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Counter Changes between Releases S9 and S10

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1 Summary

The purpose of this document is to describe the counters that are been included in the BSC S10 software release. The counters have been introduced either to complement the new set of S10 features, or to improve the existing set of measurements.

The S10 software release includes improvements to the existing measurements and counters related to the following new features:

- BSS10004 Adaptive Multi Rate Codec
- BSS10005 Reversed Hunting
- BSS10012 MS Location Services
- BSS10016 Common BCCH Control
- BSS10022 FER Measurement
- BSS10045 Dynamic Abis Allocation
- BSS10046 Multi BCF Control
- BSS10072 Automated Planning
- BSS10074 Support of PCCCH/PBCCH
- BSS10083 Enhanced GPRS
- BSS10084 Priority Class based Quality of Service
- BSS10087 Support for 850 MHz frequencies
- BSS10089 System Level Trace
- BSS10091 EDGE

2 Overview of the new counters

The BSC S10 software release introduces roughly 800 new counters for monitoring the performance of the network. The new counters are either associated with a new feature that is present in the BSS10 software, or are improvements to the existing set of measurements.

The new counters in the existing measurements are:

Traffic Measurement	001182-001190
Handover Measurement	004131-004143
RX Quality Measurement	014021-014149
BSC Level Clear Code Measurement	500370
	500628-500629
	500710-500720
BSC Clear Code (PM) Measurement	051133-051136
	051147-051149
MS Capability Measurement	071033-071034
PCU Measurement	072088-072106
RLC Blocks per TRX Measurement	073003

The new measurements are:

TBF Observation for GPRS Trace	025000-025217
Position Based Services Observation	026000-026190
Defined Adjacent Cell Measurement	075000-075197
Dynamic Abis Measurement	076000-076008
FER Measurement	077000-077031

Position Based Services Measurement	078000-078019
Coding Scheme Measurement	079000-079009
Reversed Hunting Measurement	089000-089015
Quality of Service Measurement	090000-090006
PBCCH Measurement	091000-091027
Non-BCCH Layer Offset Measurement	092000-098042

For the purposes of this document the counters are divided according to the new BSS10 features that they relate to, rather than the measurement type. Each section in this document gives a brief description of each feature in the S10 release. It then details the counters associated with the new feature.

3

BSS10022 FER Measurement

FER Measurement provides a possibility of reporting the uplink frame erasure rate (UL FER) from the BTS to the BSC. This enables a more realistic measuring of the voice quality in the system and enables handovers and power control on the basis of FER rather than BER-based RxQuality. As a result, this feature can provide more capacity and better quality to the network.

Furthermore, DL FER is estimated using the correlation between UL FER and UL BER values and applying these to the DL BER values. Both the UL FER values and the estimated downlink frame erasure probability (FEP) values are available in the new FER measurement. In addition to the handover and power control algorithms, this feature also provides significant improvements to network quality statistics.

Frame Erasure Rate is the best indicator available for a GSM system for assessing the Voice Quality provided in a network. It represents the percentage of frames that are dropped due a to high number of non-corrected bit errors in the frame.

The RxQuality that is based on BER is not a good indicator of network quality, especially when the efficiency of the error correction mechanism changes as a new functionality, for example frequency hopping or dynamic channel coding, is introduced to the network.

Frequency Hopping disperses the fading and interference problems, allowing the decoding mechanism to effectively restore the original information via the Error Correction process. Not only the correlation between BER and FER will change when Frequency Hopping is in use, but also the different frequency hopping schemes (depending on the reuse and the number of frequencies to hop over) will have a different BER to FER correlation.

The Channel Coding algorithm in use has a direct impact on the Error Correction performance. The performance of the channel coding depends on its robustness. A good example of this is a situation where different coding schemes are implemented simultaneously in AMR networks. Again the correlation between BER and FER will change, and this time it will potentially do it dynamically according to the conditions.

Note

This is an optional feature.

3.1 FER Measurement (NEW)

No	<i>077000</i>
COUNTER NAME	<i>BTS ID</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	BTS identification, values range from 1 to 248.
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
LIMITS	1...248

No	<i>077001</i>
COUNTER NAME	<i>TRX ID</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	TRX identification, values range from 1 to 32.
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
LIMITS	1...32

No	077002
COUNTER NAME	USED CODEC TYPE
RELEASE/CHANGED	S10

EXPLANATION	<p>Identification of the used codec type.</p> <p>Normal channel types:</p> <p>1 = half rate speech traffic channel</p> <p>2 = full rate speech traffic channel</p> <p>3 = enhanced full rate speech traffic channel</p> <p>Adaptive Multi Rate (AMR) Codecs:</p> <p>4 = adaptive multirate half rate speech, 7.95kbit/s</p> <p>5 = adaptive multirate half rate speech, 7.5kbit/s</p> <p>6 = adaptive multirate half rate speech, 6.7kbit/s</p> <p>7 = adaptive multirate half rate speech, 5.9kbit/s</p> <p>8 = adaptive multirate half rate speech, 5.15kbit/s</p> <p>9 = adaptive multirate half rate speech, 4.75kbit/s</p> <p>10 = adaptive multirate full rate speech, 12.2kbit/s</p> <p>11 = adaptive multirate full rate speech, 10.2kbit/s</p> <p>12 = adaptive multirate full rate speech, 7.95kbit/s</p> <p>13 = adaptive multirate full rate speech, 7.4kbit/s</p> <p>14 = adaptive multirate full rate speech, 6.7kbit/s</p> <p>15 = adaptive multirate full rate speech, 5.9kbit/s</p> <p>16 = adaptive multirate full rate speech, 5.15kbit/s</p> <p>17 = adaptive multirate full rate speech, 4.75kbit/s</p>
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
LIMITS	1...17

No	077003
COUNTER NAME	TRX IN EXT AREA
RELEASE/CHANGED	S10
EXPLANATION	Normal TRX / Extended TRX 0 = normal area 1 = extended area
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
LIMITS	0...1

No	077004
COUNTER NAME	ID OF FREQUENCY GROUP
RELEASE/CHANGED	S10
EXPLANATION	Identification of the frequency group that the TRX belongs to. May either be regular or one of the sixteen super-reuse frequency groups.
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
LIMITS	0...16

No	077005
COUNTER NAME	TRX FREQUENCY
RELEASE/CHANGED	S10
EXPLANATION	Absolute radio frequency number of the TRX. Shows the TRX parameter value set as INITIAL_FREQUENCY by the operator. If hopping is used, this value is obsolete. Values: GSM 850: 128...251 GSM 900: 1...124 E-GSM 900: 0, 975...1023 GSM 1800: 512...885 GSM 1900: 512...810
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable

No	077006
COUNTER NAME	FH GROUP ID
RELEASE/CHANGED	S10
EXPLANATION	Identification of the frequency hopping group. 0 = non-hopping 1 = radio frequency hopping 2 = baseband hopping
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
LIMITS	0...2

No	077007
COUNTER NAME	CLASS 1 BOUNDARY
RELEASE/CHANGED	S10
EXPLANATION	The lower limit of FER class 1 for both uplink and downlink directions used in a measurement period. Values below this boundary are updating the class 0 counters. The default value for this limit is 20 (2%).
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
UNIT	0.1%
LIMITS	1...249

No	077008
COUNTER NAME	CLASS 2 BOUNDARY
RELEASE/CHANGED	S10
EXPLANATION	The lower limit of FER class 2 for both uplink and downlink directions used in a measurement period. The default value for this limit is 40 (4%).
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
UNIT	0.1%
LIMITS	2...250

No	077009
COUNTER NAME	CLASS 3 BOUNDARY
RELEASE/CHANGED	S10
EXPLANATION	The lower limit of FER class 3 for both uplink and downlink directions used in a measurement period. The default value for this limit is 60 (6%).
UPDATED	At the beginning of the measurement period when the call is established.

No	077009
COUNTER NAME	CLASS 3 BOUNDARY
RELEASE/CHANGED	S10
COUNTER TYPE	Variable
UNIT	0.1%
LIMITS	3...251

No	077010
COUNTER NAME	CLASS 4 BOUNDARY
RELEASE/CHANGED	S10
EXPLANATION	The lower limit of FER class 4 for both uplink and downlink directions used in a measurement period. The default value for this limit is 80 (8%).
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
UNIT	0.1%
LIMITS	4...252

No	077011
COUNTER NAME	CLASS 5 BOUNDARY
RELEASE/CHANGED	S10
EXPLANATION	The lower limit of FER class 5 for both uplink and downlink directions used in a measurement period. The default value for this limit is 100 (10%).
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
UNIT	0.1%
LIMITS	5...253

No	077012
COUNTER NAME	CLASS 6 BOUNDARY
RELEASE/CHANGED	S10
EXPLANATION	The lower limit of FER class 6 for both uplink and downlink directions used in a measurement period. The default value for this limit is 120 (12%).
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
UNIT	0.1%
LIMITS	6...254

No	077013
COUNTER NAME	CLASS 7 BOUNDARY
RELEASE/CHANGED	S10
EXPLANATION	The lower limit of FER class 7 for both uplink and downlink directions used in a measurement period. The default value for this limit is 140 (14%).
UPDATED	At the beginning of the measurement period when the call is established.
COUNTER TYPE	Variable
UNIT	0.1%
LIMITS	7...255

No	077014
COUNTER NAME	AVE WIN SIZE
RELEASE/CHANGED	S10
EXPLANATION	Size of the averaging window used in a measurement period. Default averaging window size is 2 SACCH frames.
UPDATED	At the beginning of the measurement period when the call is established.

No	077014
COUNTER NAME	AVE WIN SIZE
RELEASE/CHANGED	S10
COUNTER TYPE	Variable
UNIT	Number of SACCH frames
LIMITS	1...32

No	077015
COUNTER NAME	NBR OF UL FER CL 0
RELEASE/CHANGED	S10
EXPLANATION	Number of uplink FER samples in class 0.
UPDATED	During calls, when the BTS reports a class 0 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077016
COUNTER NAME	NBR OF UL FER CL 1
RELEASE/CHANGED	S10
EXPLANATION	Number of uplink FER samples in class 1.
UPDATED	During calls, when the BTS reports a class 1 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077017
COUNTER NAME	NBR OF UL FER CL 2
RELEASE/CHANGED	S10
EXPLANATION	Number of uplink FER samples in class 2.

