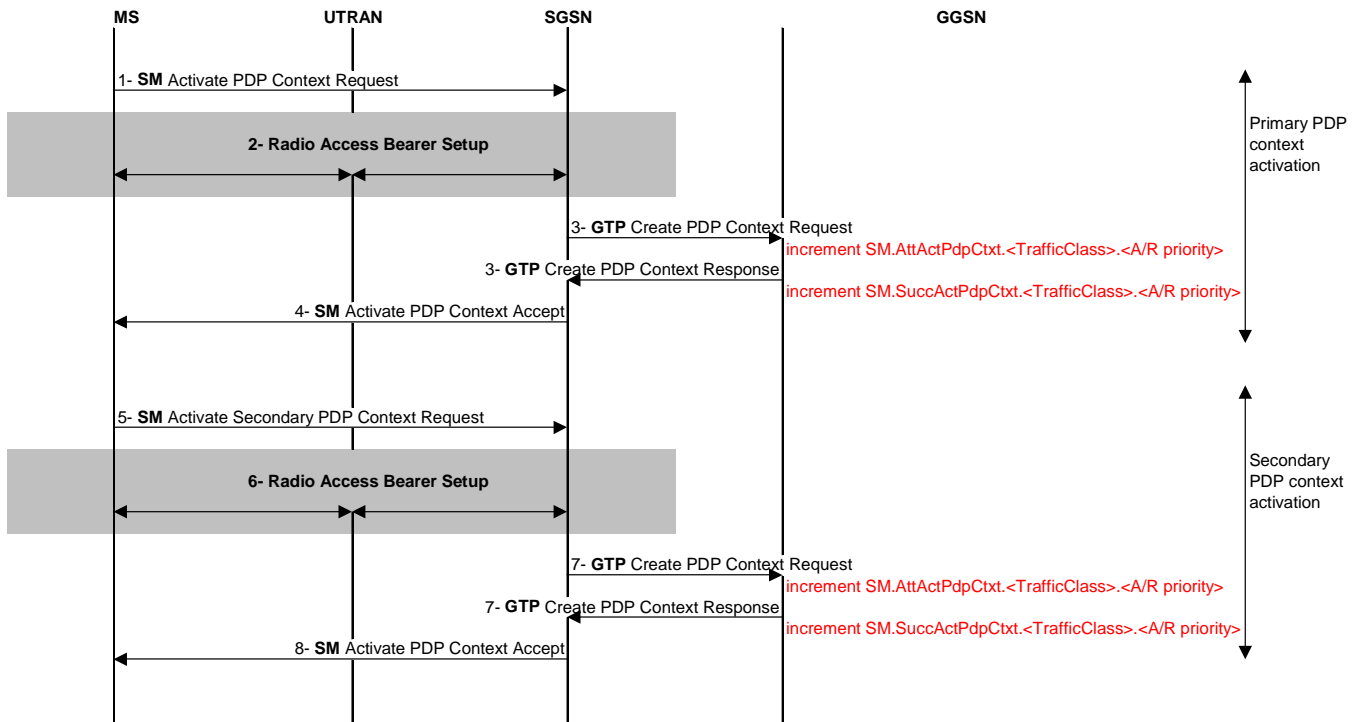


Figure from TS 23.060:

The three measurement types defined in the clause 6.1.1 are subject to the "2 out of 3 approach".

6.1.1.1 Attempted session establishments

- This measurement provides the number of attempted session establishments. This measurement is split into subcounters per traffic class and allocation/retention priority (or precedence class) indicated in the QoS profile.
- CC
- On receipt of a CREATE PDP CONTEXT REQUEST message by the GGSN, the relevant measurement is incremented according to the traffic class and allocation/retention priority (or precedence class) indicated in the message. In case of a PDP context activated with R97/98 QoS attributes, the fields traffic class and allocation/retention priority used for screening are derived from delay class and precedence class respectively, as ruled in TS 23.107 [8]. See also TS 24.008 and TS 29.060.
- A single integer value per measurement type defined in e)
- SM.AttActPdpCtxt.Bgrd.Low
 - SM.AttActPdpCtxt.Conv.Low
 - SM.AttActPdpCtxt.Intact.Low
 - SM.AttActPdpCtxt.Strm.Low
 - SM.AttActPdpCtxt.Bgrd.High
 - SM.AttActPdpCtxt.Conv.High
 - SM.AttActPdpCtxt.Intact.High
 - SM.AttActPdpCtxt.Strm.High
 - SM.AttActPdpCtxt.Bgrd.Medium
 - SM.AttActPdpCtxt.Conv.Medium
 - SM.AttActPdpCtxt.Intact.Medium
 - SM.AttActPdpCtxt.Strm.Medium
- GgsnFunction
- Valid for packet switched traffic
- COMB
- This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.1.1.2 Successful session establishments

- a) This measurement provides the number of sessions successfully established. This measurement is split into subcounters per traffic class and allocation/retention priority (or precedence class) given in the QoS profile of the related PDP context.
- b) CC
- c) The relevant measurement is incremented on transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message sent with cause "Request Accepted", according to the traffic class and allocation/retention priority of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the fields traffic class and allocation/retention priority used for screening are derived from delay class and precedence class respectively, as ruled in TS 23.107 [8]. See also TS 24.008 and TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) SM.SuccActPdpCtxt.Bgrd.Low
SM.SuccActPdpCtxt.Conv.Low
SM.SuccActPdpCtxt.Intact.Low
SM.SuccActPdpCtxt.Strm.Low
SM.SuccActPdpCtxt.Bgrd.High
SM.SuccActPdpCtxt.Conv.High
SM.SuccActPdpCtxt.Intact.High
SM.SuccActPdpCtxt.Strm.High
SM.SuccActPdpCtxt.Bgrd.Medium
SM.SuccActPdpCtxt.Conv.Medium
SM.SuccActPdpCtxt.Intact.Medium
SM.SuccActPdpCtxt.Strm.Medium
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.1.1.3 Failed session establishments

- a) This measurement provides the number of session establishment failures. This measurement is split into subcounters per failure cause.
- b) CC
- c) On transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message indicating a PDP context activation failure, the measurement is incremented according to the failure cause. Possible causes are included in TS 29.060. The sum of all supported per cause measurements should equal the total number of PDP context activation failures.
- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported.
- e) The measurement name has the form SM.FailActPdpCtxt.*Cause* where *Cause* identifies the failure cause.
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Maintenance and Vendor Performance Modelling communities.

6.1.2 Network-initiated session establishments

The performance counters presented in this subclause focus on network initiated PDP context activation procedure, that allows the GGSN to initiate the activation of a PDP context on receipt of a PDP PDU on the Gi interface. The counters proposed are mainly intended to

- monitor the signalling exchanged between the HLR and the GGSN during this procedure
- and monitor the success rate for network-initiated session establishments. It has to be noted that measurements proposed enable to distinguish between the establishment failures occurring before and after the SGSN has sent the context activation request to the MS.

These counters are associated to the Mobile Application Part (MAP) protocol layer (defined in TS 29.002) and to GPRS Tunnelling Protocol signalling (GTP-C for the control plane), between the SGSN and the GGSN (defined in TS 29.060).

The figure below, from TS 23.060, recalls the sequence of messages exchanged for a network initiated PDP context activation and details the events triggering the update of the counters values.

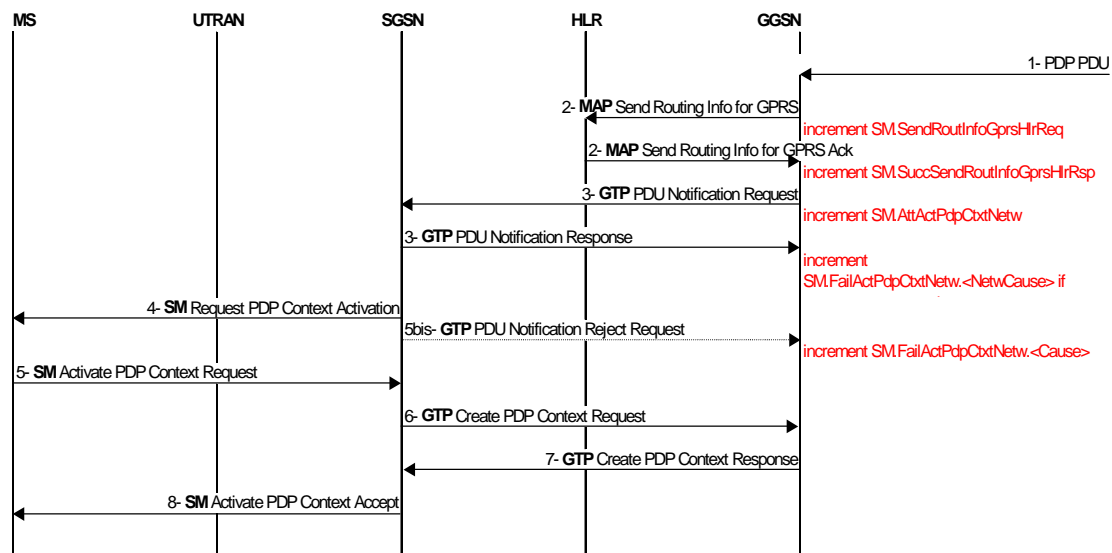


Figure from TS 23.06:

6.1.2.1 Number of routing information requests for network-initiated session establishment attempts

- a) This measurement provides the number of 'Send Routing Info for GPRS' requests sent to the HLR.
- b) CC
- c) The measurement is incremented on transmission by the GGSN of a MAP SEND ROUTING INFO FOR GPRS message to the HLR. See TS 23.060 and TS 29.002.
- d) Integer
- e) SM.SendRoutInfoGprsHlrReq
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.1.2.2 Number of routing information successful responses for network-initiated session establishment attempts

- a) This measurement provides the number of ' Send Routing Info for GPRS ^a response messages received from HLR indicating a positive outcome.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of a MAP SEND ROUTING INFO FOR GPRS response message containing an SGSN address, which indicates a successful outcome. See TS 23.060 and TS 29.002.
- d) Integer
- e) SM.SuccSendRoutInfoGprsHlrRsp
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Maintenance communities.

6.1.2.3 Attempted Network-initiated session establishments

6.1.2.3.1 Attempted Network-initiated session establishments

- a) This measurement provides the number of network-initiated session establishments attempted. Only the session establishment attempts for which a successful routing response from the HLR has been received are counted (i.e. for which a response including an SGSN address).
- b) CC
- c) The measurement is incremented on transmission by the GGSN of a PDU NOTIFICATION REQUEST message to the SGSN. See TS 23.060 and TS 29.060.
- d) Integer
- e) SM.AttActPdpCtxtNetw
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.1.2.3.24 Failed Network-initiated session establishments - failures occurred before sending PDP context activation request to the MS

- a) This measurement provides the number of network initiated session establishment failures. This measurement is split into subcounters per failure cause.
- b) CC
- c) On receipt by the GGSN of a PDU NOTIFICATION RESPONSE message with cause different from "Request Accepted", indicating a PDP context activation failure, the relevant measurement is incremented according to the failure cause. Possible causes are included in TS 29.060. The sum of all supported per cause measurements should equal the total number of PDP context activation failures occurred before sending REQUEST PDP CONTEXT ACTIVATION message to the MS.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported.
- e) The measurement name has the form *SM.FailActPdpCtxtNetw.NetwCause* where *NetwCause* identifies the failure cause.
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Maintenance communities.

6.1.2.3.35 Failed Network-initiated session establishments - failures occurred after sending PDP context activation request to the MS

- a) This measurement provides the number of network initiated session establishment failures. This measurement is split into subcounters per failure cause.
- b) CC
- c) On receipt by the GGSN of a PDU NOTIFICATION REJECT REQUEST, the relevant measurement is incremented according to the failure cause. Possible causes are included in TS 29.060. The sum of all supported per cause measurements should equal the total number of PDP context activation failures occurred after sending REQUEST PDP CONTEXT ACTIVATION message to the MS.
- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported.
- e) The measurement name has the form *SM.FailActPdpCtxtNetw.MsCause* where *MsCause* identifies the failure cause.
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Maintenance communities.

6.1.3 Number of subscribers

The performance counters presented in this subclause are mainly intended to establish a subscriber profile. Such a profile details the number of elementary procedures per active subscriber (PDP context activations, modifications, updates, Ö), usually during a busy hour. This profile may be used for 2 main purposes:

- to estimate the current load of the equipment, with details on the respective weight of each procedure in the overall load,
- to estimate the impact on the equipment of a modification of a factor in this subscriber profile (e.g. increase of the number of simultaneous active PDP contexts per subscriber, increase of the number of subscribers, Ö).

6.1.3.1 Number of subscribers with an activated PDP context

- a) This measurement provides the number of simultaneous subscribers with an activated PDP context.
- b) GAUGE
- c) The measurement is incremented on transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message with cause "Request Accepted" for an MSISDN that had no PDP context already activated. The measurement is decremented on transmission by the GGSN of a DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted" related to the last PDP context for an MSISDN. See TS 29.060 and TS 23.060.

- d) Integer
- e) SM.NbrActSubs
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.1.3.2 Mean number of subscribers with an activated PDP context

- a) This measurement provides the mean number of simultaneous subscribers with an activated PDP context.
- b) SI
- c) This measurement is obtained by sampling at a regular interval the number of subscribers that have an activated PDP context in the GGSN.
- d) Integer
- e) SM.MeanActSubs
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.1.4 Session conclusions

The performance counters presented in this subclause are related to PDP context deactivation procedure. The counters proposed are mainly intended to evaluate the ratio of GGSN-initiated PDP context deactivations in overall PDP context deactivations, estimate the PDP context deactivation success rate, and may also be used in the subscriber or session profile.

The figures below, from TS 23.060, recall the sequence of messages exchanged for MS, SGSN or GGSN initiated PDP context deactivations and detail the events triggering the update of the counters values.

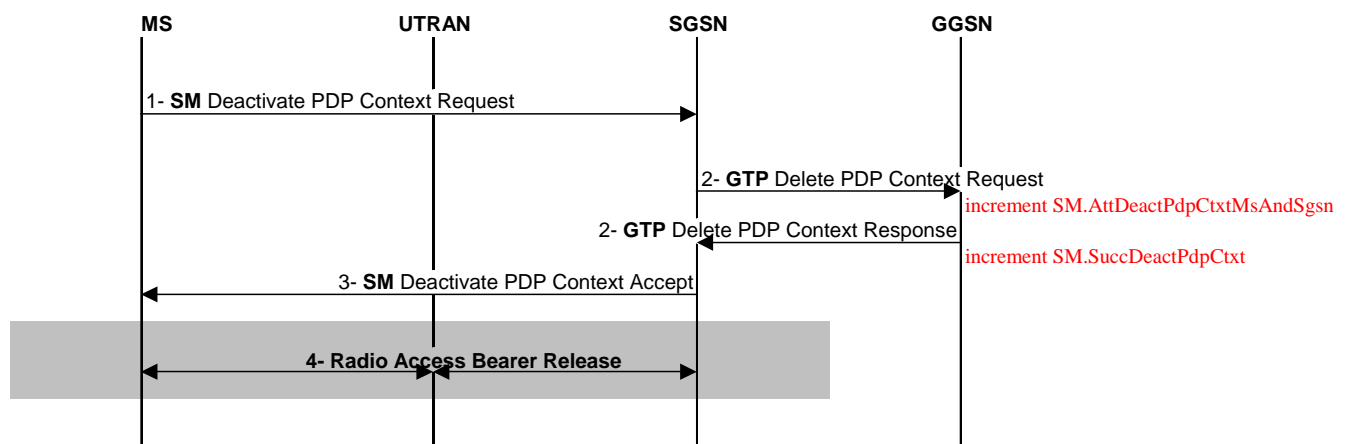


Figure: MS initiated PDP context deactivation

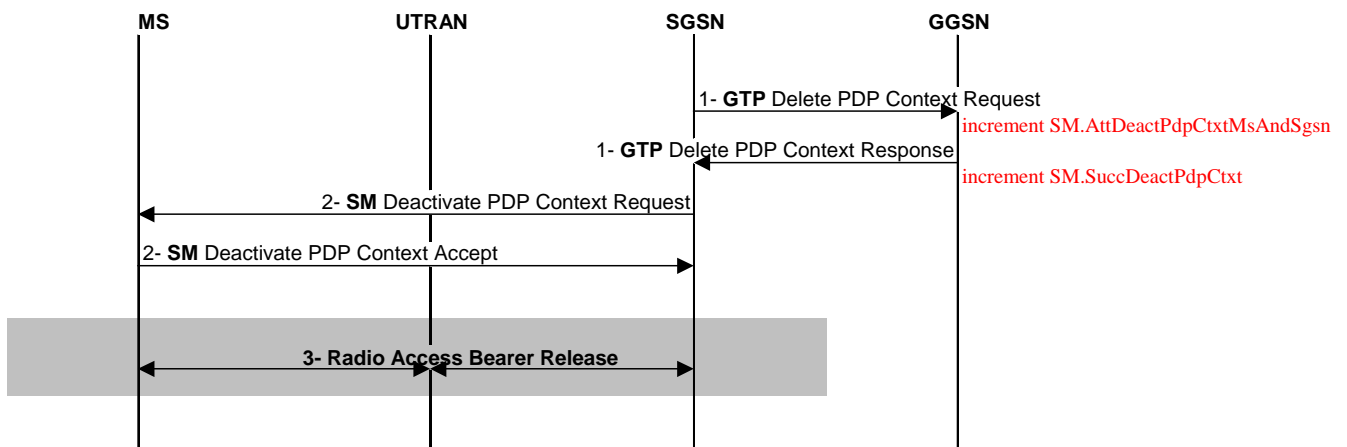


Figure: GSN initiated PDP context deactivation

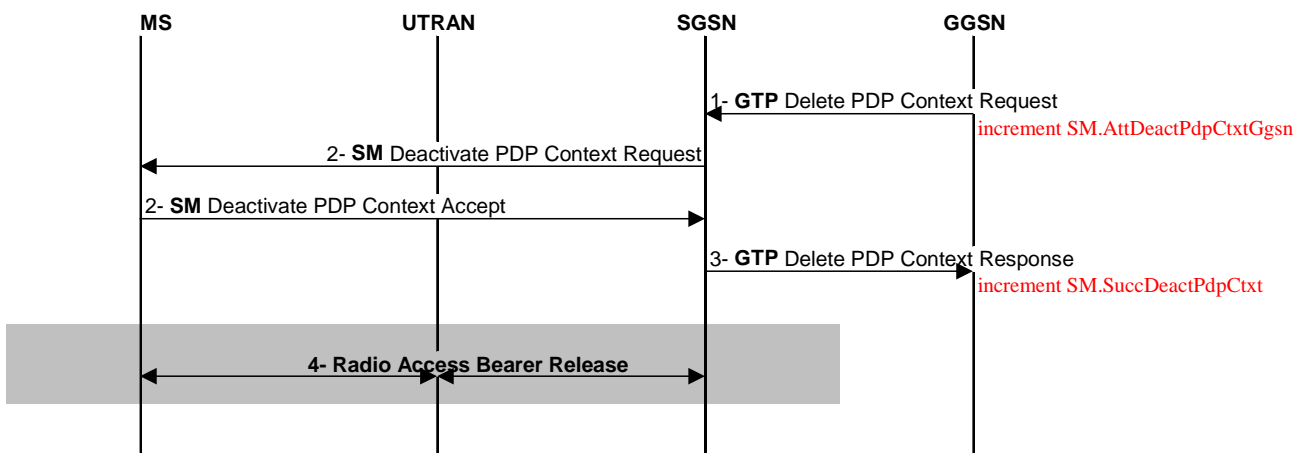


Figure: GGSN initiated PDP context deactivation

6.1.4.1 MS & SGSN-initiated session conclusions

6.1.4.1.1 Attempted MS & SGSN-initiated session conclusions

- a) This measurement provides the number of PDP context deactivations initiated by SGSN.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of a DELETE PDP CONTEXT REQUEST message. See TS 29.060.
- d) Integer
- e) SM.AttDeactPdpCtxtMsAndSgsn
- f) GgsnFunction
- g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.1.4.2 GGSN-initiated session conclusions