No	077017
COUNTER NAME	<i>NBR OF UL FER CL 2</i>
RELEASE/CHANGED	<i>S10</i>
UPDATED	During calls, when the BTS reports a class 2 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077018
COUNTER NAME	<i>NBR OF UL FER CL 3</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of uplink FER samples in class 3.
UPDATED	During calls, when the BTS reports a class 3 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077019
COUNTER NAME	<i>NBR OF UL FER CL 4</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of uplink FER samples in class 4.
UPDATED	During calls, when the BTS reports a class 4 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077020
COUNTER NAME	NBR OF UL FER CL 5
RELEASE/CHANGED	S10
EXPLANATION	Number of uplink FER samples in class 5.
UPDATED	During calls, when the BTS reports a class 5 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077021
COUNTER NAME	NBR OF UL FER CL 6
RELEASE/CHANGED	S10
EXPLANATION	Number of uplink FER samples in class 6.
UPDATED	During calls, when the BTS reports a class 6 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077022
COUNTER NAME	NBR OF UL FER CL 7
RELEASE/CHANGED	S10
EXPLANATION	Number of uplink FER samples in class 7.
UPDATED	During calls, when the BTS reports a class 7 UL FER value in the measurement report.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077023
COUNTER NAME	<i>NBR OF DL FER CL 0</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of downlink FER samples in class 0.
UPDATED	During calls, when the BTS reports the DL BER value, and the value is mapped to a class 0 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077024
COUNTER NAME	<i>NBR OF DL FER CL 1</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of downlink FER samples in class 1.
UPDATED	During calls, when the BTS reports the DL BER value, and the value is mapped to a class 1 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077025
COUNTER NAME	<i>NBR OF DL FER CL 2</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of downlink FER samples in class 2.
UPDATED	During calls, when the BTS reports the DL BER value, and the value is mapped to a class 2 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077026
COUNTER NAME	<i>NBR OF DL FER CL 3</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of downlink FER samples in class 3.
UPDATED	During calls, when the BTS reports the DL BER value, and the value is mapped to a class 3 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	<i>077027</i>
COUNTER NAME	<i>NBR OF DL FER CL 4</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of downlink FER samples in class 4.
UPDATED	During calls, when the BTS reports the DL BER value, and the value is mapped to a class 4 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	<i>077028</i>
COUNTER NAME	<i>NBR OF DL FER CL 5</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of downlink FER samples in class 5.
UPDATED	During calls, when the BTS reports the DL BER value and the value is mapped to a class 5 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077029
COUNTER NAME	NBR OF DL FER CL 6
RELEASE/CHANGED	S10
EXPLANATION	Number of downlink FER samples in class 6.
UPDATED	During calls, when the BTS reports the DL BER value, and the value is mapped to a class 6 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077030
COUNTER NAME	NBR OF DL FER CL 7
RELEASE/CHANGED	S10
EXPLANATION	Number of downlink FER samples in class 7.
UPDATED	During calls, when the BTS reports the DL BER value, and the value is mapped to a class 7 DL FER.
	This counter is updated only when the corresponding correlation table is available.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

No	077031
COUNTER NAME	NBR OF DL FER EST
RELEASE/CHANGED	S10
EXPLANATION	Total number of estimated FER values on the downlink direction.
UPDATED	When the DL FER counters are updated with the estimated values.
COUNTER TYPE	Cumulative
UNIT	Number of TCH frames

4

BSS10089 System Level Trace

This system level feature extends the use of the tracing facility to the GPRS service. Tracing is currently available in the network elements of the GSM network for tracing circuit switched calls. The trace support is not fully specified for GPRS and therefore the solution is partly proprietary.

The trace facility enables customer administration and network management to trace the subscribers' activities that result in events occurring in the PLMN. The trace facility is a useful maintenance and development tool that can be used during system testing. It can particularly be used in conjunction with test-MSs to ascertain the digital cell 'footprint', network integrity, and also the network quality of service, as perceived by the PLMN.

It is possible to define subscriber tracing for a certain subscriber in both the HLR or a specific SGSN. Equipment tracing can be defined in the SGSN.

Tracing has already been implemented to the GSM network, but since the introduction of GPRS-service adds new network elements to the GSM network (GGSN, SGSN) this requires that the trace features be updated.

Network management can use the facility for subscriber trace, for example, in connection with a customer complaint or with a suspected equipment malfunction.

When the operator wishes to trace GPRS subscribers in their own (home) network, the trace is first activated in the HLR. If the subscriber is not roaming outside the HPLMN and is registered in the HLR, the HLR activates the trace in the specified SGSN. Otherwise the HLR waits until the subscriber becomes active in the HPLMN before activating the trace in SGSN.

When the operator wants to trace a foreign subscriber, the trace is activated directly with MMI commands to all SGSNs in the operator's network. The subscriber trace is in active pending state until an invoking event occurs. The number of active trace cases is limited.

Network elements involved

Tracing is a system level feature and in order to obtain full benefit from it, it must be implemented to all the main network elements of the GPRS network, including SGSN, GGSN, BSC, MSC/HLR, and NMS.

4.1 TBF Observation for GPRS Trace (NEW)

Note

This observation type can not be controlled locally from the BSC. It is only used for GPRS Trace and is activated from the SGSN or HLR.

No	<i>025000</i>
COUNTER NAME	<i>SEGMENT ID</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Identification of the telecom cell.
UPDATED	When a TBF is allocated.

No	<i>025001</i>
COUNTER NAME	<i>BTS ID</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Identification of the BTS.
UPDATED	When a TBF is allocated.

No	<i>025002</i>
COUNTER NAME	<i>TRX ID</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Identification of the TRX.
UPDATED	When a TBF is allocated.

No	<i>025003</i>
COUNTER NAME	<i>IMSI</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	IMSI code of the traced subscriber.
UPDATED	When a TBF is allocated.

No	025004
COUNTER NAME	TBF ALLOCATION TIME
RELEASE/CHANGED	S10
EXPLANATION	Time stamp for the allocation of a TBF. Coded in BCD (binary coded decimal) Hundredths of seconds : byte Seconds : byte Minutes : byte Hours : byte Day : byte Month : byte Year : word
UPDATED	When a TBF is allocated.

Note

If the allocation time stamp is missing, the trace data is divided into several reports. The reports can be linked using the IMSI code.

No	025005
COUNTER NAME	TBF RELEASE TIME
RELEASE/CHANGED	S10
EXPLANATION	Time stamp for the release of a TBF. Coded in BCD (binary coded decimal) Hundredths of seconds : byte Seconds : byte Minutes : byte Hours : byte Day : byte Month : byte Year : word
UPDATED	When a TBF is released.

Note

If the release time stamp is missing, the trace data is divided into several reports. The reports can be linked using the IMSI code.

No	025006
COUNTER NAME	TBF DIRECTION
RELEASE/CHANGED	S10
EXPLANATION	Direction of a TBF. 0 = uplink 1 = downlink
UPDATED	When a TBF is allocated.

No	025007
COUNTER NAME	QOS PRIORITY CLASS
RELEASE/CHANGED	S10
EXPLANATION	Quality of Service as defined in the description of the QoS in GSM specification 08.18, chapter 11.3.28. 0 = DL High Priority, UL Radio Priority 1 1 = DL Normal Priority, UL Radio Priority 2 2 = DL Low Priority, UL Radio Priority 3 3 = DL Reserved, UL Radio Priority 4 4 = DL Reserved, UL Radio Priority Unknown
UPDATED	When a TBF is allocated.

No	025008
COUNTER NAME	NBR OF FLOW CNTRL CHANGES
RELEASE/CHANGED	S10
EXPLANATION	Number of flow control changes during a TBF. This counter gives the number of MS flow control change data groups (the following two counter sets) with relevant data.
UPDATED	When MS flow control is changed.

Sequence of counters 025009 and 025010 is repeated 20 times as follows:

- *025009 BUCKET SIZE 0*
- *025010 LEAK RATE 0*
- ...
- *025047 BUCKET SIZE 19*
- *025048 LEAK RATE 19*

No	<i>025009</i>
COUNTER NAME	<i>BUCKET SIZE 0</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Current RLC data buffer size in bytes as defined in the description of the BSSGP Virtual Connection (BVC) Bucket Size in GSM specification 08.18, chapter 11.3.5.
UPDATED	When MS flow control is changed.

No	<i>025010</i>
COUNTER NAME	<i>LEAK RATE 0</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Current transmission rate from RLC data buffer in bytes as defined in the description of the Bucket Leak Rate in GSM specification 08.18, chapter 11.3.4.
UPDATED	When MS flow control is changed.

No	<i>025049</i>
COUNTER NAME	<i>NBR OF TCHS IN BEG</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of TCHs allocated to a TBF at the beginning.
UPDATED	When a TBF is allocated.

No	025050
COUNTER NAME	<i>NBR OF REALLOC</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of TCH reallocations during a TBF. This counter gives the number of reallocation data groups (the following four counter sets) with relevant data.
UPDATED	When a TBF is reallocated.

Sequence of counters 025051 - 025054 is repeated 20 times as follows:

- *025051 REALLOC CAUSE 0*
- *025052 BTS ID 0*
- *025053 TRX ID 0*
- *025054 NEW NBR OF TCHS 0*
- ...
- *025127 REALLOC CAUSE 19*
- *025128 BTS ID 19*
- *025129 TRX ID 19*
- *025130 NEW NBR OF TCHS 19*

No	025051
COUNTER NAME	<i>REALLOC CAUSE 0</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Cause of TBF reallocation. 0 = Inadequate TBF resources 1 = TBF resources not optimal 2 = Territory downgrade 3 = Multislot class unknown 4 = Change of multislot class 5 = Bad RX Level 6 = Load balancing between BTSs 7 = Load balancing between TSLs
UPDATED	When a TBF is reallocated.

No	025052
COUNTER NAME	BTS ID 0
RELEASE/CHANGED	S10
EXPLANATION	Identification of the BTS.
UPDATED	When a TBF is reallocated.

No	025053
COUNTER NAME	TRX ID 0
RELEASE/CHANGED	S10
EXPLANATION	Identification of the TRX.
UPDATED	When a TBF is reallocated.

No	025054
COUNTER NAME	NEW NBR OF TCHS 0
RELEASE/CHANGED	S10
EXPLANATION	Number of TCHs in a TBF after a reallocation.
UPDATED	When a TBF is reallocated.

No	025131
COUNTER NAME	AMOUNT OF LLC DATA
RELEASE/CHANGED	S10
EXPLANATION	Amount of LLC data during a TBF.
UPDATED	When a TBF is released.
UNIT	Byte

No	025132
COUNTER NAME	<i>NBR OF RLC BLOCKS LAST MCS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of RLC blocks in a TBF using the last MCS.
UPDATED	When a TBF is released.

No	025133
COUNTER NAME	<i>INITIAL CODING SCHEME</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	MCS at the beginning of a TBF allocation.
UPDATED	When a TBF is allocated.

No	025134
COUNTER NAME	<i>NBR OF DYNABIS MCS CHANGES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of MCS changes caused by Dynamic Abis bus blockage.
UPDATED	When a TBF is released.

No	025135
COUNTER NAME	<i>MCS CHANGES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of changes of the MCS. This counter gives the number of MCS change data groups (the following four counter sets) with relevant data.
UPDATED	When the MCS is changed.

Sequence of counters 025136 - 025139 is repeated 20 times as follows:

- *025136 MCS CHANGE CAUSE 0*
- *025137 NEW MCS 0*
- *025138 NBR OF RLC BLOCKS PREV MCS 0*

- 025139 AMOUNT OF LLC DATA PREV MCS 0
- ...
- 025212 MCS CHANGE CAUSE 19
- 025213 NEW MCS 19
- 025214 NBR OF RLC BLOCKS PREV MCS 19
- 025215 AMOUNT OF LLC DATA PREV MCS 19

No	025136
COUNTER NAME	MCS CHANGE CAUSE 0
RELEASE/CHANGED	S10
EXPLANATION	Cause of the MCS change: 0 = changed by network 1 = EGPRS downgrade due to GPRS
UPDATED	When the MCS is changed.

No	025137
COUNTER NAME	NEW MCS 0
RELEASE/CHANGED	S10
EXPLANATION	New MCS.
UPDATED	When the MCS is changed.

No	025138
COUNTER NAME	NBR OF RLC BLOCKS PREV MCS 0
RELEASE/CHANGED	S10
EXPLANATION	Number of RLC blocks using the previous MCS.
UPDATED	When the MCS is changed.

No	<i>025139</i>
COUNTER NAME	<i>AMOUNT OF LLC DATA PREV MCS 0</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Amount of LLC data using the previous MCS.
UPDATED	When the MCS is changed.
UNIT	Byte

No	025216
COUNTER NAME	CAUSE TBF RELEASE
RELEASE/CHANGED	S10
EXPLANATION	Cause of the TBF release: 0 = Normal release 1 = Flush 2 = Abnormal release 3 = Duplicate UL TBF 4 = Channel management (CHM) initiated 5 = No reply to polling request 6 = No reply to UL packet acknowledgment 7 = Too many consecutive Uplink State Flag (USF) control blocks and bad frames 8 = Too many consecutive Relative Reserved Block Period (RRBP) data bad frames 9 = UL establishment timer expired 10 = UL reassignment timer expired 11 = DL establishment timer expired 12 = DL reassignment timer expired 13 = TSL reconfiguration timer expired due to TBF establishment 14 = TSL reconfiguration timer expired due to TBF reassignment 15 = Timer 3141 expired 16 = No channels available 17 = DX message buffer allocation failure 18 = DX message send failure 19 = Cell not found 20 = Mobile array full 21 = Attempt to duplicate TBF 22 = Abnormal TBF found 23 = Immediate UL assignment not acknowledged 24 = Suspend 25 = Cell deleted
UPDATED	When a TBF is released.

No	025217
COUNTER NAME	TRACE STATUS
RELEASE/CHANGED	S10
EXPLANATION	Status of the trace in ACTIVE state: 0 = no trace error 1 = pending table overflow 2 = ACTIVE trace outdated 3 = TLLI changed during TBF
UPDATED	When an observation report is generated.

5

BSS10072 Automated planning

This feature is used to increase the automation and planning accuracy in the mobile networks and, as a result, reduce the operational costs and increase the revenues of the operator.

The Target Areas for Automation in Planning

It is possible to reduce the operating costs associated with running a network that grows both in size and in complexity by employing a high degree of automation. In the future, network automation allows the operators to reduce their operating costs and thus gain a competitive advantage. The aim is to automate those tasks that have the largest impact on network performance and require the most manpower. This approach includes not only the automation of the existing methods, but also improvements to these methods. Together they help improve the network quality.

In GSM systems, automation can be applied to the following areas:

- Frequency planning
- Neighbour planning
- Adaptive setting of parameters on a cell-by-cell basis.

In the S10 time frame one new BSC measurement is created. This measurement, Defined Adjacent Cell Measurement, complements the S9 Channel Finder Measurement by providing the required information on the defined adjacencies of all BTS on a BSC for frequency and neighbour planning.

Note

An optional BSC feature kit is needed: Defined Adjacent Cell Measurement and Double BA List.

5.1 Defined Adjacent Cell Measurement (NEW)

No	075000
COUNTER NAME	DAC USED BLOCKS
RELEASE/CHANGED	S10

EXPLANATION	Number of reported defined adjacent neighbouring cells in the record.
UPDATED	At the end of the measurement period.
LIMITS	0...32

No	075001
COUNTER NAME	DAC DB VALUE LOW
RELEASE/CHANGED	S10

EXPLANATION	Lower dB value for C/I classification.
UPDATED	At the end of the measurement period.
EXAMPLE VALUES	FFFF FFC4 = -60 FFFF FFFF = -1 0000 0014 = 20
COUNTER TYPE	Variable
LIMITS	-63...62 dB

No	075002
COUNTER NAME	DAC DB VALUE HIGH
RELEASE/CHANGED	S10

EXPLANATION	Higher dB value for C/I classification.
UPDATED	At the end of the measurement period.
EXAMPLE VALUES	FFFF FFC4 = -60 FFFF FFFF = -1 0000 0014 = 20
COUNTER TYPE	Variable
LIMITS	-62...63 dB

No	075003
COUNTER NAME	AVE DOWNL SIGNAL STRENGTH IN SERV CELL
RELEASE/CHANGED	S10
EXPLANATION	Average strength of the downlink signal received from a serving cell.
UPDATED	<p>The strength of the received serving cell signal is registered when the MS reports adjacent cells during a call. The average strength of the downlink signal from the serving cell is calculated on the basis of these records.</p> <p>Strength of the received signal level according to GSM 05.08 (8.1.4):</p> <p>0 = less than -110 dBm</p> <p>1 = -110 to -109 dBm</p> <p>2 = -109 to -108 dBm</p> <p>...</p> <p>62 = -49 to -48 dBm</p> <p>63 = greater than -48 dBm</p>
DEPENDENCIES	This counter is updated with counter 075004.
COUNTER TYPE	Average

No	075004
COUNTER NAME	AVE DOWNL SIGNAL STRENGTH IN SERV CELL DENOM
RELEASE/CHANGED	S10
EXPLANATION	Denominator of the average strength of the downlink signal received from a serving cell.
DEPENDENCIES	This counter is updated with counter 075003.
COUNTER TYPE	Average

No	075005
COUNTER NAME	SUM OF SQUARES OF SERV CELL SIGNALS
RELEASE/CHANGED	S10
EXPLANATION	Sum of the squares of the downlink signals received from a serving cell. This counter is used in the standard deviation calculation in post processing. In case of overflow, the value of this counter is set to FFFF FFFF.
UPDATED	The square of the strength of the received signal is registered when the MS reports a serving cell during a call.

No	075006
COUNTER NAME	AVE DOWNL SIGNAL STRENGTH IN ADJ CELL 1
RELEASE/CHANGED	S10
EXPLANATION	Average strength of the downlink signal received from an adjacent cell.
UPDATED	The strength of the received signal is registered when the MS reports an adjacent cell during a call. The average strength of the downlink signal from the adjacent cell is calculated on the basis of these records. Strength of the received signal level according to GSM 05.08 (8.1.4): 0 = less than -110 dBm 1 = -110 to -109 dBm 2 = -109 to -108 dBm ... 62 = -49 to -48 dBm 63 = greater than -48 dBm
DEPENDENCIES	The sum of counters 075009, 075010 and 075011 is the denominator.
COUNTER TYPE	Average

No	<i>075007</i>
COUNTER NAME	<i>NCC 1</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Network color code identification part of the base station identification code.
LIMITS	0...7

No	<i>075007</i>
COUNTER NAME	<i>BCC 1</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	BTS colour code identification part of the base station identification code.
LIMITS	0...7

No	<i>075007</i>
COUNTER NAME	<i>BCCH 1</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of the BCCH carrier (= absolute radio frequency number). Values: GSM 850: 128...251 GSM 900: 1...124 E-GSM 900: 0, 975...1023 GSM 1800: 512...855 GSM 1900: 512...810

No	075008
COUNTER NAME	SUM OF SQUARES OF SIGNALS 1
RELEASE/CHANGED	S10
EXPLANATION	Sum of the squares of the downlink signals received from an adjacent cell. This counter is used in the standard deviation calculation in post processing. In case of overflow, the value of this counter is set to FFFF FFFF.
UPDATED	The square of the strength of the received signal is registered when the MS reports an adjacent cell during a call.

No	075009
COUNTER NAME	NUMBER OF SAMPLES IN CLASS 1 OF ADJ CELL 1
RELEASE/CHANGED	S10
EXPLANATION	Number of samples where the C/I value is lower than the default value or the user-given value (DB_VALUE_LOW). C/I value here refers to the difference between the DL signal strength of the serving cell and the signal strength of the defined adjacent cell.
UPDATED	When the signal strength is lower than the limit.

No	075010
COUNTER NAME	NUMBER OF SAMPLES IN CLASS 2 OF ADJ CELL 1
RELEASE/CHANGED	S10
EXPLANATION	Number of samples where the C/I value is between the default values and the user-given values (DB_VALUE_LOW and DB_VALUE_HIGH). C/I value here refers to the difference between the DL signal strength of the serving cell and the signal strength of the defined adjacent cell.
UPDATED	When signal strength is between the limiting values.

No	075011
COUNTER NAME	NUMBER OF SAMPLES IN CLASS 3 OF ADJ CELL 1
RELEASE/CHANGED	S10
EXPLANATION	Number of samples where the C/I value is bigger than the default value or the user-given value (DB_VALUE_HIGH). C/I value here refers to the difference between the DL signal strength of the serving cell and the signal strength of the defined adjacent cell.
UPDATED	When signal strength is higher than the limit.

Note

Counters 075006–075011 are repeated 32 times.

No	075192
COUNTER NAME	AVE DOWNL SIGNAL STRENGTH IN ADJ CELL 32
RELEASE/CHANGED	S10
EXPLANATION	Average strength of the downlink signal received from an adjacent cell.
UPDATED	<p>The strength of the received signal is registered when the MS reports an adjacent cell during a call. The average strength of the downlink signal from the adjacent cell is calculated on the basis of these records.</p> <p>Strength of the received signal level according to GSM 05.08 (8.1.4):</p> <p>0 = less than -110 dBm</p> <p>1 = -110 to -109 dBm</p> <p>2 = -109 to -108 dBm</p> <p>...</p> <p>62 = -49 to -48 dBm</p> <p>63 = greater than -48 dBm</p>
DEPENDENCIES	The sum of counters 075195, 075196 and 075197 is the denominator.
COUNTER TYPE	Average

No	075193
COUNTER NAME	NCC 32
RELEASE/CHANGED	S10
EXPLANATION	Network color code identification part of the base station identification code.
LIMITS	0..7

No	075193
COUNTER NAME	BCC 32
RELEASE/CHANGED	S10
EXPLANATION	BTS color code identification part of the base station identification code.
LIMITS	0..7

No	075193
COUNTER NAME	BCCH 32
RELEASE/CHANGED	S10
EXPLANATION	Number of the BCCH carrier (= absolute radio frequency number). Values: GSM 850: 128...251 GSM 900: 1...124 E-GSM 900: 0, 975...1023 GSM 1800: 512...855 GSM 1900: 512...810

No	075194
COUNTER NAME	SUM OF SQUARES OF SIGNALS 32
RELEASE/CHANGED	S10
EXPLANATION	Sum of the squares of the downlink signals received from an adjacent cell. This counter is used in the standard deviation calculation in post processing. In case of overflow, the value of this counter is set to FFFF FFFF.
UPDATED	The square of the strength of the received signal is registered when the MS reports an adjacent cell during a call.

No	075195
COUNTER NAME	NUMBER OF SAMPLES IN CLASS 1 OF ADJ CELL 32
RELEASE/CHANGED	S10
EXPLANATION	Number of samples where the C/I value is lower than the default value or the user-given value (DB_VALUE_LOW). C/I value here refers to the difference between the DL signal strength of the serving cell and the signal strength of the defined adjacent cell.
UPDATED	When the signal strength is lower than the limit.

No	075196
COUNTER NAME	NUMBER OF SAMPLES IN CLASS 2 OF ADJ CELL 32
RELEASE/CHANGED	S10
EXPLANATION	Number of samples where the C/I value is between the default values and the user-given values (DB_VALUE_LOW and DB_VALUE_HIGH). C/I value here refers to the difference between the DL signal strength of the serving cell and the signal strength of the defined adjacent cell.
UPDATED	When the signal strength is between the limiting values.

No	075197
COUNTER NAME	NUMBER OF SAMPLES IN CLASS 3 OF ADJ CELL 32
RELEASE/CHANGED	S10
EXPLANATION	Number of samples where the C/I value is greater than the default value or the user-given value (DB_VALUE_HIGH). C/I value here refers to the difference between the DL signal strength of the serving cell and the signal strength of the defined adjacent cell.
UPDATED	When signal strength is greater than the limit.

6

BSS10012 MS Location Services

MS Location Services allows a GSM subscriber and/or valid mobile equipment to be positioned within a certain Quality of Service. The positioning can be initiated by the subscriber, the network, or an external party utilizing the Mobile Positioning Function.

Positioning is subject to various restrictions based on capability, security, service profiles, etc. The LCS allows the location of a GSM mobile station (MS) to be determined at any time while the MS is within the radio coverage area of the GSM HPLMN or VPLMN. Location Services include, for example, the following applications:

- Government Applications
 - Emergency calls
 - Electronic surveillance.
- Operator Applications
 - Home zone calls.
- Commercial Services
 - Fleet management, tracking packages
 - Information on the nearest hotel, gas station etc.
 - Car Navigation
 - Emergency roadside service
 - Search of stolen property.