6.1.4.2.1 Attempted GGSN-initiated session conclusions

a) This measurement provides the number of PDP context deactivations initiated by GGSN.

b) CC

c) The measurement is incremented on transmission by the GGSN of a DELETE PDP CONTEXT REQUEST message. See TS 29.060.

d) Integer

e) SM.AttDeactPdpCtxtGgsn

f) GgsnFunction

g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.1.4.3 Successfully concluded sessions

a) This measurement provides the number of sessions successfully concluded.

b) CC

c) The measurement is incremented on transmission or receipt by the GGSN of a DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted". See TS 29.060.

d) Integer

e) SM.SuccDeactPdpCtxt

f) GgsnFunction

g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.2 Per APN measurements

These measurements will only be provided for a subset of all the APNs of the GGSN (see TS 23.003 for APN definition). The way the list of monitored APNs is configured is outside the scope of the present document.

6.2.1 Session establishments

The performance counters presented in this subclause are intended to bring a more detailed view on session activations compared to counters defined in subclause 1.1. Especially, they enable to monitor the session establishment success rate when user authentication is required and when a dynamic PDP address is to be allocated by the GGSN.

Furthermore, the definition of "per APN" measurements allows to let performance monitoring focus on a "specific service" handled by a GGSN: TS 23.003 indicates that an APN Network Identifier may be used to access a service associated with a GGSN and that this may be achieved by defining;

- an APN that corresponds to a DNS name of a GGSN and is locally interpreted by the GGSN as a request for a specific service, or;
- an APN Network Identifier consisting of 3 or more labels and starting with a Reserved Service Label, or an APN Network Identifier consisting of a Reserved Service Label alone, that indicates a GGSN by the nature of the requested service.

The figure below, from TS 29.061 [26] details the message sequence during a PDP context activation for the non-transparent IP case, where a dynamic PDP address is to be allocated and user authentication is required.

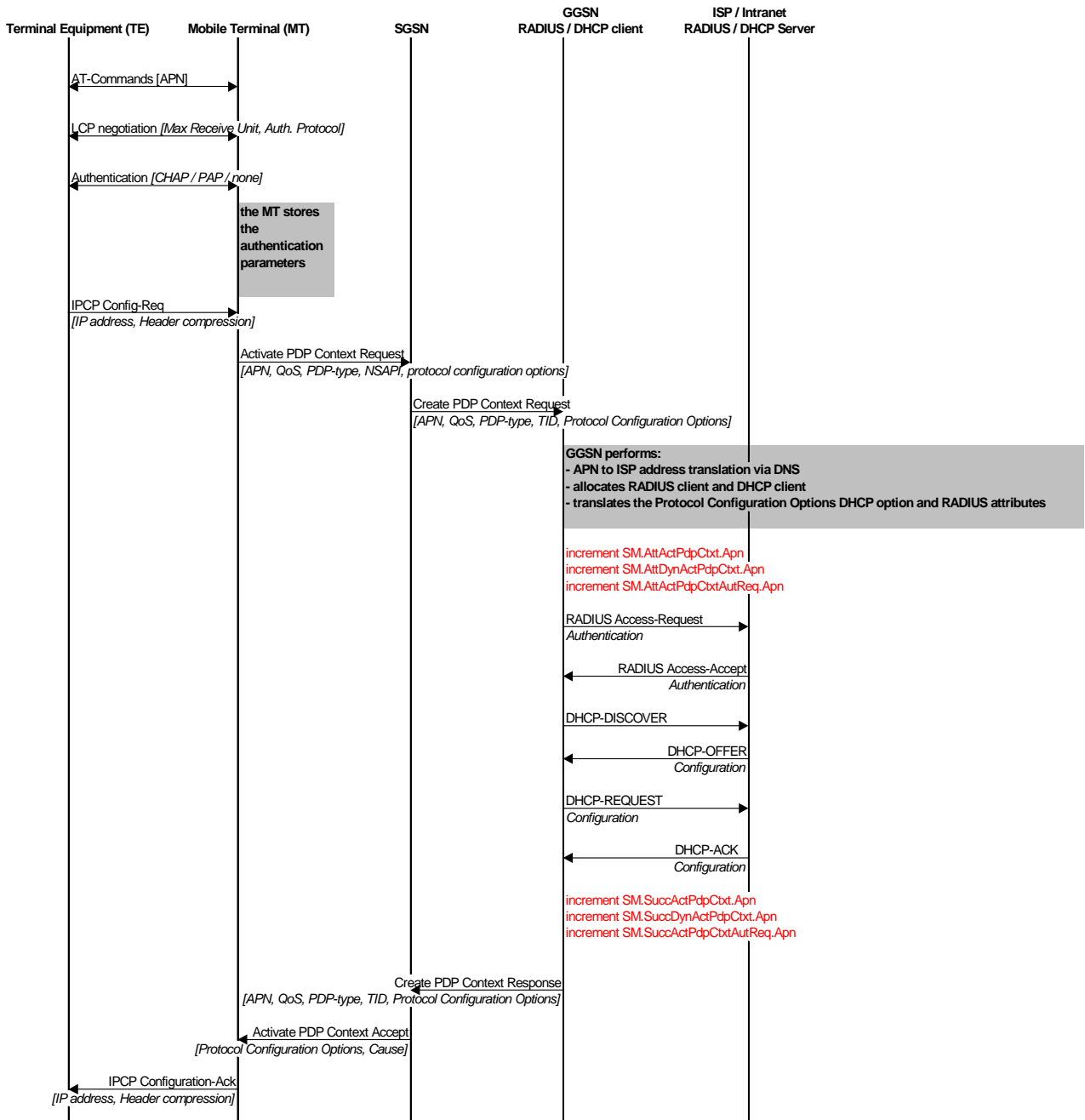


Figure:

6.2.1.1 Session establishments, per APN

6.2.1.1.1 Attempted session establishments, per APN

- a) This measurement provides the number of PDP context activation procedures on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of a CREATE PDP CONTEXT REQUEST message from the SGSN. See TS 29.060.
- d) Integer
- e) SM.AttActPdpCtxt.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.2.1.1.2 Successfully established sessions, per APN

- a) This measurement provides the number of successfully completed activation PDP context procedures on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on transmission of a CREATE PDP CONTEXT RESPONSE message with cause "Request Accepted " from GGSN. See TS 29.060.
- d) Integer
- e) SM.SuccActPdpCtxt.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.2.1.2 Session establishments with dynamic PDP address allocation required, per APN

6.2.1.2.1~~3~~ Attempted session establishments with dynamic PDP address allocation required, per APN

- a) This measurement provides the number of dynamic PDP context activation procedures where a dynamic PDP address is requested on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of a CREATE PDP CONTEXT REQUEST message with an empty PDP address, which indicates that the MS requires a dynamic PDP address. See TS 29.060.
- d) Integer
- e) SM.AttDynActPdpCtxt.Apn
- f) GgsnFunction, per APN

- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Maintenance communities.

6.2.1.2.24 Successfully established sessions with dynamic PDP address allocation required, per APN

- a) This measurement provides the number of successfully attempted dynamic PDP context activation procedures where a dynamic PDP address is requested on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message with cause "Request Accepted" where the PDP address has been dynamically assigned. See TS 23.060 and TS 29.060.
- d) Integer
- e) SM.SuccDynActPdpCtxt.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Maintenance communities.

6.2.1.3 Session establishments with user authentication required, per APN

6.2.1.3.15 Attempted session establishments with user authentication required, per APN

- a) This measurement provides the number of PDP context activation procedures for which user authentication is required.
- b) CC
- c) The measurement is incremented when a CREATE PDP CONTEXT REQUEST message is received by the GGSN, for which protocol configuration options indicates that user authentication is required to access the external PDN. See TS 29.060 and TS 24.008.
- d) Integer
- e) SM.AttActPdpCtxtAutReq.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Maintenance communities.

6.2.1.3.26 Failed session establishments due to user authentication failure, per APN

- a) This measurement provides the number of PDP context activation procedures failed due to user authentication failure.
- b) CC

- c) The measurement is incremented when a CREATE PDP CONTEXT RESPONSE message with cause "User Authentication Failed" is received by the GGSN. See TS 29.060 and TS 24.008.
- d) Integer
- e) SM.FailActPdpCtxtAutReq.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Maintenance communities.

6.2.2 Active sessions

The performance counters presented in this subclause are defined on a per APN basis and are mainly intended

- to monitor the repartition of QoS attributes defined for current active sessions
- and to establish a session profile. A session profile details the number of elementary procedures per active session (PDP context modifications, updates, Ö), usually during a busy hour.

6.2.2.1 Number of simultaneous active sessions, per APN

- a) This measurement provides the current number of simultaneous active sessions per APN. This measurement is split into subcounters per traffic class and allocation/retention priority (or precedence class) indicated in the QoS profile.
- b) GAUGE
- c) The relevant measurement is incremented on transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message with cause "Request Accepted" according to the traffic class or allocation/retention priority indicated in the QoS profile.
The relevant measurement is decremented on transmission or receipt of DELETE PDP CONTEXT RESPONSE with cause "Request Accepted" according to the traffic class or the allocation/retention priority of the PDP context.
In case of a PDP context activated with R97/98 QoS attributes, the fields traffic class and allocation/retention priority used for screening are derived from delay class and precedence class respectively, as ruled in TS 23.107 [8].
See also TS 24.008 and TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) SM.NbrActPdpCtxt.Apn.Low
SM.NbrActPdpCtxt.Apn.Medium
SM.NbrActPdpCtxt.Apn.High
SM.NbrActPdpCtxt.Apn.Conv
SM.NbrActPdpCtxt.Apn.Strm
SM.NbrActPdpCtxt.Apn.Intact
SM.NbrActPdpCtxt.Apn.Bgrd
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.2.2.2 Peak number of simultaneous active sessions, per APN

- a) This measurement provides the peak number of active PDP contexts in GGSN per APN. This measurement is obtained by comparing following an update of the actual number of active PDP context in GGSN per APN, this value with the currently maximal value within the actual granularity period.
- b) GAUGE
- c) The measurement is incremented on transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message with cause "Request Accepted" and decremented on transmission or receipt by the GGSN of a DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted". The measurement value keeps track of the highest value experienced in the collection interval. See TS 29.060
- d) Integer
- e) SM.MaxNbrActPdpCtxt.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Operator Business and Vendor Performance Modelling communities.

6.2.2.3 MS & SGSN-initiated session modifications, per APN

6.2.2.3.1 Attempted MS & SGSN-initiated session modifications, per APN

- a) This measurement provides the number of PDP context updates attempted, either by MS or SGSN.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of an UPDATE PDP CONTEXT REQUEST message. See TS 29.060.
- d) Integer
- e) SM.AttUpdPdpCtxtMsAndSgsn.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.2.2.3.24 Successfully performed MS & SGSN-initiated session modifications, per APN

- a) This measurement provides the number of successfully performed PDP context updates initiated either by MS or SGSN.
- b) CC
- c) The measurement is incremented on transmission by the GGSN of an UPDATE PDP CONTEXT RESPONSE message with cause "Request Accepted". See TS 29.060.
- d) Integer
- e) SM.SuccUpdPdpCtxtMsAndSgsn.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.2.3 Session conclusions

6.2.3.1 MS-initiated session conclusions, per APN

6.2.3.1.1 Attempted MS-initiated session conclusions, per APN

- a) This measurement provides the number of PDP context deactivation procedures initiated by the MS on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of a DELETE PDP CONTEXT REQUEST message from the SGSN. See TS 23.060 and TS 29.060.
- d) Integer
- e) SM.AttDeactPdpCtxtMs.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.2.3.1.2 Successful MS-initiated session conclusions, per APN

- a) This measurement provides the number of successfully completed PDP context deactivation procedures initiated by the MS on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on transmission by the GGSN of a DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted" to the SGSN. See TS 29.060.
- d) Integer
- e) SM.SuccDeactPdpCtxtMs.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.2.3.2 GGSN-initiated session conclusions, per APN

6.2.3.2.1 Attempted GGSN-initiated session conclusions, per APN

- a) This measurement provides the number of PDP context deactivation procedures initiated by the GGSN, on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on transmission by the GGSN of a DELETE PDP CONTEXT REQUEST message to the SGSN. See TS 29.60.

- d) Integer
- e) SM.AttDeactPdpCtxtGgsn.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.2.3.2.24 Successful GGSN-initiated session conclusions, per APN

- a) This measurement provides the number of successfully completed PDP context deactivation procedures initiated by the GGSN, on a per APN of the GGSN basis.
- b) CC
- c) The measurement is incremented on receipt of DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted" from the SGSN.
- d) Integer
- e) SM.SuccDeactPdpCtxtGgsn.Apn
- f) GgsnFunction, per APN
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.3 GTP measurements

The performance counters presented in this subclause are mainly intended to:

- monitor the signalling and bearer traffic exchanged between the GGSN and peer GSNs
- establish the session profile (including GTP average packet size, signalling overhead, uplink and downlink GTP traffic per session, Ö)
- and monitor the GGSN load (through measurements such as the total bit rate handled by the node, the number of GTP tunnels handled or the ratio of packets discarded at GGSN level).

These counters are associated to GPRS Tunnelling Protocol (GTP-C and GTP-U), between the SGSN and the GGSN, and defined in TS 23.060 and TS 29.060. The breakdown per traffic class allows to monitor the way traffic is handled by the GGSN according to QoS attributes attached to the relevant PDP context.

6.3.1 Number of incoming GTP data packets on the Gn interface

- a) This measurement provides the number of GTP Data Packets received on the Gn interface. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on receipt of a GTP data packet on the Gn interface, according to the traffic class of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.060.
- d) A single integer value per measurement type defined in e)

- e) GTP.IncDataPkt.Bgrd
GTP.IncDataPkt.Conv
GTP.IncDataPkt.Intact
GTP.IncDataPkt.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.3.2 Number of outgoing GTP data packets on the Gn interface

- a) This measurement provides the number of GTP Data Packets sent onto the Gn interface. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on transmission of a GTP data packet on the Gn interface, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.OutDataPkt.Bgrd
GTP.OutDataPkt.Conv
GTP.OutDataPkt.Intact
GTP.OutDataPkt.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.3.3 Number of discarded GTP data packets

- a) This measurement provides the number of GTP Data Packets discarded. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented when a GTP data packet is discarded, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.DiscDataPkt.Bgrd
GTP.DiscDataPkt.Conv
GTP.DiscDataPkt.Intact
GTP.DiscDataPkt.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic

- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.3.4 Number of octets of incoming GTP data packets on the Gn interface

- a) This measurement provides the number of GTP payload octets received. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on receipt of a GTP data packet on the Gn interface, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. The data packet size is extracted from the GTP header and added on to the measurement value. See TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.IncDataOct.Bgrd
GTP.IncDataOct.Conv
GTP.IncDataOct.Intact
GTP.IncDataOct.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.3.5 Number of octets of outgoing GTP data packets on the Gn interface

- a) This measurement provides the number of GTP payload octets sent. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on transmission of a GTP data packet on the Gn interface, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. The data packet size is extracted from the GTP header and added on to the measurement value. See TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.OutDataOct.Bgrd
GTP.OutDataOct.Conv
GTP.OutDataOct.Intact
GTP.OutDataOct.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.3.6 Number of incoming GTP signalling packets on the Gn interface

- a) This measurement provides the number of GTP signalling packets received on the Gn interface. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on receipt of a GTP signalling packet on the Gn interface, according to the traffic class of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.IncSigPkt.Bgrd
GTP.IncSigPkt.Conv
GTP.IncSigPkt.Intact
GTP.IncSigPkt.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.3.7 Number of outgoing GTP signalling packets on the Gn interface

- a) This measurement provides the number of GTP signalling packets sent onto the Gn interface. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on transmission of a GTP signalling packet on the Gn interface, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.OutSigPkt.Bgrd
GTP.OutSigPkt.Conv
GTP.OutSigPkt.Intact
GTP.OutSigPkt.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.3.8 Number of discarded GTP signalling packets

- a) This measurement provides the number of GTP signalling packets discarded. This measurement is split into subcounters per traffic class.
- b) CC

- c) The relevant measurement is incremented when a GTP signalling packet is discarded, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.DiscSigPkt.Bgrd
GTP.DiscSigPkt.Conv
GTP.DiscSigPkt.Intact
GTP.DiscSigPkt.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.3.9 Number of octets of incoming GTP signalling packets on the Gn interface

- a) This measurement provides the number of octets of received GTP signalling packets. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on receipt of a GTP signalling packet on the Gn interface, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. The signalling packet size is extracted from the GTP header and added on to the measurement value. See TS 29.060.
- d) A single integer value per measurement type defined in e)
- e) GTP.IncSigOct.Bgrd
GTP.IncSigOct.Conv
GTP.IncSigOct.Intact
GTP.IncSigOct.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.3.10 Number of octets of outgoing GTP signalling packets on the Gn interface

- a) This measurement provides the number of octets of sent GTP signalling packets. This measurement is split into subcounters per traffic class.
- b) CC
- c) The relevant measurement is incremented on transmission of a GTP signalling packet on the Gn interface, according to the traffic class indicated in the QoS profile of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as

ruled in TS 23.107 [8]. The signalling packet size is extracted from the GTP header and added on to the measurement value. See TS 29.060.