The different MS Location methods have different benefits and drawbacks, therefore no single method can be suitable for all applications.

Nokia BSS10 will include the E-OTD method. Moreover, the Cell ID+TA method will be implemented to perform legacy (no E-OTD capability) MSs location calculation. The E-TA, that is, TA correction will improve the location accuracy of legacy MSs. The method includes location calculation using radio interface measurements, for example RxLev and MS speed information.

Support for the stand-alone GPS method will also be implemented. Signalling between SMLC and MS is similar in both E-OTD and stand-alone GPS method.

6.1 PBS Measurement (NEW)

No	078000
COUNTER NAME	NBR OF LOC REQ FROM LCS
RELEASE/CHANGED	S10
EXPLANATION	Number of location requests from external LCS clients.
UPDATED	When the SMLC has received a location request started by an external LCS client.
No	078001
COUNTER NAME	SUCC LOC CALC BY LCS REQ
RELEASE/CHANGED	S10
EXPLANATION	Number of successful location calculations requested by external LCS clients.
UPDATED	When a location calculation requested by an external LCS client is successful.
No	078002
COUNTER NAME	NBR OF LOC REQ EMERGENCY
RELEASE/CHANGED	S10
EXPLANATION	Number of location requests from emergency calls.
UPDATED	When the SMLC has received a location request started by an emergency call.
No	078003
COUNTER NAME	SUCC LOC CALC EMERGENCY
RELEASE/CHANGED	S10
EXPLANATION	Number of successful location calculations requested by emergency calls.
UPDATED	When a location calculation requested by an emergency call is successful.

No	078004
COUNTER NAME	<i>NBR OF E-OTD CALCULATIONS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of E-OTD location calculations.
UPDATED	When the SMLC has received a location request and the E-OTD method is used.

No	078005
COUNTER NAME	<i>SUCC LOC CALC E-OTD</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of successful E-OTD location calculations.
UPDATED	When the SMLC has calculated the locations using the E-OTD method, and the required accuracy (QoS) is fulfilled.

No	078006
COUNTER NAME	<i>SUCC LOC CALC CELL ID TA</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of successful location calculations using only the Cell Id+TA method.
UPDATED	When the SMLC has calculated locations using only the Cell Id+TA method, and the required accuracy (QoS) is fulfilled.

No	078007
COUNTER NAME	<i>NBR OF LOC CALC STAND ALONE GPS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of location calculations using the stand-alone GPS method.
UPDATED	When the SMLC has received a location request, and the stand-alone GPS method is used.

No	078008
COUNTER NAME	SUCC LOC CALC STAND ALONE GPS
RELEASE/CHANGED	S10
EXPLANATION	Number of successful location calculations using the GPS stand-alone method.
UPDATED	When the MS has calculated locations using the GPS stand-alone method, and the required accuracy (QoS) is fulfilled.

No	078009
COUNTER NAME	NO E-OTD SUPPORT
RELEASE/CHANGED	S10
EXPLANATION	Number of location requests to MSs that do not support E-OTD.
UPDATED	When a location request using E-OTD has been sent, and the MS reports that it has no capability for E-OTD method.

No	078010
COUNTER NAME	NOT ENOUGH OTD VALUES
RELEASE/CHANGED	S10
EXPLANATION	Number of E-OTD assistance data responses that do not include enough OTD measurement data to perform E-OTD calculations.
UPDATED	When the MS cannot deliver enough OTD values.

No	078011
COUNTER NAME	NO RIT COVERAGE
RELEASE/CHANGED	S10
EXPLANATION	Number of E-OTD calculation attempts that are rejected because of insufficient RIT coverage.
UPDATED	When the E-OTD method cannot be used because of insufficient RIT coverage.

No	<i>078012</i>
COUNTER NAME	<i>INSUFFICIENT BTS INFORMATION</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of E-OTD calculation attempts that are rejected because of insufficient BTS information.
UPDATED	When the E-OTD method cannot be used because of insufficient BTS information.

No	<i>078013</i>
COUNTER NAME	<i>NBR OF LOC REQ FROM MS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of location requests from the MS.
UPDATED	When the SMLC has received a location request started by the MS.

No	<i>078014</i>
COUNTER NAME	<i>SUCC LOC CALC BY MS REQ</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of successful location calculations requested by the MS.
UPDATED	When a location calculation requested by the MS is successful.

No	<i>078015</i>
COUNTER NAME	<i>NBR OF LOC REQ FROM OPER</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of location requests from the operator.
UPDATED	When the SMLC has received a location request started by the operator.

No	078016
COUNTER NAME	SUCC LOC CALC BY OPER REQ
RELEASE/CHANGED	S10
EXPLANATION	Number of successful location calculations requested by the operator.
UPDATED	When a location calculation requested by the operator is successful.

No	078017
COUNTER NAME	FEATURE NOT SUPPORTED
RELEASE/CHANGED	S10
EXPLANATION	Number of location requests that are rejected because the PBS feature is not supported.
UPDATED	When the location request cannot be fulfilled because the feature is not supported or, for example, assistance data or deciphering key requests are used.

No	078018
COUNTER NAME	NBR OF MCATCH 1 LCS REQ
RELEASE/CHANGED	S10
EXPLANATION	Number of location requests that are served using Mcatch 1.0 solution.
UPDATED	When a location request is received while S9 Mcatch support is set on.

No	078019
COUNTER NAME	SUCC MCATCH 1 MEASUREMENTS
RELEASE/CHANGED	S10
EXPLANATION	Number of successful CI+TA+RXlevel measurements that are served using Mcatch 1.0 solution.
UPDATED	When a location request is successfully served with CI+TA+RXlevel information.

6.2 PBS Observation (NEW)

No	<i>026000</i>
COUNTER NAME	<i>BTS ID</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Identification of the target BTS.
LIMITS	1...248

No	<i>026001</i>
COUNTER NAME	<i>TRX ID</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Identification of the target TRX.
LIMITS	1...80

No	<i>026002</i>
COUNTER NAME	<i>CELL ID</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	LAC+CI information.
	Fields:
	LAC: word
	CI: word

No	026003
COUNTER NAME	REQUEST START TIME
RELEASE/CHANGED	S10
EXPLANATION	<p>Time stamp for the location request. Coded in BCD (Binary Coded Decimal) Hundredths of seconds : byte Seconds : byte Minutes : byte Hours : byte Day : byte Month : byte Year : word</p>

No	026004
COUNTER NAME	REQUEST RESPONSE TIME
RELEASE/CHANGED	S10
EXPLANATION	<p>Time stamp for location response. Coded in BCD (Binary Coded Decimal) Hundredths of seconds : byte Seconds : byte Minutes : byte Hours : byte Day : byte Month : byte Year : word</p>

No	026005
COUNTER NAME	EMERGENCY CALL
RELEASE/CHANGED	S10
EXPLANATION	<p>Observed location request is made for an emergency call. Values: 0 = not an emergency call 1 = emergency call</p>

No	026006
COUNTER NAME	LSC QOS INFO
RELEASE/CHANGED	S10
EXPLANATION	<p>Location request QoS information element. See GSM Specification 09.31</p> <p>Fields:</p> <p>Vertical coordinate indicator: byte</p> <p>0 = vertical coordinate not requested</p> <p>1 = vertical coordinate is requested</p> <p>Vertical accuracy indicator: byte</p> <p>0 = vertical accuracy is not specified</p> <p>1 = vertical accuracy is specified</p> <p>Vertical accuracy: byte</p> <p>Horizontal accuracy indicator: byte</p> <p>0 = horizontal accuracy is not specified</p> <p>1 = horizontal accuracy is specified</p> <p>Horizontal accuracy: byte</p> <p>Response time: byte</p>

The following counters (026007–026100) together show the E-OTD assistance data contents.

No	026007
COUNTER NAME	BCCH CARRIER
RELEASE/CHANGED	S10
EXPLANATION	Absolute Radio Frequency Channel Number (ARFCN) of BCCH carrier.
RELATED TO A FEATURE	BSS10012: MS Location Services
LIMITS	0...1023

No	026008
COUNTER NAME	BSIC
RELEASE/CHANGED	S10
EXPLANATION	BSIC identification.
RELATED TO A FEATURE	BSS10012: MS Location Services
LIMITS	0...63

No	026009
COUNTER NAME	TIMESLOT SCHEME
RELEASE/CHANGED	S10
EXPLANATION	Timeslot scheme. Possible values: 0 = all time slots are 156.25 bits long 1 = time slots 0 and 4 are 157 bits long and the others are 156 bits long
RELATED TO A FEATURE	BSS10012: MS Location Services

No	026010
COUNTER NAME	NUM OF BTS
RELEASE/CHANGED	S10
EXPLANATION	Number of BTSs.
RELATED TO A FEATURE	BSS10012: MS Location Services
LIMITS	0...15

The following counters (026011–026100) are repeated 15 times:

No	COUNTER NAME	EXPLANATION
026011	BCCH CARRIER	Absolute Radio Frequency Channel Number (ARFCN) of BCCH carrier Value range: 0...1023
026012	BSIC	BSIC identification Value range: 0...63
026013	MULTIFRAME OFFSET	Multiframe offset Value range: 0...51
026014	TIMESLOT SCHEME	Timeslot scheme Possible values: 0 = all time slots are 156.25 bits long 1 = time slots 0 and 4 are 157 bits long and the others are 156 bits long.
026015	ROUGH RTD	Rough Real Time Difference (RTD) value Value range: 0...1250
026016	FINE RTD	Fine RTD, 0xFFFF means that the value is unknown Value range: 0...15

The following counters are repeated 10 times for 3 sets (counters 026119-026178):

No	COUNTER NAME	EXPLANATION
026119	OTD BSIC+BCCH 1 SET 1	Fields: BSIC: word BCCH: word If BCCH has value 0xFFFF, the field is not in use.
026120	OTD MEASURED 1 SET 1	Observed Time Difference (OTD) value. Value range: 0...39999.
:		

No	COUNTER NAME	EXPLANATION
026137	<i>OTD BSIC+BCCH 10 SET 1</i>	Fields: BSIC: word BCCH: word If BCCH has value 0xFFFF, the field is not in use.
026138	<i>OTD MEASURED 10 SET 1</i>	OTD value. Value range: 0...39999.
026139	<i>OTD BSIC+BCCH 1 SET 2</i>	Fields: BSIC: word BCCH: word If BCCH has value 0xFFFF, the field is not in use.
026140	<i>OTD MEASURED 1 SET 2</i>	OTD value. Value range: 0...39999.
:		
026157	<i>OTD BSIC+BCCH 10 SET 2</i>	Fields: BSIC: word BCCH: word If BCCH has value 0xFFFF, the field is not in use.
026158	<i>OTD MEASURED 10 SET 2</i>	OTD value. Value range: 0...39999.
026159	<i>OTD BSIC+BCCH 1 SET 3</i>	Fields: BSIC: word BCCH: word If BCCH has value 0xFFFF, the field is not in use.
026160	<i>OTD MEASURED 1 SET 3</i>	OTD value. Value range: 0...39999.
:		
026177	<i>OTD BSIC+BCCH 10 SET 3</i>	Fields: BSIC: word BCCH: word If BCCH has value 0xFFFF, the field is not in use.
026178	<i>OTD MEASURED 10 SET 3</i>	OTD value. Value range: 0...39999.

No	026161
COUNTER NAME	OTD COUNT
RELEASE/CHANGED	S10
EXPLANATION	Number of OTD measures.
RELATED TO A FEATURE	BSS10012: MS Location Services
LIMITS	0...3

No	026179
COUNTER NAME	<i>CALC RESULT E-OTD</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	<p>Calculation result according to Universal Geographical Area Description (GAD). The structure of the CALC RESULT field depends on the shape of the calculation result. The following four structures are alternative. The size of the CALC RESULT field is always 16 bytes. If the shape field has the value 255, it means that the method is not used. For detailed description of the fields, see GSM Specification 03.32</p> <p>Length: byte (length of the longest possible field) Shape: byte Result: 16 bytes Structures of calculation results for each shape value:</p> <p>Shape: 1 = Ellipsoid point with uncertainty circle Sign of latitude (byte) : 0 = north, 1 = south Degrees of latitude (dword) Degrees of longitude (longint) Uncertainty code (byte)</p> <p>Shape: 2 = Ellipsoid point with uncertainty ellipse Sign of latitude (byte) : 0 = north, 1 = south Degrees of latitude (dword) Degrees of longitude (longint) Semi-major axis of uncertainty ellipse (byte) Semi-minor axis of uncertainty ellipse (byte) Angle of semi-major axis (byte) Confidence (byte)</p>

No	026179
COUNTER NAME	CALC RESULT E-OTD
RELEASE/CHANGED	S10
<p>Shape: 9 = Ellipsoid point with altitude and uncertainty ellipsoid Sign of latitude (byte) : 0 = north, 1 = south Degrees of latitude (dword) Degrees of longitude (longint) Altitude (word) Semi-major axis of horizontal uncertainty ellipse (byte) Semi-minor axis of horizontal uncertainty ellipse (byte) Angle of semi-major axis (byte) Uncertainty of altitude (byte) Confidence (byte) Length (byte) Shape: 10 = Ellipsoid arc Sign of latitude (byte) : 0 = north, 1 = south Degrees of latitude (dword) Degrees of longitude (longint) Inner radius (byte) Uncertainty radius (byte) Offset Angle (byte) Included Angle (byte) Confidence (byte) Shape: 255 = Method is not used.</p>	

No	026180
COUNTER NAME	CALC RESULT GPS
RELEASE/CHANGED	S10
EXPLANATION	See description of counter 026179 for details.

No	026181
COUNTER NAME	CALC RESULT CELL ID
RELEASE/CHANGED	S10
EXPLANATION	See description of counter 026179 for details.

No	026182
COUNTER NAME	E-OTD USED
RELEASE/CHANGED	S10
EXPLANATION	Number of times the E-OTD method is used.

No	026183
COUNTER NAME	GPS USED
RELEASE/CHANGED	S10
EXPLANATION	Number of times the GPS method is used.

No	026184
COUNTER NAME	CELL ID USED
RELEASE/CHANGED	S10
EXPLANATION	Number of times the Cell Id+TA method is used.

No	026185
COUNTER NAME	METHOD USED
RELEASE/CHANGED	S10
EXPLANATION	<p>The positioning method used that fills the QoS requirement of the location request.</p> <p>0 = Timing Advance 1 = TOA 2 = AOA 3 = MS assisted E-OTD 4 = MS based E-OTD 5 = MS assisted GPS 6 = MS based GPS 7 = conventional GPS 16 = RX level</p>

No	026186
COUNTER NAME	SERVING CELL RX LEVELS
RELEASE/CHANGED	S10
EXPLANATION	L3 information from the MS. 32 serving cell rx levels: byte (32).

No	026187
COUNTER NAME	MS SPEED
RELEASE/CHANGED	S10
EXPLANATION	L3 information from the MS. Identification of MS speed.

No	026188
COUNTER NAME	TIMING ADVANCE
RELEASE/CHANGED	S10
EXPLANATION	L3 information from the MS. Delay of the access burst measured by the BTS at RACH which shows the distance between the MS and the BTS. The timing advance ranges from 0 to 63. The incrementation step is about 550 metres.

No	026189
COUNTER NAME	MS TA CORRECTION
RELEASE/CHANGED	S10
EXPLANATION	This value can be used as a correction to the Timing Advance (TA) value when the distance between the MS and the serving BTS is estimated on the basis of TA. The value is measured by the MS. The coding of this field is as 'TA correction' field in GSM 04.31.
LIMITS	Valid range = 0 ... 960 Value not known = 65535

No	<i>026190</i>
COUNTER NAME	<i>BTS TA CORRECTION</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	This value can be used as a correction to the Timing Advance (TA) value when the distance between the MS and the serving BTS is estimated on the basis of TA. The value is measured by the BTS. The coding of this field is as 'TA correction' field in GSM 04.31.
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LIMITS	Valid range = 0 ... 960 Value not known = 65535
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7 BSS10004 Adaptive Multi Rate Codec

Adaptive Multi Rate Codec (AMR) introduces a new set of codecs and adaptive algorithms for codec changes and can therefore provide significantly better speech quality and more capacity.

With AMR it is possible to achieve a very good speech quality in full rate (FR) mode even in low C/I conditions, or increase the speech capacity by using the half rate (HR) mode and still maintain the quality level of current FR calls. Optimal interworking with power control and handover algorithms together with enhanced quality measurements (FER Measurement feature) provide full benefits and interworking with prior Nokia top-of-the-world capacity features, such as Intelligent Frequency Hopping (IFH).

The Adaptive Multi Rate (AMR) codec consists of a family of codecs (source and channel codecs with different trade-off bit-rates) operating in the GSM FR and HR channels.

The ETSI AMR codec is capable of adapting its operation optimally according to the prevailing channel conditions.

AMR consists of eight different speech codec modes with a total of 14 channel codec modes which are listed in the following table.

Table 1. Channel and speech codec modes for AMR

Channel mode	Channel codec Mode	Source coding bit-rate, speech	Net bit-rate, in-band channel	Channel coding bit-rate, speech	Channel coding bit-rate, in-band
	CH0-FS	12.20kbit/s (GSMEFR)	0.10 kbit/s	10.20 kbit/s	0.30 kbit/s
	CH1-FS	10.20 kbit/s	0.10 kbit/s	12.20 kbit/s	0.30 kbit/s
	CH2-FS	7.95 kbit/s	0.10 kbit/s	14.45 kbit/s	0.30 kbit/s
TCH/FR	CH3-FS	7.40 kbit/s (IS-641)	0.10 kbit/s	15.00 kbit/s	0.30 kbit/s
	CH4-FS	6.70 kbit/s	0.10 kbit/s	15.70 kbit/s	0.30 kbit/s

Table 1. Channel and speech codec modes for AMR (Continued)

	CH5-FS	5.90 kbit/s	0.10 kbit/s	16.50 kbit/s	0.30 kbit/s
	CH6-FS	5.15 kbit/s	0.10 kbit/s	17.25 kbit/s	0.30 kbit/s
	CH7-FS	4.75 kbit/s	0.10 kbit/s	17.65 kbit/s	0.30 kbit/s
	CH8-HS	7.95 kbit/s (*)	0.10 kbit/s	3.25 kbit/s	0.10 kbit/s
TCH/HR	CH9-HS	7.40 kbit/s (IS-641)	0.10 kbit/s	3.80 kbit/s	0.10 kbit/s
	CH10-HS	6.70 kbit/s	0.10 kbit/s	4.50 kbit/s	0.10 kbit/s
	CH11-HS	5.90 kbit/s	0.10 kbit/s	5.30 kbit/s	0.10 kbit/s
	CH12-HS	5.15 kbit/s	0.10 kbit/s	6.05 kbit/s	0.10 kbit/s
	CH13-HS	4.75 kbit/s	0.10 kbit/s	6.45 kbit/s	0.10 kbit/s

(*) Requires 16 kbit/s TRAU. It is therefore not seen as a feasible codec mode and will not be supported by Nokia BSS10.

Codec mode adaptation for AMR is based on the received channel quality estimate in both MS and BTS, followed by a decision on the most appropriate speech and channel codec mode to be applied at a given time. In high error conditions, more bits are used in error correction in order to obtain error robust coding, while in good transmission conditions only a small amount of bits is needed for sufficient error protection. More bits can therefore be allocated for source coding.

An inband signalling channel that enables the MS and the BTS to exchange messages on applied or requested speech and channel codec modes is defined for AMR. Next, the selected speech codec mode is sent using the inband signalling channel to the transmitting side where it is applied for the other link. The BTS commands the MS to apply a particular speech codec mode in the uplink, but the MS can only request the BTS to apply a particular speech codec mode in the downlink because the BTS has the option to override the MS's request.

The MS supports all speech codec modes, although only a set of up to 4 speech codec modes is used during a call. The BSC supports all speech codec modes, except for 7.95 kbit/s on HR channel, and has one default set for each channel mode. The default codec sets also include a default set of decision thresholds and hysteresis. The initial codec mode and codec set with thresholds and hysteresis are transferred between network elements and the MS using the existing layer 3 signalling, that is, the basic principles for EFR are reused. Only a few add-ons are needed.

7.1 New counters related to AMR in Traffic Measurement

No	<i>001182</i>
COUNTER NAME	<i>FULL TCH SEIZ INTRA AMR HO</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of successful FR TCH seizures for an intra-cell handover when the channel rate changes and AMR speech codecs are in use.
UPDATED	When the Radio Resource Management allocates a FR TCH for an intra-cell handover as a response to a TCH request and the channel rate is changed from HR to FR and speech codec versions 3 are in use.
DEPENDENCIES	Counter 001116 is updated along with this counter.

No	<i>001183</i>
COUNTER NAME	<i>HALF TCH SEIZ INTRA AMR HO</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of successful HR TCH seizures for an intra-cell handover when the channel rate changes and AMR speech codecs are in use.
UPDATED	When the Radio Resource Management allocates a HR TCH for an intra-cell handover as a response to a TCH request and the channel rate is changed from FR to HR and speech codec versions 3 are in use.
DEPENDENCIES	Counter 001117 is updated along with this counter.

No	<i>001184</i>
COUNTER NAME	<i>TCH CALL REQ FOR AMR</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of the TCH requests for an AMR call.
UPDATED	When the Radio Resource Management receives a TCH request in a call setup or a handover attempt and speech codec version 3 is the preferred one.
DEPENDENCIES	Counter 001026 is updated along with this counter.

No	001185
COUNTER NAME	SUCCESSFUL AMR CODEC SET DOWNGRADES
RELEASE/CHANGED	S10
EXPLANATION	Number of successful AMR codec set downgrades during internal HOs for the source side AMR codec set. A downgrade is made to align the source side AMR codec set with the one chosen for the target side in order to utilize the one-way downlink speech path connection for the target side during the internal handover. The use of a one-way downlink speech path connection decreases the amount of muting experienced in the speech path connection. The downgrading decision during an internal handover depends on the enabled parameter AMR codec mode set downgrades and upgrades.
UPDATED	By the Abis interface services after successful mode modify procedures for the BTS and MS.

No	001186
COUNTER NAME	UNSUCCESSFUL AMR CODEC SET DOWNGRADES
RELEASE/CHANGED	S10
EXPLANATION	Number of unsuccessful AMR codec set downgrades during internal handovers for the source side AMR codec set. Alignment between the source side AMR codec set and the one chosen for the target side has failed and the use of one-way speech path downlink connection for the target side during the internal handover is not possible.
UPDATED	By the Abis interface services after an unsuccessful mode modify procedure for BTS or MS.

No	<i>001187</i>
COUNTER NAME	<i>SUCCESSFUL AMR CODEC SET UPGRADES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of successful AMR codec set upgrades for the target side after internal handovers. An upgrade is made to utilize the original AMR codec set of the target BTS which was not chosen for the target side because of a target side alignment with the source side during an internal handover. The alignment is made in order to use the one-way downlink speech path connection for the target side during the internal handover. The use of a one-way speech path downlink connection decreases the amount of muting experienced in the speech path connection. The upgrading decision after the internal handover depends on the enabled parameter AMR codec mode set downgrades and upgrades and the AMR multirate configuration in handovers.
UPDATED	By the Abis interface services after successful mode modify procedures for the BTS and MS.