- d) A single integer value per measurement type defined in e)
- e) GTP.OutSigOct.Bgrd
GTP.OutSigOct.Conv
GTP.OutSigOct.Intact
GTP.OutSigOct.Strm
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.3.11 Number of GTP tunnels on the Gn interface

- a) This measurement provides the current number of simultaneous GTP tunnels on Gn interface handled by the GGSN.
- b) GAUGE
- c) The measurement is incremented on transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message with cause "Request Accepted".
It is decremented on transmission by the GGSN of a DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted".
The measurement includes GTP tunnels for data (user plane) as well as GTP tunnels for signalling (control plane). See TS 29.060.
- d) Integer
- e) GTP.NbrTunnels
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.3.12 Number of GTP tunnels created on the Gn interface

- a) This measurement provides the number of GTP Tunnels created on Gn interface.
- b) CC
- c) The measurement is incremented on transmission by the GGSN of a CREATE PDP CONTEXT RESPONSE message with cause "Request Accepted".
The measurement includes GTP tunnels for data (user plane) as well as GTP tunnels for signalling (control plane). See TS 29.060.
- d) Integer
- e) GTP.NbrCreatTunnels
- f) GgsnFunction
- g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.4 GTP' measurements

The performance counters presented in this subclause are intended to monitor the transfer of G-CDRs to the CGF; in particular

- the number of CDR transfer attempts, together with the cause triggering the transfer enables to dimension both the CGF / Billing System and the Ga interface. The breakdown of causes for transfer attempts may also help in tuning the parameters associated to partial CDR creation.
- the breakdown of causes for transfer failure is provided to track and investigate any problem that could be detected thanks to the CDR transfer success rate.

These counters are associated to the GTP' protocol between the GGSN and the CGF, as defined in TS 29.060 and TS 32.015.

The figure below from TS 32.015 shows a normal CDR transfer between a GSN and a CGF and details the events triggering the update of the counters values.

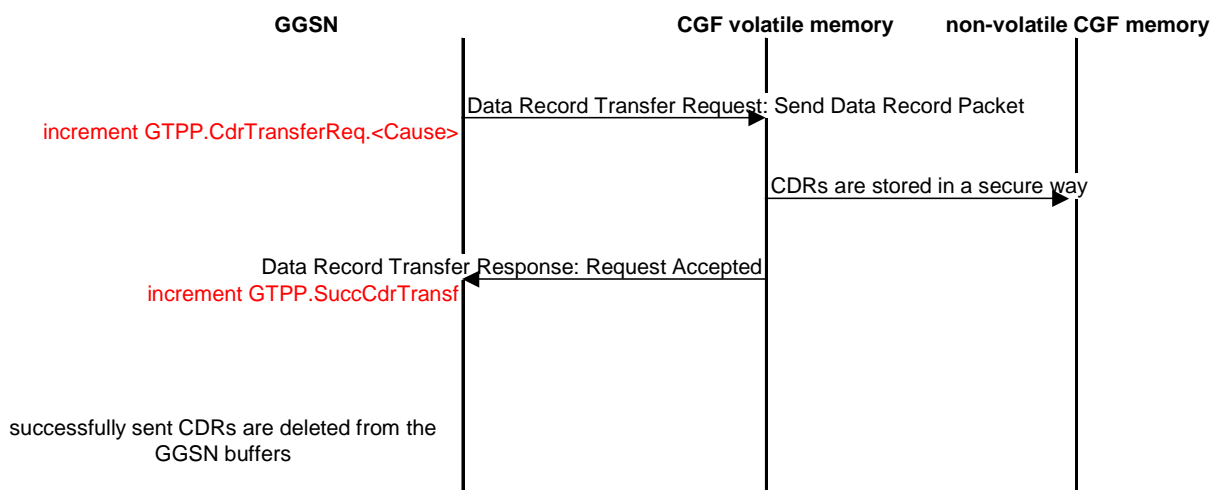


Figure from TS 32.015:

The three measurement types defined in the clause 6.4 are subject to the "2 out of 3 approach".

6.4.1 Attempted CDR information transfers

- This measurement provides the number of CDR information transfers attempted. This measurement is split into subcounters per transfer triggering cause.
- CC
- The relevant measurement is incremented when a DATA RECORD TRANSFER REQUEST message used to transmit CDR information is sent to the CGF, according to the cause that triggered the transfer. Possible causes are included in TS 32.015.
- Each measurement is an integer value.
- The measurement name has the form `GTPP.CdrTransfReq.Cause` where *Cause* indicates the cause that triggered the transfer.
- GgsnFunction

- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.4.2 Successful CDR information transfers

- a) This measurement provides the number of CDR information successfully transmitted to CGF.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of a DATA RECORD TRANSFER RESPONSE message with cause code "Request Accepted".
- d) Integer
- e) GTPP.SuccCdrTransf
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.4.3 Failed CDR information transfers

- a) This measurement provides the number of CDR information failed to be transferred to CGF. This measurement is split into subcounters per failure cause. Possible causes are included in TS 32.015.
- b) CC
- c) The relevant measurement is incremented on receipt by the GGSN of a DATA RECORD TRANSFER RESPONSE message according to the failure cause.
- d) Each measurement is an integer value.
- e) The measurement name has the form GTPP.FailCdrTransf.*Cause* where *Cause* indicates the failure cause.
- f) GgsnFunction
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Maintenance and Operator Traffic Engineering communities.

6.5 IP measurements

The performance counters presented in this subclause are mainly intended to:

- monitor the bearer traffic exchanged between the GGSN and the external PDN on the Gi interface
- establish the session profile (including IP average packet size, uplink and downlink IP traffic per session, Ö), possibly per traffic class
- and monitor the GGSN load (through measurements such as the total bit rate handled by the node, the ratio of packets discarded at GGSN level, Ö).

These counters are associated to IP protocol on the Gi interface.

These counters are proposed to be screened with regards to the protocol configuration options, as defined in TS 24.008 and TS 29.061 [26], i.e. a set of the counters is associated to any valid combination of the different options below:

- transparent or non-transparent access to the external PDN
- user data encryption (IPSec, Ö)
- tunnelling of packets onto the Gi interface

Any valid combination of these options fully defines a "Gi reference point". The figure below gives an overview of some Gi reference points.

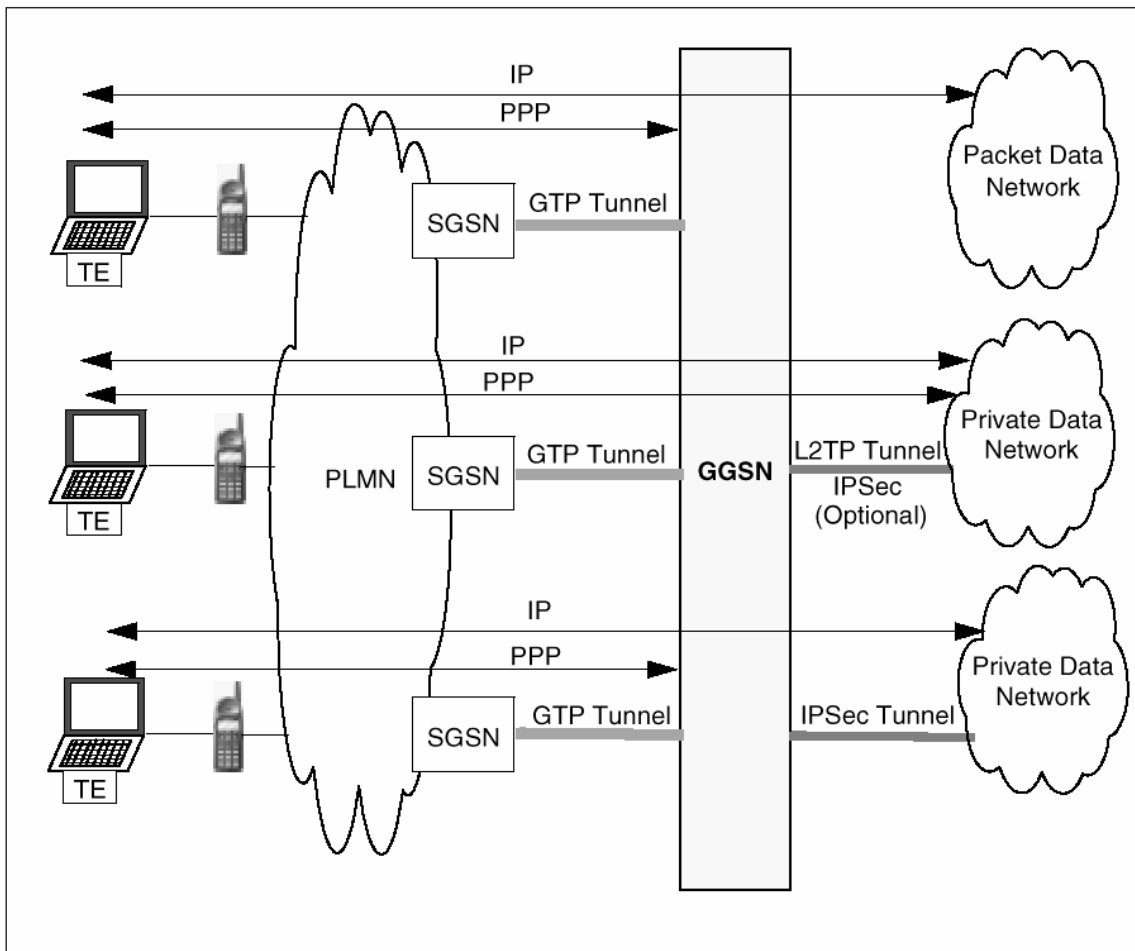


Figure: Overview of some Gi reference points

6.5.1 Number of incoming IP data packets on the Gi interface

This measurement provides the number of IP data packets received on the Gi interface. This measurement is split into subcounters per traffic class of the related PDP context.

- CC
- The relevant measurement is incremented on receipt of an IP data packet on the Gi interface, according to the traffic class of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also 07 and TS 29.061 [26].

- c) A single integer value per measurement type defined in e)
- d) IP.IncDataPkt.Bgrd
IP.IncDataPkt.Conv
IP.IncDataPkt.Intact
IP.IncDataPkt.Strm
- e) GgsnFunction, per Gi reference point
- f) Valid for packet switched traffic
- g) COMB
- h) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.5.2 Number of outgoing IP data packets on the Gi interface

- a) This measurement provides the number of IP data packets sent onto the Gi interface. This measurement is split into subcounters per traffic class of the related PDP context.
- b) CC
- c) The relevant measurement is incremented on transmission of an IP data packet on the Gi interface, according to the traffic class of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.061 [26].
- d) A single integer value per measurement type defined in e)
- e) IP.OutDataPkt.Bgrd
IP.OutDataPkt.Conv
IP.OutDataPkt.Intact
IP.OutDataPkt.Strm
- f) GgsnFunction, per Gi reference point
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.5.3 Number of IP data packets discarded due to node congestion

- a) This measurement provides the number of IP data packets discarded. This measurement is split into subcounters per traffic class of the related PDP context.
- b) CC
- c) The relevant measurement is incremented when a received IP data packet is discarded due to node congestion, according to the traffic class of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. See also TS 29.061 [26].
- d) A single integer value per measurement type defined in e)
- e) IP.DiscDataPkt.Bgrd
IP.DiscDataPkt.Conv
IP.DiscDataPkt.Intact
IP.DiscDataPkt.Strm
- f) GgsnFunction, per Gi reference point

- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling, Operator Traffic Engineering and Vendor Development Engineering communities.

6.5.4 Number of octets of incoming IP data packets on the Gi interface

- a) This measurement provides the number of IP payload octets received on the Gi interface. This measurement is split into subcounters per traffic class of the related PDP context.
- b) CC
- c) The relevant measurement is incremented on receipt of an IP data packet on the Gi interface, according to the traffic class of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. The data packet size is extracted from the IP header and added on to the measurement value. See TS 29.061 [26].
- d) A single integer value per measurement type defined in e)
- e) IP.IncDataOct.Bgrd
IP.IncDataOct.Conv
IP.IncDataOct.Intact
IP.IncDataOct.Strm
- f) GgsnFunction, per Gi reference point
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

6.5.5 Number of octets of outgoing IP data packets on the Gi interface

- a) This measurement provides the number of IP payload octets sent onto the Gi interface. This measurement is split into subcounters per traffic class of the related PDP context.
- b) CC
- c) The relevant measurement is incremented on transmission of an IP data packet on the Gi interface, according to the traffic class of the related PDP context. In case of a PDP context activated with R97/98 QoS attributes, the field traffic class used for screening is derived from delay class, as ruled in TS 23.107 [8]. The data packet size is extracted from the IP header and added on to the measurement value. See TS 29.061 [26].
- d) A single integer value per measurement type defined in e)
- e) IP.OutDataOct.Bgrd
IP.OutDataOct.Conv
IP.OutDataOct.Intact
IP.OutDataOct.Strm
- f) GgsnFunction, per Gi reference point
- g) Valid for packet switched traffic
- h) COMB
- i) This measurement is mainly dedicated to Vendor Performance Modelling and Operator Traffic Engineering communities.

End of Change in Clause 6
End of Document

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010237	--	--	Submitted to TSG SA #12 for Approval.	1.0.2	4.0.0
Sep 2001	S_13	SP-010468	001	--	Corrections on UMTS and combined UMTS/GSM measurements: Addition of family name for CN measurements, addition of the list of families, addition of Annex A: "(n-1) out of n" examples, application of the "(n-1) out of n" approach to all relevant measurements, enhancement of per cause measurements	4.0.0	4.1.0
Mar 2002	S_15	SP-020026	002	--	Correction of the measured object class for some SGSN MM measurement definitions	4.1.0	4.2.0
Mai 2002	--	--	--	--	MCC clean-up (Cosmetics based on EditHelp)	4.2.0	4.2.1
Jun 2002	S_16	SP-020291	003	2	Introduction of "Performance Measurements Definition Process" describing the repeatable, top-down process to define measurements for inclusion in future 3GPP Releases	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	004	--	Adding performance measurement definitions related to GGSN	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	005	--	Introduction of an optional "Purpose" clause in the measurement template	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	006	--	Addition of explanatory text for Radio Access Bearer (RAB) measurements	4.2.0	5.0.0
Sep 2002	S_17	SP-020609	009	--	Introduction of Service Based Performance Measurement Definitions	5.0.0	5.1.0
Sep 2002	S_17	SP-020609	010	--	Add flexibility in the measurement template for the Measured Object Class (MOC)	5.0.0	5.1.0
Mar 2003	S_19	SP-030146	012	--	Correction of the subscriber number measurement definitions	5.1.0	5.2.0
Jun 2003	S_20	SP-030292	014	--	Correction of the definition of the successful GPRS attach counters	5.2.0	5.3.0
Jun 2003	S_20	SP-030292	015	--	Deletion of dual clause 4.1.2	5.2.0	5.3.0
Jun 2003	S_20	SP-030293	016	--	Addition of GPRS per cause measurement definitions	5.3.0	6.0.0
Jun 2003	S_20	SP-030293	017	--	Introduction of MMS Service Based Performance Measurement	5.3.0	6.0.0
Sep 2003	S_21	SP-030431	020	--	Correction of collection method for SGSN measurements	6.0.0	6.1.0
Sep 2003	S_21	SP-030431	023	--	Correction of outgoing intra-cell hard handovers measurements	6.0.0	6.1.0
Dec 2003	S_22	SP-030645	025	--	Correction of terms used for subcounter definitions	6.1.0	6.2.0
Mar 2004	S_23	SP-040134	028	--	Correction of "Radio link addition" measurements	6.2.0	6.3.0
Mar 2004	S_23	SP-040135	029	--	Add the measurements about lu connection release	6.2.0	6.3.0
Jun 2004	S_24	SP-040266	032	--	Correction of Inter-RAT handover measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040267	035	--	Correction of RAB assignment measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040269	038	--	Correction of hard handover measurement definitions	6.3.0	6.4.0
Jun 2004	S_24	SP-040270	039	--	Addition of the measurements about RAB modification and RAB release by CN	6.3.0	6.4.0

CHANGE REQUEST

⌘ **32.403 CR 041** ⌘ rev - ⌘ Current version: **6.4.0** ⌘

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:	⌘ Add measurements about Mobility Management		
Source:	⌘ SA5 (llrui@bupt.edu.cn , liyewen@chinamobile.com)		
Work item code:	⌘ OAM-PM	Date:	⌘ 20/08/2004
Category:	⌘ B	Release:	⌘ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ In "Mobility Management" for GPRS services, there are three types of attach procedures, i.e. "GPRS attach procedures", "GPRS attach procedures with IMSI already attached" and "combined GPRS/IMSI attach procedures". In "measurements about Mobility Management", the failed attach procedures should be counted respectively for above three types of attach procedures. Currently, the "Failed GPRS Attach Procedure" measures the total number of failed attach procedures without distinguish above three types. Furthermore, for the above three types of attach procedures, the attach procedures might be aborted by PS CN (TS 24.008), the measurements about aborted attach procedures are absent currently.
Summary of change:	⌘ <ol style="list-style-type: none"> Separate the measurements about failed attach procedures into "Failed GPRS Attach Procedures", "Failed GPRS attach procedures with IMSI already attached" and "Failed combined GPRS/IMSI attach procedures". Add "Aborted GPRS Attach Procedure", "Aborted GPRS attach procedures with IMSI already attached" and "Aborted combined GPRS/IMSI attach procedures", so "3 out of 4 approach" is needed.
Consequences if not approved:	⌘ The measurements about failed attach procedures are not counted respectively for the three types of attach procedures, and the measurements about aborted attach procedures are absent currently.