No	<i>001188</i>
COUNTER NAME	<i>UNSUCCESSFUL AMR CODEC SET UPGRADES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of unsuccessful AMR codec set upgrades after internal handovers for the target side AMR codec set. The target side continues to use the currently used AMR codec set.
UPDATED	By the Abis interface services after an unsuccessful mode modify procedure for BTS or MS.

7.2 New counters related to AMR in Handover Measurement

No	<i>004142</i>
COUNTER NAME	<i>HO ATT FOR AMR TO HR</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of handover attempts from AMR FR to AMR HR.
UPDATED	When a channel rate change handover attempt for an AMR FR call is started.

No	<i>004143</i>
COUNTER NAME	<i>HO ATT FOR AMR TO FR</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of handover attempts from AMR HR to AMR FR.
UPDATED	When a channel rate change handover attempt for an AMR HR call is started.

7.3 New counters related to AMR in RX Quality Statistics Measurement

No	<i>014021</i>
COUNTER NAME	<i>AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH RXQUAL 0</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	<i>014022</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION WITH RXQUAL 0 S10</i>
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	<i>014023</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH RXQUAL 1 S10</i>
EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 1. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	014024
COUNTER NAME	AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 1
	S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 1. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	014025
COUNTER NAME	AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH
RELEASE/CHANGED	RXQUAL 2
	S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 2. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	<i>014026</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION WITH RXQUAL 2 S10</i>
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 2. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	<i>014027</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH RXQUAL 3 S10</i>
EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 3. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	014028
COUNTER NAME	AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 3
	S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 3. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	014029
COUNTER NAME	AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH
RELEASE/CHANGED	RXQUAL 4
	S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 4. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	014030
COUNTER NAME RELEASE/CHANGED	AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION WITH RXQUAL 4 S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 4. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	014031
COUNTER NAME RELEASE/CHANGED	AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH RXQUAL 5 S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 5. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	014032
COUNTER NAME	AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 5
	S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 5. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	014033
COUNTER NAME	AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH
RELEASE/CHANGED	RXQUAL 6
	S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 6. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	<i>014034</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION WITH RXQUAL 6 S10</i>
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 6. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	<i>014035</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR FR CODEC MODE 1 ON UPLINK DIRECTION WITH RXQUAL 7 S10</i>
EXPLANATION	Amount of AMR FR codec mode 1 usage on uplink direction within RxQual 7. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.

No	014036
COUNTER NAME	AMR FR CODEC MODE 1 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 7
	S10
EXPLANATION	Amount of AMR FR codec mode 1 usage on downlink direction within RxQual 7. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.

No	014037
COUNTER NAME	AMR FR CODEC MODE 2 ON UPLINK DIRECTION WITH
RELEASE/CHANGED	RXQUAL 0
	S10
EXPLANATION	Amount of AMR FR codec mode 2 usage on uplink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 2 will be used as an uplink codec mode at the end of the measurement interval.

No	014038
COUNTER NAME RELEASE/CHANGED	AMR FR CODEC MODE 2 ON DOWNLINK DIRECTION WITH RXQUAL 0 S10
EXPLANATION	Amount of AMR FR codec mode 2 usage on downlink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 2 will be used as a downlink codec mode at the end of the measurement interval.

No	014039
COUNTER NAME RELEASE/CHANGED	AMR FR CODEC MODE 2 ON UPLINK DIRECTION WITH RXQUAL 1 S10
EXPLANATION	Amount of AMR FR codec mode 2 usage on uplink direction within RxQual 1. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 2 will be used as an uplink codec mode at the end of the measurement interval.

No	014040
COUNTER NAME	AMR FR CODEC MODE 2 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 1
	S10
EXPLANATION	Amount of AMR FR codec mode 2 usage on downlink direction within RxQual 1. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When the Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 2 will be used as a downlink codec mode at the end of the measurement interval.

:
 This is repeated for each mode up to mode 4.
 mode 2 rxq2-rxq7, mode 3 rxq1-rxq7, mode 4 rxq1-rxq6
 :

No	014083
COUNTER NAME	AMR FR CODEC MODE 4 ON UPLINK DIRECTION WITH
RELEASE/CHANGED	RXQUAL 7
	S10
EXPLANATION	Amount of AMR FR codec mode 4 usage on uplink direction within RxQual 7. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 4 will be used as an uplink codec mode at the end of the measurement interval.

No	<i>014084</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR FR CODEC MODE 4 ON DOWNLINK DIRECTION WITH RXQUAL 7 S10</i>
EXPLANATION	Amount of AMR FR codec mode 4 usage on downlink direction within RxQual 7. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR FR codec mode 7 will be used as a downlink codec mode at the end of the measurement interval.

No	<i>014085</i>
COUNTER NAME RELEASE/CHANGED	<i>AMR HR CODEC MODE 1 ON UPLINK DIRECTION WITH RXQUAL 0 S10</i>
EXPLANATION	Amount of AMR HR codec mode 1 usage on uplink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

No	014086
COUNTER NAME	AMR HR CODEC MODE 1 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 0
	S10
EXPLANATION	Amount of AMR HR codec mode 1 usage on downlink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

No	014087
COUNTER NAME	AMR HR CODEC MODE 1 ON UPLINK DIRECTION WITH
RELEASE/CHANGED	RXQUAL 1
	S10
EXPLANATION	Amount of AMR HR codec mode 1 usage on uplink direction within RxQual 1. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 1 will be used as an uplink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

:
 This repeated for each rxqual in mode 1

:

No	014100
COUNTER NAME RELEASE/CHANGED	AMR HR CODEC MODE 1 ON DOWNLINK DIRECTION WITH RXQUAL 7 S10
EXPLANATION	Amount of AMR HR codec mode 1 usage on downlink direction within RxQual 7. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 1 will be used as a downlink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

No	014101
COUNTER NAME RELEASE/CHANGED	AMR HR CODEC MODE 2 ON UPLINK DIRECTION WITH RXQUAL 0 S10
EXPLANATION	Amount of AMR HR codec mode 2 usage on uplink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 2 will be used as an uplink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

No	014102
COUNTER NAME	AMR HR CODEC MODE 2 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 0
	S10
EXPLANATION	Amount of AMR HR codec mode 2 usage on downlink direction within RxQual 0. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 2 will be used as a downlink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

No	014103
COUNTER NAME	AMR HR CODEC MODE 2 ON UPLINK DIRECTION WITH
RELEASE/CHANGED	RXQUAL 1
	S10
EXPLANATION	Amount of AMR HR codec mode 2 usage on uplink direction within RxQual 1. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 2 will be used as an uplink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

:

This is repeated for modes 2,3 and 4 and for each rxqual in each mode.

mode 2 rx1-rx7, mode 3 rxq1-rxq7, mode4 rxq1-rxq7

:

No	014148
COUNTER NAME	AMR HR CODEC MODE 4 ON DOWNLINK DIRECTION
RELEASE/CHANGED	WITH RXQUAL 7
	S10
EXPLANATION	Amount of AMR HR codec mode 4 usage on downlink direction within RxQual 7. On fast link adaptation (LA) mode the codec mode is used last during the measurement interval. On slow LA mode this counter indicates the only used codec mode on the measurement interval.
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS indicating that the AMR HR codec mode 4 will be used as a downlink codec mode at the end of the measurement interval.
DEPENDENCIES	Counter AMR CODEC MODE SETS is updated along with this counter.

No	014149
COUNTER NAME	AMR CODEC MODE SETS
RELEASE/CHANGED	S10
EXPLANATION	Indicates the AMR codec mode sets for FR and HR channel rates during the measurement interval. The actual codec modes behind counters AMR FR/HR CODEC MODE m ON UP/DOWNLINK DIRECTION WITH RXQUAL n can be derived by this counter. The most significant word indicates the used AMR FR codec mode set with bits 8 to 1, codec modes being in descending order from 12.2 kbit/s to 4.75 kbit/s. The least significant word indicates the used AMR HR codec mode set with bits 6 to 1, codec modes being in descending order from 7.95 kbit/s to 4.75 kbit/s. (See Appendix A AMR Mode Set (014149) Counter decoding for detailed description).
UPDATED	When Radio Connection Supervision receives a radio measurement from the BTS and AMR codec modes are included in the report.

7.4 New counters related to AMR in BSC Level Clear Code (PM) Measurement

No	<i>051133</i>
COUNTER NAME	<i>INTRA HO TO AMR HR</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of successful intra-cell HOs from AMR FR to AMR HR.
UPDATED	After the HO_PERFORMED message is sent to the MSC.
DEPENDENCIES	Counter 051014 is updated along with this counter.

No	<i>051134</i>
COUNTER NAME	<i>INTRA HO TO AMR FR</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of successful intra-cell handovers from AMR HR to AMR FR.
UPDATED	After the HO_PERFORMED message is sent to the MSC.
DEPENDENCIES	Counter 051014 is updated along with this counter.

8

BSS10046 Multi BCF Control

With the Multi BCF Control feature, several BTSs can be combined into one logical cell. This allows the operator to increase the capacity of a cell while maintaining maximum spectral efficiency. The feature increases the cell capacity of Nokia Talk-family BTSs to 24 TRXs and Nokia UltraSite EDGE BTSs to 36 TRXs, while it requires no extra BCCH. Multi BCF Control also provides a path for site expansion from Nokia Talk-family to Nokia UltraSite EDGE BTS and, as a result, an evolution path to EDGE services.

The operator can arrange the base stations so that the TRXs in different base stations (operating on the same frequency band) can serve the same cell with a single BCCH. Certain changes, such as synchronization between the base stations, are required at the base station site. At the BSC, the operator sets all BTS objects that share the same BCCH to a new SEGMENT (SEG) object.

Segment functionality

In addition to a new architecture, the Multi BCF feature also introduces a new radio network object, called a SEGMENT (SEG). The SEG is essentially the same as a telecom cell. Until now, the term *BTS object* has referred to the same entity as a telecom cell. However, this is not the case anymore since a telecom cell (or SEG) may consist of several BTS objects.

A BTS is a group of similar TRXs. It consists either of TRXs of the same frequency band (Common BCCH) or TRXs of the same base station site type (Multi BCF).

The use of the segment structure is not restricted to the Common BCCH and Multi BCF features, it can also be used on its own. An operator can, for example, create multiple hopping groups in a cell by gathering the TRXs of one hopping group into one BTS and have several such BTSs in a segment.

A SEG must contain a serving layer which is always the PGSM900 frequency band containing a TRX that has the BCCH channel, and some combination of TRXs from other frequency bands.

When combined with the Multi BCF feature, each band of a segment can have TRXs of different base station types, with the precondition that the TRXs are in different BTSs of a band.

In its simplest form, a SEG can also consist of just one BTS/TRX.

8.1 New counters related to Multi BCF Control in Handover Measurement

No	<i>004137</i>
COUNTER NAME	<i>HO ATTEMPT INTER BTS TYPE SDCCH</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of attempts to perform an SDCCH-SDCCH handover, based on the duration of an SDCCH reservation, from an UltraSite BTS to a Talk Family BTS within a segment.
UPDATED	At the source BTS, whenever an attempt is made to move a call from an SDCCH in an UltraSite BTS to an SDCCH in a Talk Family BTS of the segment, based on the duration of the source SDCCH reservation.
DEPENDENCIES	Information on the success of the attempts on BSC level can be seen in counter 051148.

No	<i>004138</i>
COUNTER NAME	<i>INTRA CELL SUCCESS SDCCH HO BETWEEN BTS TYPES</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of completed and successful SDCCH-SDCCH handovers from a BTS of one base station site type to a BTS of another type within a segment.
UPDATED	At the target BTS when the call has been successfully transferred to the target SDCCH and the handover was between BTSs of different base station site types within a segment.
DEPENDENCIES	Counter 004131 is updated along with this counter.

No	<i>004139</i>
COUNTER NAME	<i>HO ATTEMPT INTER BTS TYPE TCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of attempts to perform a TCH-TCH handover from an UltraSite BTS to a Talk Family BTS due to load reasons within a segment.
UPDATED	At the source BTS whenever an attempt is made to move a call from a TCH in an UltraSite BTS to a TCH in a Talk Family BTS in order to decrease the load of the source BTS.
DEPENDENCIES	Information on the success of the attempts on BSC level can be seen in counter 051147.

No	<i>004140</i>
COUNTER NAME	<i>INTRA CELL SUCCESS TCH HO BETWEEN BTS TYPES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of completed and successful TCH-TCH handovers from a BTS of one base station site type to a BTS of another type within a segment.
UPDATED	At the target BTS when the call has been successfully transferred to the target TCH and the handover was between BTSs of different base station site types within a segment.
DEPENDENCIES	Counter 004132 is updated along with this counter.

8.2 New counters related to common Multi BCF Control in BSC Level Clear Code (PM) Measurement

No	<i>051147</i>
COUNTER NAME	<i>INTRA INTER BTS TYPE TCH</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of completed and successful TCH-TCH handovers from an UltraSite BTS to a Talk Family BTS due to load reasons within a segment.
UPDATED	When the call has been successfully transferred from a TCH of an UltraSite BTS to a TCH of a Talk Family BTS of the segment, due to the TCH load of the source BTS.
DEPENDENCIES	Counters 004132 and 004140 are updated along with this counter. Counter 004139 indicates the respective attempts in each BTS. These counters are included in the Handover Measurement.

No	<i>051148</i>
COUNTER NAME	<i>INTRA INTER BTS TYPE SDC</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of completed and successful SDCCH-SDCCH handovers from an UltraSite BTS to a Talk Family BTS within a segment, started on the basis of SDCCH reservation duration .
UPDATED	When the call has been successfully transferred from an SDCCH of an UltraSite BTS to an SDCCH of a Talk Family BTS of the segment based on the SDCCH reservation duration in the source SDCCH.
DEPENDENCIES	Counters 004131 and 004138 are updated along with this counter. Counter 004137 indicates the respective attempts in each BTS. These counters are included in the Handover Measurement.

9

BSS10016 Common BCCH Control

With Common BCCH, GSM 900 (both PGSM 900 and EGSM 900) and GSM 1800 TRXs can be included into one cell with a BCCH that is allocated from one band used in the cell. Common BCCH functionality is introduced in the ETSI GSM specification 03.26 - Multiband operation of GSM 900/1800 by a single operator. GSM 900 and GSM 1800 TRXs share the same BCCH, that is, they form one cell. This functionality can be considered a progression from the integrated dual band BTS and EGSM 900 frequency band support (Tri Band).

The TCH allocation between GSM 900 and tri band mobiles is made by the BSC on cell basis. The BCCH of the neighbouring cell is measured from one band only, which provides more reliable C/I values in the IUO & Dual Band case.

The main advantages of the common BCCH functionality are:

- Improved trunking gain
- The use of signalling channels is optimized by sharing them between bands
- Tighter reuse of all GSM1800 carriers (no BCCHs).

In order to ensure that the network operates well, the operator should take into account issues related to the difference of propagation between the different bands, for example GSM 900 and GSM 1800, while performing cell planning.

9.1 Non-BCCH Layer Offset Measurement (NEW)

No	092000
COUNTER NAME	OFFSET SAMPLE BELOW ZERO
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples below 0 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level difference between the BCCH and the TCH is below 0 dB. Thus, the reported TCH signal level is stronger than that of the BCCH of the segment.
UNIT	dB

No	092001
COUNTER NAME	OFFSET SAMPLE OF ZERO
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples of 0 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the reported signal level is equal to that of the BCCH of the segment.
UNIT	dB

No	092002
COUNTER NAME	OFFSET SAMPLE OF 1 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 1 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 1 dB stronger than that of the TCH.
UNIT	dB

No	<i>092003</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 2 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 2 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 2 dB stronger than that of the TCH.
UNIT	dB

No	<i>092004</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 3 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 3 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 3 dB stronger than that of the TCH.
UNIT	dB

No	<i>092005</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 4 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 4 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 4 dB stronger than that of the TCH.
UNIT	dB

No	092006
COUNTER NAME	OFFSET SAMPLE OF 5 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 5 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 5 dB stronger than that of the TCH.
UNIT	dB

No	092007
COUNTER NAME	OFFSET SAMPLE OF 6 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 6 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 6 dB stronger than that of the TCH.
UNIT	dB

No	092008
COUNTER NAME	OFFSET SAMPLE OF 7 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 7 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 7 dB stronger than that of the TCH.
UNIT	dB

No	<i>092009</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 8 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of the measured offset samples above 8 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 8 dB stronger than that of the TCH.
UNIT	dB

No	<i>092010</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 9 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 9 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 9 dB stronger than that of the TCH.
UNIT	dB

No	<i>092011</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 10 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 10 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 10 dB stronger than that of the TCH.
UNIT	dB

No	092012
COUNTER NAME	OFFSET SAMPLE OF 11 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 11 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 11 dB stronger than that of the TCH.
UNIT	dB

No	092013
COUNTER NAME	OFFSET SAMPLE OF 12 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 12 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 12 dB stronger than that of the TCH.
UNIT	dB

No	092014
COUNTER NAME	OFFSET SAMPLE OF 13 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 13 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 13 dB stronger than that of the TCH.
UNIT	dB

No	<i>092015</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 14 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 14 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 14 dB stronger than that of the TCH.
UNIT	dB

No	<i>092016</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 15 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 15 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 15 dB stronger than that of the TCH.
UNIT	dB

No	<i>092017</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 16 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 16 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 16 dB stronger than that of the TCH.
UNIT	dB

No	092018
COUNTER NAME	OFFSET SAMPLE OF 17 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 17 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 17 dB stronger than that of the TCH.
UNIT	dB

No	092019
COUNTER NAME	OFFSET SAMPLE OF 18 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 18 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 18 dB stronger than that of the TCH.
UNIT	dB

No	092020
COUNTER NAME	OFFSET SAMPLE OF 19 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 19 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 19 dB stronger than that of the TCH.
UNIT	dB

No	<i>092021</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 20 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 20 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 20 dB stronger than that of the TCH.
UNIT	dB

No	<i>092022</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 21 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 21 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 21 dB stronger than that of the TCH.
UNIT	dB

No	<i>092023</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 22 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 22 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 22 dB stronger than that of the TCH.
UNIT	dB

No	092024
COUNTER NAME	OFFSET SAMPLE OF 23 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 23 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 23 dB stronger than that of the TCH.
UNIT	dB

No	092025
COUNTER NAME	OFFSET SAMPLE OF 24 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 24 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 24 dB stronger than that of the TCH.
UNIT	dB

No	092026
COUNTER NAME	OFFSET SAMPLE OF 25 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 25 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 25 dB stronger than that of the TCH.
UNIT	dB

No	<i>092027</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 26 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 26 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 26 dB stronger than that of the TCH.
UNIT	dB

No	<i>092028</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 27 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 27 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 27 dB stronger than that of the TCH.
UNIT	dB

No	<i>092029</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 28 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 28 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 28 dB stronger than that of the TCH.
UNIT	dB

No	092030
COUNTER NAME	OFFSET SAMPLE OF 29 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 29 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 29 dB stronger than that of the TCH.
UNIT	dB

No	092031
COUNTER NAME	OFFSET SAMPLE OF 30 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 30 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 30 dB stronger than that of the TCH.
UNIT	dB

No	092032
COUNTER NAME	OFFSET SAMPLE OF 31 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 31 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 31 dB stronger than that of the TCH.
UNIT	dB

No	<i>092033</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 32 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 32 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 32 dB stronger than that of the TCH.
UNIT	dB

No	<i>092034</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 33 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 33 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 33 dB stronger than that of the TCH.
UNIT	dB

No	<i>092035</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 34 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 34 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 34 dB stronger than that of the TCH.
UNIT	dB

No	092036
COUNTER NAME	OFFSET SAMPLE OF 35 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 35 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 35 dB stronger than that of the TCH.
UNIT	dB

No	092037
COUNTER NAME	OFFSET SAMPLE OF 36 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 36 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 36 dB stronger than that of the TCH.
UNIT	dB

No	092038
COUNTER NAME	OFFSET SAMPLE OF 37 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 37 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 37 dB stronger than that of the TCH.
UNIT	dB

No	<i>092039</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 38 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 38 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 38 dB stronger than that of the TCH.
UNIT	dB

No	<i>092040</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 39 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 39 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 39 dB stronger than that of the TCH.
UNIT	dB

No	<i>092041</i>
COUNTER NAME	<i>OFFSET SAMPLE OF 40 dB</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of measured offset samples above 40 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is 40 dB stronger than that of the TCH.
UNIT	dB

No	092042
COUNTER NAME	OFFSET SAMPLE ABOVE 40 dB
RELEASE/CHANGED	S10
EXPLANATION	Number of measured offset samples above 40 dB.
UPDATED	When the BSC receives a measurement report from the MS on a GSM 1800 TCH and the signal level of the BCCH is over 40 dB stronger than that of the TCH.
UNIT	dB

9.2 New counters related to Common BCCH Control in Handover Measurement

No	004131
COUNTER NAME	INTRA CELL SUCCESS SDCCH HO BETWEEN BTSS
RELEASE/CHANGED	S10
EXPLANATION	Number of completed and successful SDCCH-SDCCH handovers between two BTSs of the segment.
UPDATED	At the target BTS when the call has been successfully transferred to the target SDCCH.

No	004132
COUNTER NAME	INTRA CELL SUCCESS TCH HO BETWEEN BTSS
RELEASE/CHANGED	S10
EXPLANATION	Number of completed and successful TCH-TCH handovers between BTSs of the segment.
UPDATED	At the target BTS when the call has been successfully transferred to the target TCH.

No	004133
COUNTER NAME	<i>HO ATTEMPT INTER BAND SDCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of attempts to perform an SDCCH handover, based on the duration of an SDCCH-SDCCH reservation, from a BTS on the BCCH frequency band to a BTS on another frequency band of the segment.
UPDATED	At the source BTS on the PGSM900 band (or EGSM900 when no PGSM900 band exists) whenever a handover attempt is made to move a call to an SDCCH on another frequency band of the segment. PGSM900 and EGSM900 are here regarded as different bands.
DEPENDENCIES	Information on the success of the attempts can be seen on BSC level in counter 051136.

No	004134
COUNTER NAME	<i>INTRA CELL SUCCESS SDCCH HO BETWEEN BANDS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of completed and successful SDCCH-SDCCH handovers between two BTSs on different frequency bands of a segment. PGSM900 and EGSM900 are regarded as parts of the same GSM900 frequency band. The possible cases include handovers from PGSM900 to GSM1800, from EGSM900 to GSM1800, from GSM1800 to PGSM900, and from GSM1800 to EGSM900.
UPDATED	At the target BTS when the call has been successfully transferred to the target SDCCH.
DEPENDENCIES	Counter 004131 is updated along with this counter.