Clauses affected:	⌘ 5.1								
Other specs affected:	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">⌘</td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N	⌘	X	⌘	X	⌘	X
Y	N								
⌘	X								
⌘	X								
⌘	X								
Other comments:	⌘								

Change in Clause 5.1

5.1 Mobility Management

5.1.1 GPRS attach procedures

The four measurements defined in the clause 5.1.1 are subject to the "3 out of 4 approach".

Note: Number of Attempted GPRS attach procedures = Number of Successful GPRS attach procedures + Total Number of Failed GPRS attach procedures + Aborted GPRS attach procedures.

5.1.1.1 Attempted GPRS attach procedures

- a) This measurement provides the number of attempted GPRS attach procedures initiated within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "ATTACH REQUEST" message with "Attach type" information element indicating "GPRS attach" from the MS, ~~indicating a GPRS attach~~(TS 24.008; ~~attach type = GPRS attach~~).
- d) A single integer value per measurement type defined in e).
- e) MM.AttGprsAttach:
 - MM.AttGprsAttach Combined (don't care);
 - MM.AttGprsAttach.G GSM;
 - MM.AttGprsAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.1.2 Successful GPRS attach procedures

- a) This measurement provides the number of successfully performed GPRS attach procedures within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "ATTACH ACCEPT" message to the MS, indicating a GPRS only attached (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccGprsAttach:
 - MM.SuccGprsAttach Combined (don't care);
 - MM.SuccGprsAttach.G GSM;
 - MM.SuccGprsAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.1.3 Failed GPRS attach procedures

- a) This measurement provides the number of failed GPRS attach procedures. The measurement is split into subcounters per the reject cause. The three measurements defined in e) are subject to the "2 out of 3 approach".
- b) CC
- c) Transmission by the SGSN of the ATTACH REJECT message to the MS, in response to a "ATTACH REQUEST" message with the "Attach type" information element indicating "GPRS attach", the relevant measurement is incremented according to the reject cause. Possible reject causes are defined within TS 24.008 [15].
The sum of all supported per cause measurements shall be equal to the total number of failed GPRS attach procedures. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.
- d) Each measurement (as defined in e) is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.
- e) MM.FailedGprsAttach.Cause

<u>MM.FailedGprsAttach.Cause</u>	<u>Combined (don't care)</u>
<u>MM.FailedGprsAttach.Cause.G</u>	<u>GSM</u>
<u>MM.FailedGprsAttach.Cause.U</u>	<u>UMTS</u>

where Cause identifies the reject cause
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching
- h) GSM/UMTS

5.1.1.4 Aborted GPRS attach procedures

- a) This measurement provides the number of aborted GPRS attach procedures. The three measurements defined in e) are subject to the "2 out of 3 approach".
- b) CC
- c) Abortion of a GPRS attach procedure, or a "ATTACH REQUEST" message with "Attach type" information element indicating "GPRS attach" would not be treated (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AbortedGprsAttach:

<u>- MM.AbortedGprsAttach</u>	<u>Combined (don't care);</u>
<u>- MM.AbortedGprsAttach.G</u>	<u>GSM;</u>
<u>- MM.AbortedGprsAttach.U</u>	<u>UMTS.</u>
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching
- h) GSM/UMTS

5.1.2 Intra-SGSN Routing Area update procedures

5.1.2.1 Attempted intra-SGSN Routing Area update procedures

- a) This measurement provides the number of attempted intra-SGSN Routing Area Update procedures initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Receipt of a "ROUTING AREA UPDATE REQUEST" message from the MS, where the old RA and the new RA are served by this SGSN (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttIntraSgsnRaUpdate:
 - MM.AttIntraSgsnRaUpdate Combined (don't care);
 - MM.AttIntraSgsnRaUpdate.G GSM;
 - MM.AttIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.2.24 Successful intra-SGSN Routing Area update procedures

- a) This measurement provides the number of successfully performed intra-SGSN Routing Area Update procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of "ROUTING AREA UPDATE ACCEPT" message to the MS (TS 24.008).
- d) A single integer value.
- e) MM.SuccIntraSgsnRaUpdate:
 - MM.SuccIntraSgsnRaUpdate Combined (don't care);
 - MM.SuccIntraSgsnRaUpdate.G GSM;
 - MM.SuccIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.3 GPRS detach procedures initiated by MS

5.1.3.15 Attempted GPRS detach procedures initiated by MS

- a) This measurement provides the number of MS initiated GPRS detach procedures within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "DETACH REQUEST" message from the MS indicating a GPRS detach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttGprsDetachMs:
 - MM.AttGprsDetachMs Combined (don't care);
 - MM.AttGprsDetachMs.G GSM;

- MM.AttGprsDetachMs.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.4 GPRS detach procedures initiated by SGSN

5.1.4.16 Attempted GPRS detach procedures initiated by SGSN

- a) This measurement provides the number of attempted GPRS detach procedures initiated by SGSN. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "DETACH REQUEST" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttGprsDetachSgsn:
 - MM.AttGprsDetachSgsn Combined (don't care);
 - MM.AttGprsDetachSgsn.G GSM;
 - MM.AttGprsDetachSgsn.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.4.2 Successful GPRS detach procedures initiated by SGSN

- a) This measurement provides the number of successfully completed GPRS detach procedures SGSN-initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "DETACH ACCEPT" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccGprsDetachSgsn:
 - MM.SuccGprsDetachSgsn Combined (don't care);
 - MM.SuccGprsDetachSgsn.G GSM;
 - MM.SuccGprsDetachSgsn.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
GSM/UMTS.

5.1.5 Inter-SGSN Routing Area update procedures

5.1.5.17 Attempted inter-SGSN Routing Area update procedures

- a) This measurement provides the number of attempted inter-SGSN Routing Area Update procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "ROUTING AREA UPDATE REQUEST" message from the MS where the old RA is served by another SGSNs (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttInterSgsnRaUpdate:
- MM.AttInterSgsnRaUpdate Combined (don't care);
 - MM.AttInterSgsnRaUpdate.G GSM;
 - MM.AttInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.5.28 Successful inter-SGSN Routing Area update procedures

- a) This measurement provides the number of successfully completed inter-SGSN Routing Area Update procedures in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "ROUTING AREA UPDATE COMPLETE" message from the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccInterSgsnRaUpdate:
- MM.SuccInterSgsnRaUpdate Combined (don't care);
 - MM.SuccInterSgsnRaUpdate.G GSM;
 - MM.SuccInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.6 GPRS attach procedures with IMSI already attached

The four measurements defined in the clause 5.1.6 are subject to the "3 out of 4 approach".

Note: Number of Attempted GPRS attach procedures with IMSI already attached = Number of Successful GPRS attach procedures with IMSI already attached + Total Number of Failed GPRS attach procedures with IMSI already attached + Aborted GPRS attach procedures with IMSI already attached.

5.1.6.19 Attempted GPRS attach procedures with IMSI already attached

- a) This measurement provides the number of attempted GPRS attach procedures, while IMSI is already attached. ~~We count the attempt initiated within this SGSN area.~~
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "ATTACH REQUEST" Message with "Attach type" information element indicating "GPRS attach while IMSI attached" from the MS, ~~indicating GPRS attach while IMSI attached~~ (TS 24.008; ~~attach type = GPRS attach while IMSI attached~~).
- d) A single integer value per measurement type defined in e).
- e) MM.AttGprsAttachImsiAttached:
 - MM.AttGprsAttachImsiAttached Combined (don't care);
 - MM.AttGprsAttachImsiAttached.G GSM;
 - MM.AttGprsAttachImsiAttached.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.6.240 Successful GPRS attach procedures with IMSI already attached

- a) This measurement provides the number of successfully performed GPRS attach procedures, while IMSI is already attached. We count the attempts initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "ATTACH ACCEPT" message to the MS, indicating a GPRS attach while IMSI attached, in response to a previously transmitted "ATTACH REQUEST" indicating a GPRS attach while IMSI attached (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccGprsAttachImsiAttached:
 - MM.SuccGprsAttachImsiAttached Combined (don't care);
 - MM.SuccGprsAttachImsiAttached.G GSM;
 - MM.SuccGprsAttachImsiAttached.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.6.3 Failed GPRS attach procedures with IMSI already attached

- a) This measurement provides the number of failed GPRS attach procedures with IMSI already attached. The measurement is split into subcounters per the reject cause. The three measurements defined in e) are subject to the "2 out of 3 approach".
- b) CC
- c) Transmission by the SGSN of the ATTACH REJECT message to the MS, in response to a "ATTACH REQUEST" message with the "Attach type" information element indicating "GPRS attach while IMSI

attached", the relevant measurement is incremented according to the reject cause. Possible reject causes are defined within TS 24.008 [15].

The sum of all supported per cause measurements shall be equal to the total number of failed GPRS attach procedures with IMSI already attached. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

d) Each measurement (as defined in e) is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.

e) **MM.FailedGprsAttachImsiAttached.Cause**

<u>MM.FailedGprsAttachImsiAttached.Cause</u>	<u>Combined (don't care)</u>
<u>MM.FailedGprsAttachImsiAttached.Cause.G</u>	<u>GSM</u>
<u>MM.FailedGprsAttachImsiAttached.Cause.U</u>	<u>UMTS</u>

where Cause identifies the reject cause

f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.

g) Valid for packet switching

h) GSM/UMTS

5.1.6.4 Aborted GPRS attach procedures with IMSI already attached

a) This measurement provides the number of aborted GPRS attach procedures with IMSI already attached. The three measurements defined in e) are subject to the "2 out of 3 approach".

b) CC

c) Abortion of a GPRS attach procedure with IMSI already attached, or a "ATTACH REQUEST" message with "Attach type" information element indicating "GPRS attach while IMSI attached" would not be treated (TS 24.008).

d) A single integer value per measurement type defined in e).

e) **MM.AbortedGprsAttachImsiAttached:**

- **MM.AbortedGprsAttachImsiAttachedCombined (don't care);**

- **MM.AbortedGprsAttachImsiAttached.G GSM;**

- **MM.AbortedGprsAttachImsiAttached.U UMTS.**

f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.

g) Valid for packet switching

h) GSM/UMTS

5.1.7 IMSI detach procedures initiated by MS

5.1.7.144 Attempted IMSI detach procedures initiated by MS

a) This measurement provides the number of attempted IMSI detach procedures MS-initiated within this SGSN area.

The three measurement types defined in e) are subject to the "2 out of 3 approach".

b) CC.

c) Receipt of a "DETACH REQUEST" message from the MS, indicating a IMSI detach (TS 24.008).

d) A single integer value per measurement type defined in e).

e) **MM.AtImsiDetachMs:**

- MM.AttImsiDetachMs Combined (don't care);
 - MM.AttImsiDetachMs.G GSM;
 - MM.AttImsiDetachMs.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.8 Combined GPRS/IMSI attach procedures

The four measurements defined in the clause 5.1.8 are subject to the "3 out of 4 approach".

Note: Number of Attempted combined GPRS/IMSI attach procedures = Number of Successful combined GPRS/IMSI attach procedures + Total Number of Failed combined GPRS/IMSI attach procedures + Aborted combined GPRS/IMSI attach procedures.

5.1.8.142 Attempted combined GPRS/IMSI attach procedures

- a) This measurement provides the number of attempts of combined GPRS/IMSI attach procedures initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "ATTACH REQUEST" message with "Attach type" information element indicating "Combined GPRS/IMSI attach" from the MS, ~~indicating combined GPRS/IMSI attach~~ (TS 24.008; ~~attach type = Combined GPRS/IMSI attach~~).
- d) A single integer value per measurement type defined in e) .
- e) MM.AttCombiAttach:
- MM.AttCombiAttach Combined (don't care);
 - MM.AttCombiAttach.G GSM;
 - MM.AttCombiAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.8.243 Successful combined GPRS/IMSI attach procedures

- a) This measurement provides the number of successfully completed combined GPRS/IMSI attach procedures initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of a "ATTACH ACCEPT" message to the MS, indicating combined GPRS/IMSI attach, in response to a "ATTACH REQUEST" indicating combined GPRS/IMSI attach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccCombiAttach:
- MM.SuccCombiAttach Combined (don't care);

- MM.SuccCombiAttach.G GSM;
 - MM.SuccCombiAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.8.3 Failed combined GPRS/IMSI attach procedures

- a) This measurement provides the number of failed combined GPRS/IMSI attach procedures. The measurement is split into subcounters per the reject cause. The three measurements defined in e) are subject to the "2 out of 3 approach".
- b) CC
- c) Transmission by the SGSN of the ATTACH REJECT message to the MS, in response to a "ATTACH REQUEST" message with the "Attach type" information element indicating "Combined GPRS/IMSI attach", the relevant measurement is incremented according to the reject cause. Possible reject causes are defined within TS 24.008 [15].
The sum of all supported per cause measurements shall be equal to the total number of failed combined GPRS/IMSI attach procedures. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.
- d) Each measurement (as defined in e) is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.
- e) MM.FailedCombiAttach.Cause
- | | |
|-------------------------------------|------------------------------|
| <u>MM.FailedCombiAttach.Cause</u> | <u>Combined (don't care)</u> |
| <u>MM.FailedCombiAttach.Cause.G</u> | <u>GSM</u> |
| <u>MM.FailedCombiAttach.Cause.U</u> | <u>UMTS</u> |
- where Cause identifies the reject cause
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching
- h) GSM/UMTS

5.1.8.4 Aborted combined GPRS/IMSI attach procedures

- a) This measurement provides the number of aborted combined GPRS/IMSI attach procedures. The three measurements defined in e) are subject to the "2 out of 3 approach".
- b) CC
- c) Abortion of a combined GPRS/IMSI attach procedure, or a "ATTACH REQUEST" message with "Attach type" information element indicating "Combined GPRS/IMSI attach" would not be treated (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AbortedCombiAttach:
- MM.AbortedCombiAttachCombined (don't care);
 - MM.AbortedCombiAttach.G GSM;
 - MM.AbortedCombiAttach.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching

h) GSM/UMTS

5.1.9 Combined GPRS/IMSI detach procedures initiated by MS

5.1.9.144 Attempted combined GPRS/IMSI detach procedures initiated by MS

- a) This measurement provides the number of attempted Combined GPRS/IMSI detach procedures MS-initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "DETACH REQUEST" message from the MS, indicating a Combined GPRS/IMSI detach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttCombiDetachMs:
 - MM.AttCombiDetachMs Combined (don't care);
 - MM.AttCombiDetachMs.G GSM;
 - MM.AttCombiDetachMs.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.1.15 Successful GPRS detach procedures initiated by SGSN~~

- ~~a) This measurement provides the number of successfully completed GPRS detach procedures SGSN-initiated within this SGSN area.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~e) Receipt of "DETACH ACCEPT" message from the MS (TS 24.008).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) MM.SuccGprsDetachSgsn:
 - ~~— MM.SuccGprsDetachSgsn — Combined (don't care);~~
 - ~~— MM.SuccGprsDetachSgsn.G — GSM;~~
 - ~~— MM.SuccGprsDetachSgsn.U — UMTS.~~~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM/UMTS.~~

5.1.10 Combined RA/LA intra-SGSN Routing Area update procedures

5.1.10.16 Attempted combined RA/LA intra-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates (intra-SGSN) procedures initiated in this SGSN. These are counted as attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttCombiIntraSgsnRaUpdate:
 - MM.AttCombiIntraSgsnRaUpdate Combined (don't care);
 - MM.AttCombiIntraSgsnRaUpdate.G GSM;
 - MM.AttCombiIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.10.1 Successful combined RA/LA intra-SGSN Routing Area update procedures

- a) This measurement provides the number of success-fully performed combined RA/LA updates (intra-SGSN) procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccCombiIntraSgsnRaUpdate:
 - MM.SuccCombiIntraSgsnRaUpdate Combined (don't care);
 - MM.SuccCombiIntraSgsnRaUpdate.G GSM;
 - MM.SuccCombiIntraSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.11 "Combined RA/LA with IMSI Attach" intra-SGSN Routing Area update procedures

5.1.11.17 Attempted "combined RA/LA with IMSI Attach" intra-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates with IMSI attach (intra-SGSN) procedures initiated in this SGSN. These are counted as attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update with IMSI attach (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttImsiCombiIntraSgsnRAUpdate:

- MM.AttImsiCombiIntraSgsnRAUpdate Combined (don't care);
 - MM.AttImsiCombiIntraSgsnRAUpdate.G GSM;
 - MM.AttImsiCombiIntraSgsnRAUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.1.18 Successful combined RA/LA intra-SGSN Routing Area update procedures~~

- ~~a) This measurement provides the number of success fully performed combined RA/LA updates (intra-SGSN) procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~
- ~~c) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) MM.SuccCombiIntraSgsnRaUpdate:~~
- ~~— MM.SuccCombiIntraSgsnRaUpdate — Combined (don't care);~~
 - ~~— MM.SuccCombiIntraSgsnRaUpdate.G — GSM;~~
 - ~~— MM.SuccCombiIntraSgsnRaUpdate.U — UMTS.~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM/UMTS.~~

5.1.12 Combined RA/LA inter-SGSN Routing Area update procedures

5.1.12.19 Attempted combined RA/LA inter-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates (inter-SGSN) procedures initiated in this SGSN. These are counted as attempts.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.AttCombiInterSgsnRaUpdate:
- MM.AttCombiInterSgsnRaUpdate Combined (don't care);
 - MM.AttCombiInterSgsnRaUpdate.G GSM;
 - MM.AttCombiInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.12.2 Successful combined RA/LA inter-SGSN Routing Area update procedures

- a) This measurement provides the number of success-fully performed combined RA/LA updates (inter-SGSN) procedures initiated in this SGSN.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.SuccCombiInterSgsnRaUpdate:
 - MM.SuccCombiInterSgsnRaUpdate Combined (don't care);
 - MM.SuccCombiInterSgsnRaUpdate.G GSM;
 - MM.SuccCombiInterSgsnRaUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.13 "Combined RA/LA with IMSI Attach" inter-SGSN Routing Area update procedures

5.1.13.120 Attempted "combined RA/LA with IMSI Attach" inter-SGSN Routing Area update procedures

- a) This measurement provides the number of combined RA/LA updates with IMSI attach (inter-SGSN) procedures initiated in this SGSN. These are counted as attempts:
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of "Routing Area Update REQUEST" message from the MS, indicating a combined RA/LA update with IMSI attach.E52.
- d) A single integer value per measurement type defined in e).
- e) MM.AttImsiCombiInterSgsnRAUpdate:
 - MM.AttImsiCombiInterSgsnRAUpdate Combined (don't care);
 - MM.AttImsiCombiInterSgsnRAUpdate.G GSM;
 - MM.AttImsiCombiInterSgsnRAUpdate.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

~~5.1.21 Successful combined RA/LA inter-SGSN Routing Area update procedures~~

- ~~a) This measurement provides the number of success-fully performed combined RA/LA updates (inter-SGSN) procedures initiated in this SGSN.~~
~~The three measurement types defined in e) are subject to the "2 out of 3 approach".~~
- ~~b) CC.~~

- ~~e) Transmission of "Routing Area Update ACCEPT" message to the MS (TS 24.008).~~
- ~~d) A single integer value per measurement type defined in e).~~
- ~~e) MM.SuccCombiInterSgsnRaUpdate:~~
 - ~~— MM.SuccCombiInterSgsnRaUpdate — Combined (don't care);~~
 - ~~— MM.SuccCombiInterSgsnRaUpdate.G — GSM;~~
 - ~~— MM.SuccCombiInterSgsnRaUpdate.U — UMTS.~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM/UMTS.~~

5.1.1422 Number of received invalid P-TMSI's during detach

- a) This measurement provides the number of received invalid P-TMSI's during detach. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of an "DETACH_REQUEST" with invalid P-TMSI (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.NbrPTMSIDetachFail:
 - MM.NbrPTMSIDetachFail Combined (don't care);
 - MM.NbrPTMSIDetachFail.G GSM;
 - MM.NbrPTMSIDetachFail.U UMTS.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.15 GSM PS paging procedures

5.1.15.123 Attempted GSM PS paging procedures

- a) This measurement provides the total number of PS paging procedures that are initiated at the SGSN, over the Gb interface.
- b) CC.
- c) Incremented when a GSM paging procedure is started, i.e. at the transmission of the first BSSGP Paging Request (GSM 08.18) from the SGSN to the MS.
- d) A single integer value.
- e) MM.AttPsPagingProcGb.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM.

5.1.15.2 Successful GSM PS paging procedures

- a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Gb interface.
- b) CC.
- c) when an uplink trigger (any LLC frame) is received by the SGSN from the MS (over the Gb interface) as response to a GSM paging PS procedure (TS 23.060) or during intersystem change UMTS -> GSM.
- d) A single integer value.
- e) MM.SuccPsPagingProcGb.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM.

5.1.16 UMTS PS paging procedures

5.1.16.124 Attempted UMTS PS paging procedures

- a) This measurement provides the total number of PS paging procedures that are initiated at the SGSN, over the Iu interface.
- b) CC.
- c) Incremented when a UMTS paging procedure is started i.e. at the transmission of the first "Paging" message (TS 25.413 [5]) from the SGSN to the MS.
- d) A single integer value.
- e) MM.AttPsPagingProcIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) UMTS.

5.1.16.2 Successful UMTS PS paging procedures

- a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Iu interface.
- b) CC.
- c) When a paging response is received by the SGSN from the MS (over the Iu interface) as response to a UMTS paging PS procedure (Receipt of "Service Request" message (with Service Type = Paging Response) to the MS (TS 24.008)) or during intersystem change GSM -> UMTS.
- d) A single integer value.
- e) MM.SuccPsPagingProcIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) UMTS.

5.1.17 PS paging procedures with unknown access type

5.1.17.125 Attempted PS paging procedures with unknown access type

- a) This measurement provides the total number of PS paging procedures that are initiated at the SGSN, with access type unknown. In this case the paging will be done both over the Gb and the Iu interface.
- b) CC.
- c) Incremented when a paging procedure is started for which MM doesn't know the access type i.e. at the transmission of the first BSSGP Paging Request (GSM 08.18) and/or "Paging" message (TS 25.413 [5]) from the SGSN to the MS.
- d) A single integer value.
- e) MM.AttPsPagingProcGbIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) Combined.

5.1.1826 Number of PS paging message sends from 2G-SGSN to the MS

- a) This measurement provides the Number of PS paging message sends from 2G-SGSN to the MS.
- b) CC.
- c) Transmission of "GMM-PAGING.req" (GSM 08.18) from the SGSN to the MS. Each paging message will be counted separately, addressed to all BSS in this certain RA.
- d) A single integer value.
- e) MM.NbrPsPagingMesGb.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) GSM.

5.1.1927 Number of PS paging message sends from 3G-SGSN to the MS

- a) This measurement provides the Number of PS paging message sends from 3G-SGSN to the MS.
- b) CC.
- c) Transmission of "Paging" message (CN Domain Indicator = PS Domain) from the SGSN to the MS (TS 25.413 [5]). Each paging message will be counted separately, addressed to all RNC in this certain RA.
- d) A single integer value.
- e) MM.NbrPsPagingMesIu.
- f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.
- g) Valid for packet switching.
- h) UMTS.

5.1.28 ~~Successful GSM PS paging procedures~~

- ~~a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Gb interface.~~
- ~~b) CC.~~
- ~~c) when an uplink_trigger (any LLC frame) is received by the SGSN from the MS (over the Gb interface) as response to a GSM paging PS procedure (TS 23.060) or during intersystem change UMTS → GSM.~~
- ~~d) A single integer value.~~
- ~~e) MM.SuccPsPagingProcGb.~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) GSM.~~

5.1.29 ~~Successful UMTS PS paging procedures~~

- ~~a) This measurement provides the total number of successful PS paging procedures that are initiated at the SGSN, over the Iu interface.~~
- ~~b) CC.~~
- ~~c) When a paging_response is received by the SGSN from the MS (over the Iu interface) as response to a UMTS paging PS procedure (Receipt of "Service Request" message (with Service Type = Paging Response) to the MS (TS 24.008)) or during intersystem change GSM → UMTS.~~
- ~~d) A single integer value.~~
- ~~e) MM.SuccPsPagingProcIu.~~
- ~~f) RA, specified by a concatenation of the MCC, MNC, LAC and the RAC.~~
- ~~g) Valid for packet switching.~~
- ~~h) UMTS.~~

5.1.320 Number of subscribers in PMM-IDLE state

- a) Number of subscribers in PMM-IDLE state.
- b) GAUGE.
- c) Incremented at PS Signalling Connection Release (Iu Release), decremented at PS Detach or PS Signalling Connection Establish (Service Request).
- d) A single integer value.
- e) MM.NbrSubPmmIdle.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.1.321 Number of subscribers in PMM-CONNECTED state

- a) Number of subscribers in PMM-CONNECTED state.
- b) GAUGE.

- c) Decrementated at PS Signalling Connection Release (Iu Release), Detach, PS Attach Reject or RAU Reject, incremented at PS Attach or PS Signalling Connection Establish (Service Request).
- d) A single integer value.
- e) MM.NbrSubPmmConnected
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.1.322 Number of attached subscribers

- a) This measurement provides the number of attached subscribers within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) Incremented when a subscriber enters the GMM_REGISTERED state in the SGSN Location Register, and decremented when a subscriber leaves the GMM_REGISTERED state.
Note: the GMM state machine in the SGSN Location Register is described in 3GPP TS 24.008 [15], subclause 4.1.3.3 (Figure 4.1c/3GPP TS 24.008: GMM main states on the network side).A single integer value per measurement type defined in e).
- e) MM.NbrActAttachedSub:
 - MM.NbrActAttachedSub Combined (don't care);
 - MM.NbrActAttachedSub.G GSM;
 - MM.NbrActAttachedSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.323 Number of home subscribers

- a) This measurement provides the number of GPRS home subscribers located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or GMM_DEREGISTERED. Only GPRS subscribers that are homed in the same GPRS network are considered.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) Incremented by one when GPRS home subscriber is successfully registered in the SGSN location registered and decremented by one when GPRS home subscriber is successfully deregistered out of the SGSN location register (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.NbrHomeSub:
 - MM.NbrHomeSub Combined (don't care);
 - MM.NbrHomeSub.G GSM;
 - MM.NbrHomeSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.

h) GSM/UMTS.

5.1.324 Number of visiting national subscribers

- a) This measurement provides the number of visiting national GPRS subscribers located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or GMM_DEREGISTERED. Only GPRS subscribers that are homed in a partner GPRS network of the same country are considered. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.
- c) This measurement provides the number of visiting national GPRS subscribers located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or GMM_DEREGISTERED. Only GPRS subscribers that are homed in a partner GPRS network of the same country are considered.
- d) A single integer value per measurement type defined in e).
- e) MM.NbrVisitingNatSub:
- MM.NbrVisitingNatSub Combined (don't care);
 - MM.NbrVisitingNatSub.G GSM;
 - MM.NbrVisitingNatSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.325 Number of visiting foreign subscribers

- a) This measurement provides the number of visiting foreign GPRS located in the SGSN location register. The GPRS MM state of this subscriber is GMM_REGISTERED or MM_DEREGISTERED. Only GPRS subscribers that are homed in a GPRS network of a foreign country are considered. The three measurement types defined in e) are subject to the "2 out of 3 approach"..
- b) GAUGE.
- c) Incremented by one when GPRS subscriber is successfully registered in the SGSN location registered and decremented by one when GPRS subscriber is successfully deregistered out of the SGSN location register (TS 24.008).
- d) A single integer value per measurement type defined in e).
- e) MM.NbrVisitingForeign:
- MM.NbrVisitingForeign Combined (don't care);
 - MM.NbrVisitingForeign.G GSM;
 - MM.NbrVisitingForeign.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.326 Mean number of attached subscribers

- a) This measurement provides the arithmetic mean number of the number of attached subscribers within this SGSN area. The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of subscribers which are attached and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrAttachedSub:
 - MM.MeanNbrAttachedSub Combined (don't care);
 - MM.MeanNbrAttachedSub.G GSM;
 - MM.MeanNbrAttachedSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.327 Mean Number of home subscribers

- a) This measurement provides the arithmetic mean number of GPRS home subscribers located in the SGSN location register.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of GPRS home subscribers located in the SGSN location register and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrHomeSub:
 - MM.MeanNbrHomeSub Combined (don't care);
 - MM.MeanNbrHomeSub.G GSM;
 - MM.MeanNbrHomeSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.328 Mean Number of visiting national subscribers

- a) This measurement provides the arithmetic mean number of visiting national GPRS subscribers located in the SGSN location register.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of visiting national GPRS subscribers located in the SGSN location register and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrVisitingNatSub:
 - MM.MeanNbrVisitingNatSub Combined (don't care);
 - MM.MeanNbrVisitingNatSub.G GSM;

- MM.MeanNbrVisitingNatSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.329 Mean Number of visiting foreign subscribers

- a) This measurement provides the arithmetic mean number of visiting foreign GPRS located in the SGSN location register.
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of visiting foreign GPRS subscribers located in the SGSN location register and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrVisitingForeign:
 - MM.MeanNbrVisitingForeign Combined (don't care);
 - MM.MeanNbrVisitingForeign.G GSM;
 - MM.MeanNbrVisitingForeign.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.430 Number of CAMEL subscribers

- a) This measurement provides the number of attached subscriber within this SGSN area with CAMEL service
The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) GAUGE.Incremented when a CAMEL subscriber enters the GMM_REGISTERED state in the SGSN Location Register, and decremented when a subscriber leaves the GMM_REGISTERED state.
Note: the GMM state machine in the SGSN Location Register is described in 3GPP TS 24.008 [15], subclause 4.1.3.3 (Figure 4.1c/3GPP TS 24.008: GMM main states on the network side).

~~c)~~ A single integer value per measurement type defined in e).

~~d)~~ MM.NbrCamelSub:

- MM.NbrCamelSub Combined (don't care);
- MM.NbrCamelSub.G GSM;
- MM.NbrCamelSub.U UMTS.

~~e)~~ SgsnFunction.

~~f)~~ Valid for packet switching.

~~h)~~ GSM/UMTS.

5.1.431 Mean Number of CAMEL subscribers

- a) This measurement provides the arithmetic mean number value of attached subscribers with CAMEL service
The three measurement types defined in e) are subject to the "2 out of 3 approach".

- b) SI.
- c) This measurement is obtained by sampling at a pre-defined interval, the number of subscribers which are attached using CAMEL service and then taking the arithmetic mean.
- d) A single integer value per measurement type defined in e).
- e) MM.MeanNbrCamelSub:
 - MM.MeanNbrCamelSub Combined (don't care);
 - MM.MeanNbrCamelSub.G GSM;
 - MM.MeanNbrCamelSub.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.1.32 InsertSubscriberData requests received from a HLR during GPRS Update Location procedure

5.1.432.1 Attempted InsertSubscriberData requests received from a HLR during GPRS Update Location procedure

- a) This measurement provides the number of InsertSubscriberData requests received from a HLR during GPRS Update Location procedure.
- b) CC.
- c) Receipt of a "MAP-INSERT-SUBSCRIBER-DATA" service request (TS 29.002) during a GPRS Update Location procedure.
- d) A single integer value.
- e) MM.AttInsertSubscrDataHlrUpdLoc.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.33 Attempted GPRS Update Locations sent to the HLR

5.1.433.1 Attempted GPRS Update Locations sent to the HLR

- a) This measurement provides the number of GPRS Update Locations sent to the HLR.
- b) CC.
- c) Transmission of a 'MAP_UPDATE_LOCATION' service request (TS 29.002).
- d) A single integer value.
- e) MM.AttUpdateGprsLocationHlr.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.33.244 Successful GPRS Update Locations sent to the HLR

- a) This measurement provides the number of successful GPRS Update Locations returned from the HLR.
- b) CC.
- c) Transmission of a 'MAP_UPDATE_LOCATION' service request (TS 29.002).
- d) A single integer value.
- e) MM.SuccUpdateGprsLocationHlr.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.34 CancelLocation requests received from an HLR-operator, in case of a HLR-initiated Detach

5.1.34.15 Attempted CancelLocation requests received from an HLR-operator, in case of a HLR-initiated Detach

- a) This measurement provides the number of CancelLocation requests received from an HLR-operator, in case of a HLR-initiated Detach.
- b) CC.
- c) Receipt of a 'MAP_CANCEL_LOCATION' service request (TS 29.002).
- d) A single integer value.
- e) MM.AttCancelLocHlrOp.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

5.1.35 CancelLocation requests received from a HLR due to a SGSN-change (previous SGSN)

5.1.35.146 Attempted CancelLocation requests received from a HLR due to a SGSN-change (previous SGSN)

- a) This measurement provides the number of CancelLocation requests received from a HLR due to a SGSN-change(previous SGSN).
- b) CC.
- c) Receipt of a 'MAP_CANCEL_LOCATION' service request (TS 29.002) due to a SGSN-change (previous SGSN).
- d) A single integer value.
- e) MM.AttCancelLocHlrSgsnChg.
- f) SgsnFunction.
- g) Valid for packet switching.

h) Combined.

5.1.36 Reset requests received from a HLR due to an HLR restart, indicating that a failure occurred

5.1.36.147 Attempted Reset requests received from a HLR due to an HLR restart, indicating that a failure occurred

- a) This measurement provides the number of Reset requests received from a HLR due to an HLR restart, indicating that a failure occurred.
- b) CC.
- c) Receipt of a 'MAP_RESET' service request (TS 29.002) from a HLR.
- d) A single integer value.
- e) MM.AttResetHlr.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) Combined.

~~5.1.48 Failed GPRS Attach Procedure~~

~~a) This measurement provides the number of GPRS attach procedures failures. The measurement is split into subcounters per the failure cause. The three measurement types defined in e) are subject to the "2 out of 3 approach".~~

~~b) CC~~

~~e) On transmission by the SGSN of the GPRS ATTACH REJECT message to the MS, as defined in TS 23.060 [17], indicating an attach failure, the relevant measurement is incremented according to the cause. Possible causes are included in TS 24.008 [15]. The sum of all supported per cause measurements shall be equal to the total number of GPRS attach failures. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.~~

~~d) A single integer value per measurement type as defined in e). The number of measurements is equal to the number of implemented per cause measurements plus a possible sum value identified by the .sum suffix~~

~~e) MM. FailedGprsAttach.Cause~~

MM. FailedGprsAttach.Cause	Combined (don't care)
MM. FailedGprsAttach.Cause.G	GSM
MM. FailedGprsAttach.Cause.U	UMTS

~~where Cause identifies the failure cause~~

~~f) Sgsn function~~

~~g) Valid for packet switching~~

~~h) GSM/UMTS~~

**End of Change in Clause 5.1
End of Document**

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010237	--	--	Submitted to TSG SA #12 for Approval.	1.0.2	4.0.0
Sep 2001	S_13	SP-010468	001	--	Corrections on UMTS and combined UMTS/GSM measurements: Addition of family name for CN measurements, addition of the list of families, addition of Annex A: "(n-1) out of n" examples, application of the "(n-1) out of n" approach to all relevant measurements, enhancement of per cause measurements	4.0.0	4.1.0
Mar 2002	S_15	SP-020026	002	--	Correction of the measured object class for some SGSN MM measurement definitions	4.1.0	4.2.0
Mai 2002	--	--	--	--	MCC clean-up (Cosmetics based on EditHelp)	4.2.0	4.2.1
Jun 2002	S_16	SP-020291	003	2	Introduction of "Performance Measurements Definition Process" describing the repeatable, top-down process to define measurements for inclusion in future 3GPP Releases	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	004	--	Adding performance measurement definitions related to GGSN	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	005	--	Introduction of an optional "Purpose" clause in the measurement template	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	006	--	Addition of explanatory text for Radio Access Bearer (RAB) measurements	4.2.0	5.0.0
Sep 2002	S_17	SP-020609	009	--	Introduction of Service Based Performance Measurement Definitions	5.0.0	5.1.0
Sep 2002	S_17	SP-020609	010	--	Add flexibility in the measurement template for the Measured Object Class (MOC)	5.0.0	5.1.0
Mar 2003	S_19	SP-030146	012	--	Correction of the subscriber number measurement definitions	5.1.0	5.2.0
Jun 2003	S_20	SP-030292	014	--	Correction of the definition of the successful GPRS attach counters	5.2.0	5.3.0
Jun 2003	S_20	SP-030292	015	--	Deletion of dual clause 4.1.2	5.2.0	5.3.0
Jun 2003	S_20	SP-030293	016	--	Addition of GPRS per cause measurement definitions	5.3.0	6.0.0
Jun 2003	S_20	SP-030293	017	--	Introduction of MMS Service Based Performance Measurement	5.3.0	6.0.0
Sep 2003	S_21	SP-030431	020	--	Correction of collection method for SGSN measurements	6.0.0	6.1.0
Sep 2003	S_21	SP-030431	023	--	Correction of outgoing intra-cell hard handovers measurements	6.0.0	6.1.0
Dec 2003	S_22	SP-030645	025	--	Correction of terms used for subcounter definitions	6.1.0	6.2.0
Mar 2004	S_23	SP-040134	028	--	Correction of "Radio link addition" measurements	6.2.0	6.3.0
Mar 2004	S_23	SP-040135	029	--	Add the measurements about lu connection release	6.2.0	6.3.0
Jun 2004	S_24	SP-040266	032	--	Correction of Inter-RAT handover measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040267	035	--	Correction of RAB assignment measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040269	038	--	Correction of hard handover measurement definitions	6.3.0	6.4.0
Jun 2004	S_24	SP-040270	039	--	Addition of the measurements about RAB modification and RAB release by CN	6.3.0	6.4.0

CHANGE REQUEST

⌘ **32.403 CR 042** ⌘ rev - ⌘ Current version: **6.4.0** ⌘

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:	⌘ Add measurements about iPDP context activation procedures initiated by Networki		
Source:	⌘ SA5 (llrui@bupt.edu.cn , liyewen@chinamobile.com)		
Work item code:	⌘ OAM-PM	Date:	⌘ 20/08/2004
Category:	⌘ B	Release:	⌘ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ For iPDP context activation procedures initiated by Networki, there is only measurement about failure procedure, the measurements about attempted and successful procedures are absent. Thus, there is no comparison among the number of attempted, successful and failed procedures.
Summary of change:	⌘ Add measurements about attempted and successful PDP context activation procedures initiated by Network and adopt the "(n-1) out of n" approach.
Consequences if not approved:	⌘ Incomplete measurements about PDP context activation procedures initiated by Network.

Clauses affected:	⌘ 5.6.15										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications ⌘ Test specifications ⌘ O&M Specifications ⌘	Y	N		X		X		X		
Y	N										
	X										
	X										
	X										
Other comments:	⌘										

5.6.15 PDP context activation procedures initiated by Network

5.6.15.1 Attempted PDP context activation procedures initiated by Network

- a) This measurement provides the number of attempted PDP context activation procedures initiated by Network. These include the static as well as the dynamic PDP addresses. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Receipt of a "PDU Notification Request" message from the MS (TS29.060) message from GGSN.
- d) A single integer value.
- e) SM.AttActPdpCtxtNtwk:
 - SM.AttActPdpCtxtNtwk Combined (don't care);
 - SM.AttActPdpCtxtNtwk.G GSM;
 - SM.AttActPdpCtxtNtwk.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.15.2 Successful PDP context activation procedures initiated by Network

- a) This measurement provides the number of successful PDP context activation procedures. These include the static as well as the dynamic PDP addresses. The three measurement types defined in e) are subject to the "2 out of 3 approach".
- b) CC.
- c) Transmission by the SGSN of a "Activate PDP Context Accept" message (TS 24.008) to MS for the PDP context activation initiated by Network.
- d) A single integer value.
- e) SM.SuccActPdpCtxtNtwk:
 - SM.SuccActPdpCtxtNtwk Combined (don't care);
 - SM.SuccActPdpCtxtNtwk.G GSM;
 - SM.SuccActPdpCtxtNtwk.U UMTS.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

5.6.15.3~~26~~ Failed PDP context activation procedures initiated by Network

- a) This measurement provides the number of Failed PDP context activation procedures. These include the static as well as the dynamic PDP addresses. This measurement is split into subcounters per failure cause.
- b) CC.

- c) Receipt of a " REQUEST PDP CONTEXT ACTIVATION REJECT " message from the MS (TS 24.008) message indicating a PDP context activation failure, the measurement is incremented according to the failure cause. Possible causes are included in TS 24.008. The sum of all supported per cause measurements should equal the total number of PDP context activation failures.
- d) A single integer value.
- e) The measurement name has the form SM.FailActPdpCtxtNtwk.Cause where Cause identifies the failure cause.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) GSM/UMTS.

End of Change in Clause 5.6.15
End of Document

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010237	--	--	Submitted to TSG SA #12 for Approval.	1.0.2	4.0.0
Sep 2001	S_13	SP-010468	001	--	Corrections on UMTS and combined UMTS/GSM measurements: Addition of family name for CN measurements, addition of the list of families, addition of Annex A: "(n-1) out of n" examples, application of the "(n-1) out of n" approach to all relevant measurements, enhancement of per cause measurements	4.0.0	4.1.0
Mar 2002	S_15	SP-020026	002	--	Correction of the measured object class for some SGSN MM measurement definitions	4.1.0	4.2.0
Mai 2002	--	--	--	--	MCC clean-up (Cosmetics based on EditHelp)	4.2.0	4.2.1
Jun 2002	S_16	SP-020291	003	2	Introduction of "Performance Measurements Definition Process" describing the repeatable, top-down process to define measurements for inclusion in future 3GPP Releases	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	004	--	Adding performance measurement definitions related to GGSN	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	005	--	Introduction of an optional "Purpose" clause in the measurement template	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	006	--	Addition of explanatory text for Radio Access Bearer (RAB) measurements	4.2.0	5.0.0
Sep 2002	S_17	SP-020609	009	--	Introduction of Service Based Performance Measurement Definitions	5.0.0	5.1.0
Sep 2002	S_17	SP-020609	010	--	Add flexibility in the measurement template for the Measured Object Class (MOC)	5.0.0	5.1.0
Mar 2003	S_19	SP-030146	012	--	Correction of the subscriber number measurement definitions	5.1.0	5.2.0
Jun 2003	S_20	SP-030292	014	--	Correction of the definition of the successful GPRS attach counters	5.2.0	5.3.0
Jun 2003	S_20	SP-030292	015	--	Deletion of dual clause 4.1.2	5.2.0	5.3.0
Jun 2003	S_20	SP-030293	016	--	Addition of GPRS per cause measurement definitions	5.3.0	6.0.0
Jun 2003	S_20	SP-030293	017	--	Introduction of MMS Service Based Performance Measurement	5.3.0	6.0.0
Sep 2003	S_21	SP-030431	020	--	Correction of collection method for SGSN measurements	6.0.0	6.1.0
Sep 2003	S_21	SP-030431	023	--	Correction of outgoing intra-cell hard handovers measurements	6.0.0	6.1.0
Dec 2003	S_22	SP-030645	025	--	Correction of terms used for subcounter definitions	6.1.0	6.2.0
Mar 2004	S_23	SP-040134	028	--	Correction of "Radio link addition" measurements	6.2.0	6.3.0
Mar 2004	S_23	SP-040135	029	--	Add the measurements about lu connection release	6.2.0	6.3.0
Jun 2004	S_24	SP-040266	032	--	Correction of inter-RAT handover measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040267	035	--	Correction of RAB assignment measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040269	038	--	Correction of hard handover measurement definitions	6.3.0	6.4.0
Jun 2004	S_24	SP-040270	039	--	Addition of the measurements about RAB modification and RAB release by CN	6.3.0	6.4.0

CHANGE REQUEST

⌘ **32.403 CR 043** ⌘ rev - ⌘ Current version: **6.4.0** ⌘

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:	⌘ Add measurements about relocation		
Source:	⌘ SA5 (llrui@bupt.edu.cn , liyewen@chinamobile.com)		
Work item code:	⌘ OAM-PM	Date:	⌘ 20/08/2004
Category:	⌘ B	Release:	⌘ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change: ⌘

1. Currently, the clause 4.11 "Relocation" in 32.403 contains measurements about relocation preparation and relocation. But most of relocation preparation failure is caused by the failure of relocation resource allocation. So the measurements about relocation resource allocation are beneficial for operators to locate the RNC which is failed in relocation resource allocation procedure and analyze the detailed failure causes.
2. Furthermore, the relocation procedure can be controlled by CS CN or PS CN, and can be initiated with UE involved or with UE not involved. And it is more possible for the relocation with UE involved to lead to call drop than the relocation with UE not involved. Therefore, the measurements which 1) distinguish different CN domains and 2) distinguish relocations with UE involved or with UE not involved will be beneficial for operators to analyze the relocation procedure more clearly and in detail.

Summary of change: ⌘ Add the measurements about relocation resource allocation. Enhance the relocation procedure measurements which now distinguish different CN domains and distinguish between relocations with UE involved and with UE not involved.

Consequences if not approved: ⌘ The operators can't locate the failed RNC in relocation resource allocation procedure and analyze the relocation procedure clearly and in detail.

Clauses affected: ⌘ 3.2, 4.11

Other specs affected:		Y	N		
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Other core specifications		
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Test specifications		
	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	O&M Specifications		

Other comments: ⌘

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

3G	3 rd Generation
3GPP	3G Partnership Project
ASN.1	Abstract Syntax Notation 1
BER	Basic Encoding Rules
CN	Core Network
DTD	Document Type Definition
EGQM	Enhanced Goal, Question, Metric
EM	(Network) Element Manager
FTAM	File Transfer Access and Management
FTP	File Transfer Protocol
GQM	Goal, Question, Metric
IEEE	Institute of Electrical and Electronics Engineers, Inc.
Itf	Interface
ITU-T	International Telecommunication Union - Telecommunications Standardisation Sector
MSC	Mobile services Switching Centre
NE	Network Element
NM	Network Manager
OA&M	Operation, Administration and Maintenance
OS	Operations System (EM, NM)
OSI	Open Systems Interconnection
PM	Performance Management
QoS	Quality of Service
RNC	Radio Network Controller
TFTP	Trivial FTP
UMTS	Universal Mobile Telecommunications System
UTRAN	Universal Terrestrial Radio Access Network

You can find below a list of abbreviations used within the measurement types for field E of the measurement template (see subclause 3.3).

Assn	Assign(ment,ed)
Att	Attempt(s,ed)
Auth	Authentication
Bgrd	Background
Call	Call
Chg	Change
Conn	Connection
Combi	Combined
CS	Circuit switched
Ctrl	Controlled
Conv	Conversational
Del	Deletion
Drop	Drop(ped)
Estab	Establish (ed,ment)
Fail	Fail(ed, ure)
HHO	Hard Handover
HO	Handover
Inc	Incoming
Intact	Interactive
Inter	Inter
Intra	Intra
Invol	Involve(d)
MM	Mobility Management
Nat	National
Netw	Network

NodeB	NodeB
Oct	Octet(s)
Out	Outgoing
Pkt	Packet(s)
Prep	Preparation
Proc	Procedure
PS	Packet switched
RAB	Radio Access Bearer
RAT	Radio Access Technology
ReEstab	Re-establish (ed,ment)
Rel	Released
Reloc	Relocation
Req	Request(s,ed)
<u>Res</u>	<u>Resource</u>
RL	Radio Link
RNC	RNC
RRC	Radio Resource Control
Setup	Setup
SGSN	SGSN
SHO	Soft Handover
Sig	Signalling
Strm	Streaming
Sub	Subscriber
Succ	Success(es,ful)
UE	User Equipment
UTRAN	UTRAN

End of Change in Clause 3.2

Change in Clause 4.11

4.11 Relocation

4.11.1 Relocations for CS domain

4.11.1.1 Relocations ~~s~~ preparations with UE involved for CS domain

The three measurement types defined in the subclause 4.11.1.1.n for relocations ~~s~~ preparations with UE involved for CS domain are subject to the "2 out of 3 approach".

4.11.1.1.1 Attempted relocations ~~s~~ preparations with UE involved for CS domain

- a) This measurement provides the number of attempted relocation preparations with UE involved for CS domain (~~'UE involved' and 'UE non involved' Relocations~~).
- b) CC.
- c) Transmission of a RANAP message RELOCATION REQUIRED from the source RNC to the CS CN (Source side) with Relocation Type set to i UE involved in relocation of SRNSi, indicating an attempted relocation preparation with UE involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttPrepUEInvolCS.
- f) RncFunction.
- g) Valid for circuit switched ~~and packet-switched~~ traffic.
- h) UMTS.

4.11.1.1.2 Successful relocation preparations with UE involved for CS domain

- a) This measurement provides the number of successful relocation preparations with UE involved for CS domain (~~'UE involved' and 'UE non involved' Relocations~~).
- b) CC.
- c) Receipt of a RANAP message RELOCATION COMMAND sent from the CS CN (Source side) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE involved in relocation of SRNSi', indicating a successful relocation preparation with UE involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccPrepUEInvolCS.
- f) RncFunction.
- g) Valid for circuit switched ~~and packet-switched~~ traffic.
- h) UMTS.

4.11.1.1.3 Failed relocation preparations with UE involved for CS domain

- a) This measurement provides the number of failed relocation preparations with UE involved for CS domain per cause (~~'UE involved' and 'UE non involved' Relocations~~).
- b) CC.
- c) Receipt of a RANAP message RELOCATION PREPARATION FAILURE sent from the CS CN (Source side) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE involved in relocation of SRNSi', indicating a failed relocation preparation with UE involved for CS domain. Failure causes are defined within TS 25.413 [5].

Each expected RANAP message RELOCATION COMMAND or RELOCATION PREPARATION FAILURE not received by the source RNC is added to the measurement cause 'No Reply' (not specified in TS 25.413 [5]).

The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the *.sum* suffix.
- e) The measurement name has the form RELOC.FailPrepUEInvolCS.*Cause* where *Cause* identifies the failure cause.
- f) RncFunction.
- g) Valid for circuit switched ~~and packet-switched~~ traffic.
- h) UMTS.

4.11.1.2 Relocation preparations with UE not involved for CS domain

The three measurement types defined in the subclause 4.11.1.2.n for relocation preparations with UE not involved for CS domain are subject to the "2 out of 3 approach".

4.11.1.2.1 Attempted relocation preparations with UE not involved for CS domain

- a) This measurement provides the number of attempted relocation preparations with UE not involved for CS domain.
- b) CC.

- c) Transmission of a RANAP message RELOCATION REQUIRED from the source RNC to the CS CN (Source side) with Relocation Type set to 'UE not involved in relocation of SRNS', indicating an attempted relocation preparation with UE not involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttPrepUENotInvolCS.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.2.2 Successful relocation preparations with UE not involved for CS domain

- a) This measurement provides the number of successful relocation preparations with UE not involved for CS domain.
- b) CC.
- c) Receipt of a RANAP message RELOCATION COMMAND sent from the CS CN (Source side) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE not involved in relocation of SRNS', indicating a successful relocation preparation with UE not involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccPrepUENotInvolCS.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.2.3 Failed relocation preparations with UE not involved for CS domain

- a) This measurement provides the number of failed relocation preparations with UE not involved for CS domain per cause.
- b) CC.
- c) Receipt of a RANAP message RELOCATION PREPARATION FAILURE sent from the CS CN (Source side) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE not involved in relocation of SRNS', indicating a failed relocation preparation with UE not involved for CS domain. Failure causes are defined within TS 25.413 [5].

Each expected RANAP message RELOCATION COMMAND or RELOCATION PREPARATION FAILURE not received by the source RNC is added to the measurement cause 'No Reply' (not specified in TS 25.413 [5]).

The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.
- e) The measurement name has the form RELOC.FailPrepUENotInvolCS.Cause where Cause identifies the failure cause.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.3 Relocation resource allocations with UE involved for CS domain

The three measurement types defined in the subclause 4.11.1.3.n for relocation resource allocations with UE involved for CS domain are subject to the "2 out of 3 approach".

4.11.1.3.1 Attempted relocations resource allocations with UE involved for CS domain

- a) This measurement provides the number of attempted relocation resource allocations with UE involved for CS domain.
- b) CC.
- c) Receipt of a RANAP message RELOCATION REQUEST sent from the CS CN (Target side) to the target RNC with Relocation Type set to ìUE involved in relocation of SRNSî, indicating an attempted relocation resource allocation with UE involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttResAllocUEInvolCS.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.3.2 Successful relocation resource allocations with UE involved for CS domain

- a) This measurement provides the number of successful relocation resource allocations with UE involved for CS domain.
- b) CC.
- c) Transmission of a RANAP message RELOCATION REQUEST ACKNOWLEDGE from the target RNC to the CS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to ìUE involved in relocation of SRNSî, indicating a successful relocation resource allocation with UE involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccResAllocUEInvolCS.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.3.3 Failed relocation resource allocations with UE involved for CS domain

- a) This measurement provides the number of failed relocation resource allocations with UE involved for CS domain per cause.
- b) CC.
- c) Transmission of a RANAP message RELOCATION FAILURE from the target RNC to the CS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to ìUE involved in relocation of SRNSî, indicating a failed relocation resource allocation with UE involved for CS domain. Failure causes are defined within TS 25.413 [5].

The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.

- e) The measurement name has the form RELOC.FailResAllocUEInvolCS.Cause where Cause identifies the failure cause.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.4 Relocation resource allocations with UE not involved for CS domain

The three measurement types defined in the subclause 4.11.1.4.n for relocation resource allocations with UE not involved for CS domain are subject to the "2 out of 3 approach".

4.11.1.4.1 Attempted relocations resource allocations with UE not involved for CS domain

- a) This measurement provides the number of attempted relocation resource allocations with UE not involved for CS domain.
- b) CC.
- c) Receipt of a RANAP message RELOCATION REQUEST sent from the CS CN (Target side) to the target RNC with Relocation Type set to ìUE not involved in relocation of SRNSî, indicating an attempted relocation resource allocation with UE not involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttResAllocUENotInvolCS.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.4.2 Successful relocation resource allocations with UE not involved for CS domain

- a) This measurement provides the number of successful relocation resource allocations with UE not involved for CS domain.
- b) CC.
- c) Transmission of a RANAP message RELOCATION REQUEST ACKNOWLEDGE from the target RNC to the CS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to ìUE not involved in relocation of SRNSî, indicating a successful relocation resource allocation with UE not involved for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccResAllocUENotInvolCS.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.4.3 Failed relocation resource allocations with UE not involved for CS domain

- a) This measurement provides the number of failed relocation resource allocations with UE not involved for CS domain per cause.
- b) CC.

- c) Transmission of a RANAP message RELOCATION FAILURE from the target RNC to the CS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to 'UE not involved in relocation of SRNSi', indicating a failed relocation resource allocation with UE not involved for CS domain. Failure causes are defined within TS 25.413 [5].

The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.
- e) The measurement name has the form RELOC.FailResAllocUENotInvolCS.Cause where Cause identifies the failure cause.
- f) RncFunction.
- g) Valid for circuit switched traffic.
- h) UMTS.

4.11.1.25 Relocations for CS domain

4.11.1.25.1 Successful relocations for CS domain

- a) This measurement provides the number of successful relocations for CS domain ('UE involved' and 'UE ~~non-~~not involved' Relocations).
- b) CC.
- c) Receipt of a RANAP message Iu RELEASE COMMAND sent from the CS CN (Source side) to the source RNC in response to a RELOCATION REQUIRED message, indicating a successful relocation for CS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccCS.
- f) RncFunction.
- g) Valid for circuit switched ~~and packet-switched~~ traffic.
- h) UMTS.

4.11.2 Relocations for PS domain

4.11.2.1 Relocation preparations with UE involved for PS domain

The three measurement types defined in the subclause 4.11.2.1.n for relocation preparations with UE involved for PS domain are subject to the "2 out of 3 approach".

4.11.2.1.1 Attempted relocation preparations with UE involved for PS domain

- a) This measurement provides the number of attempted relocation preparations with UE involved for PS domain.
- b) CC.
- c) Transmission of a RANAP message RELOCATION REQUIRED from the source RNC to the PS CN (Source side) with Relocation Type set to 'UE involved in relocation of SRNSi', indicating an attempted relocation preparation with UE involved for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttPrepUEInvolPS.

- f) [RncFunction.](#)
- g) [Valid for packet switched traffic.](#)
- h) [UMTS.](#)

4.11.2.1.2 Successful relocation preparations with UE involved for PS domain

- a) [This measurement provides the number of successful relocation preparations with UE involved for PS domain.](#)
- b) [CC.](#)
- c) [Receipt of a RANAP message RELOCATION COMMAND sent from the PS CN \(Source side\) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE involved in relocation of SRNS', indicating a successful relocation preparation with UE involved for PS domain \(see TS 25.413 \[5\]\).](#)
- d) [A single integer value.](#)
- e) [RELOC.SuccPrepUEInvolPS.](#)
- f) [RncFunction.](#)
- g) [Valid for packet switched traffic.](#)
- h) [UMTS.](#)

4.11.2.1.3 Failed relocation preparations with UE involved for PS domain

- a) [This measurement provides the number of failed relocation preparations with UE involved for PS domain per cause.](#)
- b) [CC.](#)
- c) [Receipt of a RANAP message RELOCATION PREPARATION FAILURE sent from the PS CN \(Source side\) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE involved in relocation of SRNS', indicating a failed relocation preparation with UE involved for PS domain. Failure causes are defined within TS 25.413 \[5\].](#)

[Each expected RANAP message RELOCATION COMMAND or RELOCATION PREPARATION FAILURE not received by the source RNC is added to the measurement cause 'No Reply' \(not specified in TS 25.413 \[5\]\).](#)

[The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.](#)

- d) [Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.](#)
- e) [The measurement name has the form RELOC.FailPrepUEInvolPS.Cause where Cause identifies the failure cause.](#)
- f) [RncFunction.](#)
- g) [Valid for packet switched traffic.](#)
- h) [UMTS.](#)

4.11.2.2 Relocation preparations with UE not involved for PS domain

[The three measurement types defined in the subclause 4.11.2.2.n for relocation preparations with UE not involved for PS domain are subject to the "2 out of 3 approach".](#)

4.11.2.2.1 Attempted relocation preparations with UE not involved for PS domain

- a) This measurement provides the number of attempted relocation preparations with UE not involved for PS domain.
- b) CC.
- c) Transmission of a RANAP message RELOCATION REQUIRED from the source RNC to the PS CN (Source side) with Relocation Type set to 'UE not involved in relocation of SRNSi', indicating an attempted relocation preparation with UE not involved for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttPrepUENotInvolPS.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.2.2 Successful relocation preparations with UE not involved for PS domain

- a) This measurement provides the number of successful relocation preparations with UE not involved for PS domain.
- b) CC.
- c) Receipt of a RANAP message RELOCATION COMMAND sent from the PS CN (Source side) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE not involved in relocation of SRNSi', indicating a successful relocation preparation with UE not involved for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccPrepUENotInvolPS.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.2.3 Failed relocation preparations with UE not involved for PS domain

- a) This measurement provides the number of failed relocation preparations with UE not involved for PS domain per cause.
- b) CC.
- c) Receipt of a RANAP message RELOCATION PREPARATION FAILURE sent from the PS CN (Source side) to the source RNC, in response to a RELOCATION REQUIRED message with Relocation Type set to 'UE not involved in relocation of SRNSi', indicating a failed relocation preparation with UE not involved for PS domain. Failure causes are defined within TS 25.413 [5].

Each expected RANAP message RELOCATION COMMAND or RELOCATION PREPARATION FAILURE not received by the source RNC is added to the measurement cause 'No Reply' (not specified in TS 25.413 [5]).

The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.

- e) The measurement name has the form RELOC.FailPrepUENotInvolPS.Cause where Cause identifies the failure cause.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.3 Relocation resource allocations with UE involved for PS domain

The three measurement types defined in the subclause 4.11.2.3.n for relocation resource allocations with UE involved for PS domain are subject to the "2 out of 3 approach".

4.11.2.3.1 Attempted relocations resource allocations with UE involved for PS domain

- a) This measurement provides the number of attempted relocation resource allocations with UE involved -for PS domain.
- b) CC.
- c) Receipt of a RANAP message RELOCATION REQUEST sent from the PS CN (Target side) to the target RNC with Relocation Type set to 'UE involved in relocation of SRNSi', indicating an attempted relocation resource allocation with UE involved for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttResAllocUEInvolPS.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.3.2 Successful relocation resource allocations with UE involved for PS domain

- a) This measurement provides the number of successful relocation resource allocations with UE involved for PS domain.
- b) CC.
- c) Transmission of a RANAP message RELOCATION REQUEST ACKNOWLEDGE from the target RNC to the PS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to 'UE involved in relocation of SRNSi', indicating a successful relocation resource allocation with UE involved for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccResAllocUEInvolPS.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.3.3 Failed relocation resource allocations with UE involved for PS domain

- a) This measurement provides the number of failed relocation resource allocations with UE involved for PS domain per cause.
- b) CC.

- c) Transmission of a RANAP message RELOCATION FAILURE from the target RNC to the PS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to ì UE involved in relocation of SRNSî, indicating a failed relocation resource allocation with UE involved for PS domain. Failure causes are defined within TS 25.413 [5].

The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.
- e) The measurement name has the form RELOC.FailResAllocUEInvolPS.Cause where Cause identifies the failure cause.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.4 Relocation resource allocations with UE not involved for PS domain

The three measurement types defined in the subclause 4.11.2.4.n for relocation resource allocations with UE not involved for PS domain are subject to the "2 out of 3 approach".

4.11.2.4.1 Attempted relocations resource allocations with UE not involved for PS domain

- a) This measurement provides the number of attempted relocation resource allocations with UE not involved for PS domain.
- b) CC.
- c) Receipt of a RANAP message RELOCATION REQUEST sent from the PS CN (Target side) to the target RNC with Relocation Type set to ì UE not involved in relocation of SRNSî, indicating an attempted relocation resource allocation with UE not involved for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.AttResAllocUENotInvolPS.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.4.2 Successful relocation resource allocations with UE not involved for PS domain

- a) This measurement provides the number of successful relocation resource allocations with UE not involved for PS domain.
- b) CC.
- c) Transmission of a RANAP message RELOCATION REQUEST ACKNOWLEDGE from the target RNC to the PS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to ì UE not involved in relocation of SRNSî, indicating a successful relocation resource allocation with UE not involved for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccResAllocUENotInvolPS.
- f) RncFunction.
- g) Valid for packet switched traffic.

h) UMTS.

4.11.2.4.3 Failed relocation resource allocations with UE not involved for PS domain

- a) This measurement provides the number of failed relocation resource allocations with UE not involved for PS domain per cause.
- b) CC.
- c) Transmission of a RANAP message RELOCATION FAILURE from the target RNC to the PS CN (Target side), in response to a RELOCATION REQUEST message with Relocation Type set to 'UE not involved in relocation of SRNS', indicating a failed relocation resource allocation with UE not involved for PS domain. Failure causes are defined within TS 25.413 [5].

The sum of all supported per cause measurements shall equal the total number of failed events. In case only a subset of per cause measurements is supported, a sum subcounter will be provided first.

- d) Each measurement is an integer value. The number of measurements is equal to the number of causes supported plus a possible sum value identified by the .sum suffix.
- e) The measurement name has the form RELOC.FailResAllocUENotInvolPS.Cause where Cause identifies the failure cause.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

4.11.2.5 Relocations for PS domain

4.11.2.5.1 Successful relocations for PS domain

- a) This measurement provides the number of successful relocations for PS domain ('UE involved' and 'UE not involved' Relocations).
- b) CC.
- c) Receipt of a RANAP message Iu RELEASE COMMAND sent from the PS CN (Source side) to the source RNC in response to a RELOCATION REQUIRED message, indicating a successful relocation for PS domain (see TS 25.413 [5]).
- d) A single integer value.
- e) RELOC.SuccPS.
- f) RncFunction.
- g) Valid for packet switched traffic.
- h) UMTS.

**End of Change in Clause 4.11
End of Document**

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010237	--	--	Submitted to TSG SA #12 for Approval.	1.0.2	4.0.0
Sep 2001	S_13	SP-010468	001	--	Corrections on UMTS and combined UMTS/GSM measurements: Addition of family name for CN measurements, addition of the list of families, addition of Annex A: "(n-1) out of n" examples, application of the "(n-1) out of n" approach to all relevant measurements, enhancement of per cause measurements	4.0.0	4.1.0
Mar 2002	S_15	SP-020026	002	--	Correction of the measured object class for some SGSN MM measurement definitions	4.1.0	4.2.0
Mai 2002	--	--	--	--	MCC clean-up (Cosmetics based on EditHelp)	4.2.0	4.2.1
Jun 2002	S_16	SP-020291	003	2	Introduction of "Performance Measurements Definition Process" describing the repeatable, top-down process to define measurements for inclusion in future 3GPP Releases	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	004	--	Adding performance measurement definitions related to GGSN	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	005	--	Introduction of an optional "Purpose" clause in the measurement template	4.2.0	5.0.0
Jun 2002	S_16	SP-020291	006	--	Addition of explanatory text for Radio Access Bearer (RAB) measurements	4.2.0	5.0.0
Sep 2002	S_17	SP-020609	009	--	Introduction of Service Based Performance Measurement Definitions	5.0.0	5.1.0
Sep 2002	S_17	SP-020609	010	--	Add flexibility in the measurement template for the Measured Object Class (MOC)	5.0.0	5.1.0
Mar 2003	S_19	SP-030146	012	--	Correction of the subscriber number measurement definitions	5.1.0	5.2.0
Jun 2003	S_20	SP-030292	014	--	Correction of the definition of the successful GPRS attach counters	5.2.0	5.3.0
Jun 2003	S_20	SP-030292	015	--	Deletion of dual clause 4.1.2	5.2.0	5.3.0
Jun 2003	S_20	SP-030293	016	--	Addition of GPRS per cause measurement definitions	5.3.0	6.0.0
Jun 2003	S_20	SP-030293	017	--	Introduction of MMS Service Based Performance Measurement	5.3.0	6.0.0
Sep 2003	S_21	SP-030431	020	--	Correction of collection method for SGSN measurements	6.0.0	6.1.0
Sep 2003	S_21	SP-030431	023	--	Correction of outgoing intra-cell hard handovers measurements	6.0.0	6.1.0
Dec 2003	S_22	SP-030645	025	--	Correction of terms used for subcounter definitions	6.1.0	6.2.0
Mar 2004	S_23	SP-040134	028	--	Correction of "Radio link addition" measurements	6.2.0	6.3.0
Mar 2004	S_23	SP-040135	029	--	Add the measurements about lu connection release	6.2.0	6.3.0
Jun 2004	S_24	SP-040266	032	--	Correction of Inter-RAT handover measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040267	035	--	Correction of RAB assignment measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040269	038	--	Correction of hard handover measurement definitions	6.3.0	6.4.0
Jun 2004	S_24	SP-040270	039	--	Addition of the measurements about RAB modification and RAB release by CN	6.3.0	6.4.0

CHANGE REQUEST

⌘ **32.403 CR 044** ⌘ rev - ⌘ Current version: **6.4.0** ⌘

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:	⌘ Change of the measurements about SRNS Relocation ⌘		
Source:	⌘ SA5 (llrui@bupt.edu.cn , liyewen@chinamobile.com) ⌘		
Work item code:	⌘ OAM-PM ⌘	Date:	⌘ 20/08/2004 ⌘
Category:	⌘ C ⌘	Release:	⌘ Rel-6 ⌘
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ In clause 5.3, there are 2 kinds of SRNS Relocation: SRNS Relocation and SRNS Relocation. According to the new structure and adopting the (n-1) out of n" approach, the successful measurements for SRNS Relocation and SRNS Relocation need to be splitted. ⌘
Summary of change:	⌘ Change the attempted intra/inter 3G-SGSN SRNS Relocation to attempted intra 3G-SGSN SRNS Relocation and adopt the (n-1) out of n" approach. ⌘
Consequences if not approved:	⌘ The structure for attempted, successful and failed intra 3G-SGSN SRNS Relocation is not perfect. For intra 3G-SGSN SRNS Relocation, the (n-1) out of n" approach is not applicable. ⌘

Clauses affected:	⌘ 5.3 ⌘						
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Other core specifications ⌘	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>		⌘
Y	N						
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	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Test specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
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	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> O&M Specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Y	N						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Other comments:	⌘						

5.3 SRNS Relocation

5.3.1 Intra 3G-SGSN SRNS Relocations

The four measurements defined in the clause 5.3.1 are subject to the "3 out of 4 approach".

Note: Number of Attempted intra 3G-SGSN SRNS Relocations = Number of Successful intra 3G-SGSN SRNS Relocations + Number of Failed intra 3G-SGSN SRNS Relocations, due to internal reasons + Number of Failed intra 3G-SGSN SRNS Relocations, due to external reasons.

5.3.1.1 Attempted intra/inter 3G-SGSN SRNS Relocations

- a) This measurement provides the number of attempts intra/inter 3G-SGSN SRNS Relocations.
- b) CC.
- c) Receipt of "Relocation Required" message (TS 25.413 [5]) from SRNC, where the Target ID indicates Intra SGSN SRNS Relocation.
- d) A single integer value.
- e) RELOC.AttIntraSGSN.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.1.2 Successful intra 3G-SGSN SRNS Relocations

- a) This measurement provides the number of successful intra 3G-SGSN SRNS Relocations.
- b) CC.
- c) Receipt of "Relocation Complete" message for intra 3G-SGSN SRNS Relocation (TS 25.413 [5]) from TRNC.
- d) A single integer value.
- e) RELOC.SuccIntraSGSN.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.1.3 Failed intra 3G-SGSN SRNS Relocations, due to internal reasons

- a) This measurement provides the number of failed intra 3G-SGSN SRNS Relocations, due to internal reasons.
- b) CC.
- c) Intra 3G-SGSN SRNS Relocation fails due to reasons located inside this SGSN:- internal resource problem-recovery- ...
- d) A single integer value.
- e) RELOC.FailIntraSGSNInt.
- f) SgsnFunction.

- g) Valid for packet switching.
- h) UMTS.

5.3.1.4 Failed intra 3G-SGSN SRNS Relocations_s, due to external reasons

- a) This measurement provides the number of failed intra 3G-SGSN SRNS Relocations_s, due to external reasons.
- b) CC.
- c) Intra 3G-SGSN SRNS Relocation fails due to reasons located in NE outside this SGSN:- "Relocation Preparation Failure" (TS 25.413 [5]) is sent to the SRNC- "Relocation Failure" (TS 25.413 [5]) is received from the TRNC- "Relocation Cancel" (TS 25.413 [5]) is received from the SRNC- missing expected message from RNC (timer expiry)- ...
- d) A single integer value.
- e) RELOC.FailIntraSGSNext.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.2 Inter 3G-SGSN SRNS Relocations

The four measurements defined in the clause 5.3.2 are subject to the "3 out of 4 approach".

Note: Number Attempted inter 3G-SGSN SRNS Relocations, counted in the old 3G-SGSN = Number of Successful inter 3G-SGSN SRNS Relocations, counted in the old 3G-SGSN + Number of Failed inter 3G-SGSN SRNS Relocations, due to external reasons, counted in the old 3G-SGSN + Number of Failed inter 3G-SGSN SRNS Relocations, due to external reasons, counted in the old 3G-SGSN.

5.3.2.15 Attempted inter 3G-SGSN SRNS Relocations_s, counted in the old 3G-SGSN

- a) This measurement provides the number of attempted_s inter 3G-SGSN SRNS Relocations_s.
- b) CC.
- c) Receipt of "Relocation Required" message (TS 25.413 [5]) from SRNC, where the Target ID indicates Inter SGSN SRNS Relocation.
- d) A single integer value.
- e) RELOC.AttInterSGSN.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.2.26 Successful inter 3G-SGSN SRNS Relocations_s, counted in the old 3G-SGSN

- a) This measurement provides the number of successful Inter 3G-SGSN SRNS Relocations_s, counted in the old 3G-SGSN.
- b) CC.
- c) Receipt of "Forward Relocation Complete" message (TS 29.060) from the new SGSN.
- d) A single integer value.
- e) RELOC.SuccInterSGSN.

- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.2.37 Failed inter 3G-SGSN SRNS Relocations, due to internal reasons, counted in the old 3G-SGSN

- a) This measurement provides the number of failed Inter 3G-SGSN SRNS Relocations, due to internal reasons.
- b) CC.
- c) Inter 3G-SGSN SRNS Relocation fails due to reasons located inside this SGSN:- internal resource problem-recovery- ...
- d) A single integer value.
- e) RELOC.FailInterSGSNInt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.2.48 Failed inter 3G-SGSN SRNS Relocations, due to external reasons, counted in the old 3G-SGSN

- a) This measurement provides the number of ~~unsuccessful~~ failed Inter 3G-SGSN SRNS Relocations, due to external reasons.
- b) CC.
- c) Inter 3G-SGSN SRNS Relocation fails due to reasons located in NE outside this SGSN:- the Cause in "Forward Relocation Response" (TS 29.060) from the new 3G-SGSN is not "Request Accepted"- "Relocation Preparation Failure" (TS 25.413 [5]) is sent to the SRNC- "Relocation Failure" (TS 25.413 [5]) is received from the TRNC- "Relocation Cancel" (TS 25.413 [5]) is received from the SRNC- missing expected message from RNC or new 3G-SGSN (timer expiry)- ...
- d) A single integer value.
- e) RELOC.FailInterSGSNExt.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.3 Inter 3G-SGSN SRNS Relocations, counted in the new 3G-SGSN

5.3.3.19 Attempted inter 3G-SGSN SRNS Relocations, counted in the new 3G-SGSN

- a) This measurement provides the number of attempted ~~s~~ inter 3G-SGSN SRNS Relocations, counted in the new 3G-SGSN.
- b) CC.
- c) Receipt of "Forward Relocation Request" message (TS 29.060) from the old SGSN.
- d) A single integer value.
- e) RELOC.AttInterSGSNNew.

- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

5.3.3.240 Successful Inter 3G-SGSN SRNS Relocations, counted in the new 3G-SGSN

- a) This measurement provides the number of successful Inter 3G-SGSN SRNS Relocations, counted in the new 3G-SGSN.
- b) CC.
- c) Transmission of "Forward Relocation Complete" message (TS 29.060) to the old SGSN.
- d) A single integer value.
- e) RELOC.SuccInterSGSNNew.
- f) SgsnFunction.
- g) Valid for packet switching.
- h) UMTS.

End of Change in Clause 5.3
End of Document

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Sep 2003	S_21	SP-030431	023	--	Correction of outgoing intra-cell hard handovers measurements	6.0.0	6.1.0
Dec 2003	S_22	SP-030645	025	--	Correction of terms used for subcounter definitions	6.1.0	6.2.0
Mar 2004	S_23	SP-040134	028	--	Correction of "Radio link addition" measurements	6.2.0	6.3.0
Mar 2004	S_23	SP-040135	029	--	Add the measurements about lu connection release	6.2.0	6.3.0
Jun 2004	S_24	SP-040266	032	--	Correction of Inter-RAT handover measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040267	035	--	Correction of RAB assignment measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040269	038	--	Correction of hard handover measurement definitions	6.3.0	6.4.0
Jun 2004	S_24	SP-040270	039	--	Addition of the measurements about RAB modification and RAB release by CN	6.3.0	6.4.0

CHANGE REQUEST

⌘ **32.403 CR 045** ⌘ rev - ⌘ Current version: **6.4.0** ⌘

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:	⌘ Split measurements about successful PDP context deactivation		
Source:	⌘ SA5 (llrui@bupt.edu.cn , liyewen@chinamobile.com)		
Work item code:	⌘ OAM-PM	Date:	⌘ 20/08/2004
Category:	⌘ C	Release:	⌘ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	⌘ There are 2 kinds of PDP context deactivations: 1) initiated by MS or SGSN 2) initiated by GGSN. In the 'session conclusions' section for GGSN, these 2 kinds of PDP context deactivations have individual measurements about attempted PDP context deactivations. But the successful PDP context deactivations are counted as a total number without distinguishing between the two kinds of PDP context deactivations. To analyze the PDP context deactivation procedure more accurately, the successful procedure needs to be splitted.
Summary of change:	⌘ Split the measurements about 'successfully concluded sessions' into 'successful MS & SGSN-initiated session conclusions' and 'successful GGSN-initiated session conclusions'.
Consequences if not approved:	⌘ For the above 2 kinds of PDP context deactivations, there is no comparison between attempted and successful PDP context deactivations.

Clauses affected:	⌘ 6.1.4						
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Other core specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	⌘	
Y	N						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> Test specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	⌘	
Y	N						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table> O&M Specifications	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	⌘	
Y	N						
<input type="checkbox"/>	<input checked="" type="checkbox"/>						
Other comments:	⌘						

Change in Clause 6.1.4

6.1.4 Session conclusions

The performance counters presented in this subclause are related to PDP context deactivation procedure. The counters proposed are mainly intended to evaluate the ratio of GGSN-initiated PDP context deactivations in overall PDP context deactivations, estimate the PDP context deactivation success rate, and may also be used in the subscriber or session profile.

The figures below, from TS 23.060, recall the sequence of messages exchanged for MS, SGSN or GGSN initiated PDP context deactivations and detail the events triggering the update of the counters values.

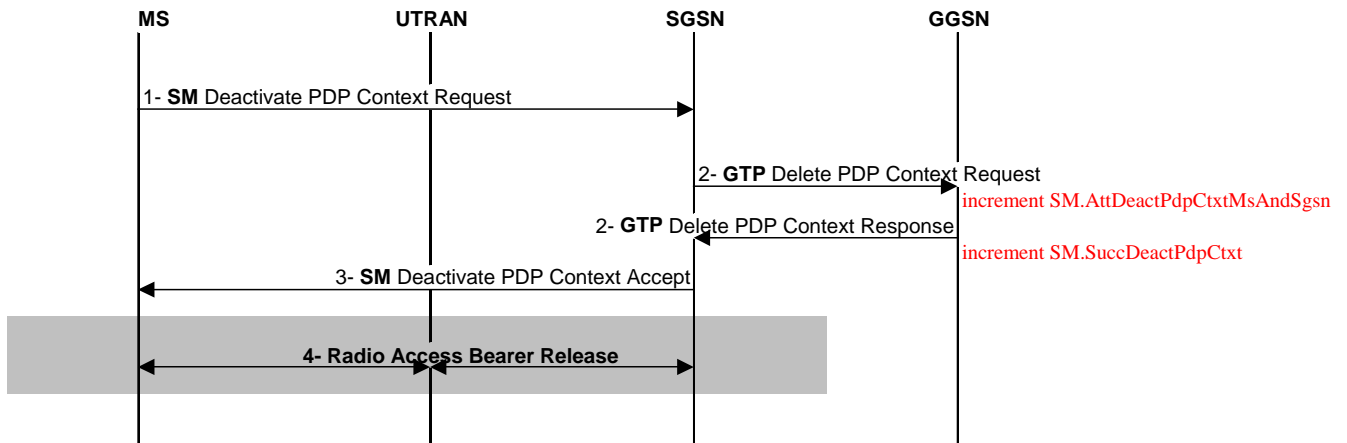


Figure: MS initiated PDP context deactivation

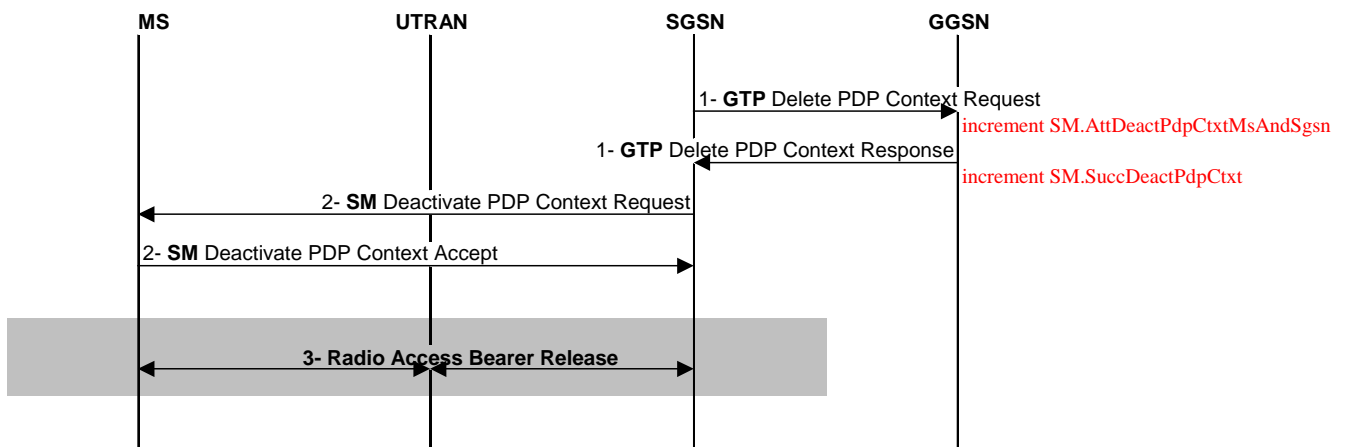


Figure: GSN initiated PDP context deactivation

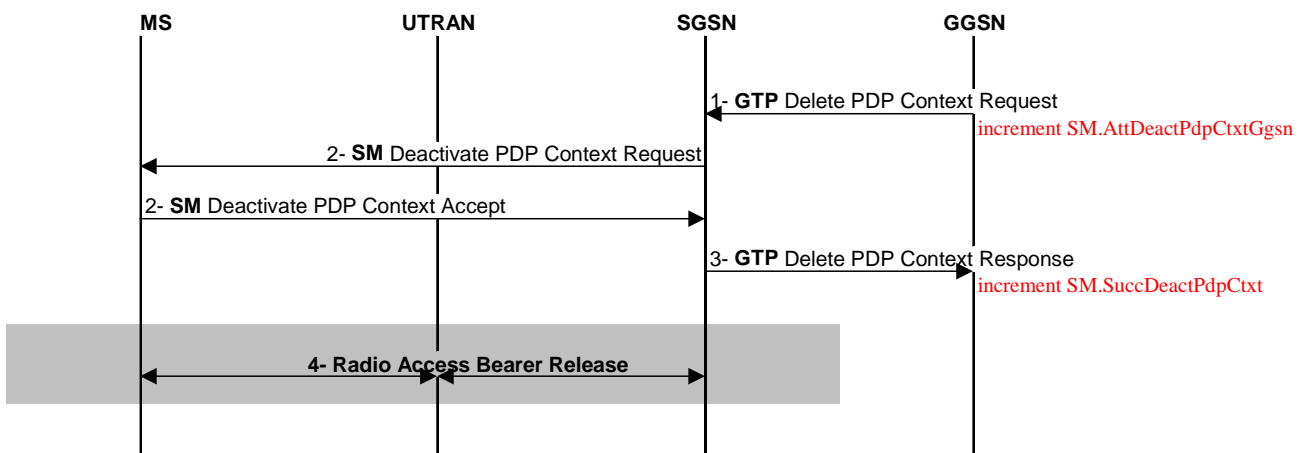


Figure: GGSN initiated PDP context deactivation

6.1.4.1 MS & SGSN-initiated session conclusions

6.1.4.1.1 Attempted MS & SGSN-initiated session conclusions

- a) This measurement provides the number of attempted PDP context deactivations initiated by MS & SGSN.
- b) CC
- c) The measurement is incremented on receipt by the GGSN of a DELETE PDP CONTEXT REQUEST message. See TS 29.060.
- d) Integer
- e) SM.AttDeactPdpCtxtMsAndSgsn
- f) GgsnFunction
- g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.1.4.1.2 Successful MS & SGSN-initiated session conclusions

a) This measurement provides the number of successful PDP context deactivations initiated by MS & SGSN.

b) CC

c) The measurement is incremented on transmission by the GGSN of a DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted". See TS 29.060.

d) Integer

e) SM.SuccDeactPdpCtxtMsAndSgsn

f) GgsnFunction

g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.1.4.2 GGSN-initiated session conclusions

6.1.4.2.1 Attempted GGSN-initiated session conclusions

a) This measurement provides the number of attempted PDP context deactivations initiated by GGSN.

b) CC

c) The measurement is incremented on transmission by the GGSN of a DELETE PDP CONTEXT REQUEST message. See TS 29.060.

d) Integer

e) SM.AttDeactPdpCtxtGgsn

f) GgsnFunction

g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

6.1.4.2.2 ~~Successfully~~ GGSN-initiated session conclusions ~~concluded sessions~~

a) This measurement provides the number of successful PDP context deactivations initiated by GGSN. ~~sessions successfully concluded.~~

b) CC

c) The measurement is incremented on ~~transmission or~~ receipt by the GGSN of a DELETE PDP CONTEXT RESPONSE message with cause "Request Accepted". See TS 29.060.

d) Integer

e) SM.SuccDeactPdpCtxtGgsn

f) GgsnFunction

g) Valid for packet switched traffic

h) COMB

i) This measurement is mainly dedicated to Vendor Performance Modelling community.

**End of Change in Clause 6.1.4
End of Document**

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2003	S_20	SP-030292	015	--	Deletion of dual clause 4.1.2	5.2.0	5.3.0
Jun 2003	S_20	SP-030293	016	--	Addition of GPRS per cause measurement definitions	5.3.0	6.0.0
Jun 2003	S_20	SP-030293	017	--	Introduction of MMS Service Based Performance Measurement	5.3.0	6.0.0
Sep 2003	S_21	SP-030431	020	--	Correction of collection method for SGSN measurements	6.0.0	6.1.0
Sep 2003	S_21	SP-030431	023	--	Correction of outgoing intra-cell hard handovers measurements	6.0.0	6.1.0
Dec 2003	S_22	SP-030645	025	--	Correction of terms used for subcounter definitions	6.1.0	6.2.0
Mar 2004	S_23	SP-040134	028	--	Correction of "Radio link addition" measurements	6.2.0	6.3.0
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Jun 2004	S_24	SP-040266	032	--	Correction of Inter-RAT handover measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040267	035	--	Correction of RAB assignment measurements	6.3.0	6.4.0
Jun 2004	S_24	SP-040269	038	--	Correction of hard handover measurement definitions	6.3.0	6.4.0
Jun 2004	S_24	SP-040270	039	--	Addition of the measurements about RAB modification and RAB release by CN	6.3.0	6.4.0