No	004135
COUNTER NAME	HO ATTEMPT INTER BAND TCH
RELEASE/CHANGED	S10
EXPLANATION	Number of attempts to perform a TCH-TCH handover between BTSs on different frequency bands of a segment due to load.
UPDATED	At the source BTS on PGSM900 or EGSM900 band whenever a handover is initiated to move a call to another band of the segment in order to decrease the load of the source BTS. PGSM900 and EGSM900 are regarded here as different bands. The possible cases include handovers from PGSM900 to GSM1800, from EGSM900 to GSM1800, and from PGSM900 to EGSM900.
DEPENDENCIES	Information on the success of the attempts can be seen on BSC level in counter 051135.

No	004136
COUNTER NAME	INTRA CELL SUCCESS TCH HO BETWEEN BANDS
RELEASE/CHANGED	S10
EXPLANATION	Number of completed and successful TCH-TCH handovers between two BTSs on different frequency bands of a segment. PGSM900 and EGSM900 are regarded as parts of the same GSM900 frequency band. The possible cases include counters from PGSM900 to GSM1800, from EGSM900 to GSM1800, from GSM1800 to PGSM900, and from GSM1800 to EGSM900.
UPDATED	At the target BTS when the call has been successfully transferred to the target TCH between GSM900 and GSM1800 bands in either direction.
DEPENDENCIES	Counter 004132 is updated along with this counter.

9.3 New counters related to common BCCH Control in BSC Level Clear Code (PM) Measurement

No	<i>051135</i>
COUNTER NAME	<i>INTRA INTER BAND TCH</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of completed and successful TCH-TCH handovers made due to load reasons between BTSs on different frequency bands of a segment .
UPDATED	When the call has been successfully transferred to the target TCH and the handover was between bands and initiated due to load reasons. PGSM900 and EGSM900 are regarded as different bands. The possible cases include handovers from PGSM900 to GSM1800, from EGSM900 to GSM1800, and from PGSM900 to EGSM900.
DEPENDENCIES	Counter 004132 is updated along with this counter. Counter 004135 indicates the respective attempts in each BTS. These counters are included in the Handover Measurement.

No	<i>051136</i>
COUNTER NAME	<i>INTRA INTER BAND SDC</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of completed and successful SDCCH-SDCCH handovers from a BTS on the BCCH frequency band to a BTS on another frequency band, started on the basis of SDCCH reservation duration .
UPDATED	When the call has been successfully transferred from the BCCH frequency band to a BTS on another frequency band based on the SDCCH reservation duration in the source BTS. When the BCCH is on the PGSM900, the possible cases include handovers from PGSM900 to GSM1800 and from PGSM900 to EGSM900. When the BCCH is on the EGSM900 the only possibility is a handover from EGSM900 to GSM1800.
DEPENDENCIES	Counter 004131 is updated along with this counter. Counter 004133 indicates the respective attempts in each BTS. These counters are included in the Handover Measurement.

10 BSS10005 Reversed Hunting

The route between the MSC and the BSS may not support all types of traffic (for example HSCSD or Half Rate). Typically, the MSC selects the correct terrestrial circuit from the circuit pool that supports the type of circuit needed for the connection. In Reversed A interface Circuit Allocation, the BSS directly allocates the needed circuit on the basis of the call type.

10.1 Reversed Hunting Measurement (NEW)

No	<i>089000</i>
COUNTER NAME	<i>NUM OF CIRCUITS IN POOL</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Total number of circuits in the A interface pool.
UPDATED	Every 20 seconds.

No	<i>089001</i>
COUNTER NAME	<i>AVE NUM OF CIRCUITS AVAILABLE</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Average number of circuits available (in WO-EX state).
UPDATED	Every 20 seconds.

No	089002
COUNTER NAME	DENOM OF CIRCUITS AVAILABLE
RELEASE/CHANGED	S10
EXPLANATION	Denominator for the counter 089001.
UPDATED	Every 20 seconds.

No	089003
COUNTER NAME	AVE NUM OF RESERVED CIRCUITS
RELEASE/CHANGED	S10
EXPLANATION	Average number of reserved circuits.
UPDATED	Every 20 seconds.

No	089004
COUNTER NAME	DENOM OF RESERVED CIRCUITS
RELEASE/CHANGED	S10
EXPLANATION	Denominator for the counter 089003.
UPDATED	Every 20 seconds.

No	089005
COUNTER NAME	NUMBER OF FR1 CALL ATTEMPTS
RELEASE/CHANGED	S10
EXPLANATION	Number of attempted Full Rate version 1 calls.
UPDATED	When switching an FR1 call during call establishment or during an external HO.

No	<i>089006</i>
COUNTER NAME	<i>NUMBER OF FR2 CALL ATTEMPTS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of attempted Full Rate version 2 calls.
UPDATED	When switching an FR2 call during call establishment or during an external HO.

No	<i>089007</i>
COUNTER NAME	<i>NUMBER OF FR3 CALL ATTEMPTS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of attempted Full Rate version 3 calls.
UPDATED	When switching an FR3 call during call establishment or during an external HO.

No	<i>089008</i>
COUNTER NAME	<i>NUMBER OF HR1 CALL ATTEMPTS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of attempted Half Rate version 1 calls
UPDATED	When switching an HR1 call during call establishment or during an external HO.

No	<i>089009</i>
COUNTER NAME	<i>NUMBER OF HR2 CALL ATTEMPTS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of attempted Half Rate version 2 calls.
UPDATED	When switching an HR2 call during call establishment or during an external HO.

No	089010
COUNTER NAME	NUMBER OF HR3 CALL ATTEMPTS
RELEASE/CHANGED	S10
EXPLANATION	Number of attempted Half Rate version 3 calls.
UPDATED	When switching an HR3 call during call establishment or during an external HO.

No	089011
COUNTER NAME	NUMBER OF SINGLE SLOT DATA CALL ATTEMPTS
RELEASE/CHANGED	S10
EXPLANATION	Number of singleslot data call attempts.
UPDATED	When switching a singleslot data call during call establishment or during an external HO.

No	089012
COUNTER NAME	NUMBER OF MS1 DATA CALL ATTEMPTS
RELEASE/CHANGED	S10
EXPLANATION	Number of multislot 1 data call attempts.
UPDATED	When switching a multislot 1 data call during call establishment or during an external HO.

No	089013
COUNTER NAME	NUMBER OF MS2 DATA CALL ATTEMPTS
RELEASE/CHANGED	S10
EXPLANATION	Number of multislot 2 data call attempts.
UPDATED	When switching a multislot 2 data call during call establishment or during an external HO.

No	089014
COUNTER NAME	NUMBER OF MS3 DATA CALL ATTEMPTS
RELEASE/CHANGED	S10
EXPLANATION	Number of multislot 3 data call attempts.
UPDATED	When switching a multislot 3 data call during call establishment or during an external HO.

No	089015
COUNTER NAME	NUMBER OF MS4 DATA CALL ATTEMPTS
RELEASE/CHANGED	S10
EXPLANATION	Number of multislot 4 data call attempts.
UPDATED	When switching a multislot 4 data call during call establishment or during an external HO.

10.2 New counters related to Reversed Hunting in BSC Level Clear Code Measurement

No	500628
COUNTER NAME	AIV CONN REFRESH TIMEOUT
RELEASE/CHANGED	S10
EXPLANATION	The A interface connection is refreshed from time to time during calls. This counter indicates that the timer for the connection refreshment procedure has expired.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

No	500629
COUNTER NAME	AIV CONN REFRESH FAILED
RELEASE/CHANGED	S10
EXPLANATION	The A interface connection is refreshed from time to time during calls. This counter indicates that the connection refreshment procedure has failed.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

No	500710
COUNTER NAME	RC0 HUNTING QUEUE FULL
RELEASE/CHANGED	S10
EXPLANATION	Number of times when there is no free place for the call in the hunting queue.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

No	500711
COUNTER NAME	RC0 CRCT CONGESTION
RELEASE/CHANGED	S10
EXPLANATION	Number of times when there is no free circuits for the call because of congestion on route.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

No	<i>500712</i>
COUNTER NAME	<i>RC0 A SEARCH ERROR</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of times when the hunting request fails because the content of the hunting request message is invalid.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

No	<i>500713</i>
COUNTER NAME	<i>RC0 CRCT POOL MISMATCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of times when the hunted circuit is from the wrong circuit pool.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

No	<i>500714</i>
COUNTER NAME	<i>RC0 REJ DUE EME CALL</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of times when the hunting queue is full and an emergency call is prioritised over an ordinary call.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

No	<i>500715</i>
COUNTER NAME	<i>RC0 ILC FILE ERROR</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	A-interface circuit reservation fails because no pools are available on the hunting list.
DEPENDENCIES	Counters 001078, 001079, 001080, 001087, 001088 and 001089 are updated with this counter.
IMPACT	Call cleared.

11

BSS10091 EDGE

Enhanced Data Rates for Global Evolution (EDGE) provides services such as Enhanced GPRS (EGPRS) which enables up to 6 times higher data rates than the current GPRS configurations.

The Nokia BSS10 EDGE Solution will include EGPRS for the packet switched data. EGPRS uses nine modulation and coding schemes (MCS) which vary from 8.8 kbps up to 59.2 kbps with one time slot in the radio interface.

Enhanced Data Rates for Global Evolution (EDGE) enhances the data capabilities of GSM networks towards 3rd generation services. With the new modulation, EDGE increases the Air interface data throughput approximately threefold, when compared with today's GSM, and it boosts both circuit switched and packet switched services. Moreover, EDGE will be the 3rd Generation radio technology for the TDMA/EDGE operators thus converging the radio networks of GSM/EDGE and TDMA/EDGE.

EDGE is specified in such a way that the throughput per time slot is triplicated. In EGPRS, the maximum standardized data rate per time slot will triple and the peak throughput, with all eight time slots in the radio interface, will be up to 473 kbps.

The data rates are tripled by introducing the 8-PSK (Phase Shift Keying), a linear higher order modulation, in addition to the existing GMSK (Gaussian Minimum Shift Keying). An 8-PSK signal is able to carry three bits per modulated symbol over the radio path, while a GMSK signal carries only one bit per symbol. The carrier symbol rate (270.833 ksps) of standard GSM is kept the same for 8-PSK, and the burst length is identical to the current GMSK using the same 200 k carrier spacing.

The Nokia EDGE solution is implemented on top of the existing GSM network and requires only minimal hardware and software upgrades to support the new air interface modulation and the increased data rates. EDGE transceivers will be able to support today's mobile terminals with GSM modulation as well as new enhanced data services on a time slot basis.

11.1 BSS10083 Enhanced GPRS

EGPRS will be built on top of GPRS which is a packet switched data service offering services like web browsing, internet/intranet access etc. EGPRS uses several modulation and coding schemes (MCS) which vary from 8.8 kbps up to 59.2 kbps in the radio interface.

Table 2. Peak data rates for single slot EGPRS

MCS	Modulation	Code rate	Family	User Rate
1	GMSK	.53	C	8.8 kbps
2	GMSK	.66	B	11.2 kbps
3	GMSK	.80	A	14.8 kbps
4	GMSK	1	C	17.6 kbps
5	8PSK	.37	B	22.4 kbps
6	8PSK	.49	A	29.6 kbps
7	8PSK	.76	B	44.8 kbps
8	8PSK	.92	A	54.4 kbps
9	8PSK	1	A	59.2 kbps

GMSK modulation provides the robust mode for wide area coverage while 8-PSK provides higher data rates. The MCSs are organized in families in order to allow re-segmentation of the data block for link adaptation. A protection level best suited for the channel condition is chosen for maximum throughput, since higher protection equals lower throughput.

11.1.1 Coding Scheme Measurement (NEW)

No	079000
COUNTER NAME	NUMBER OF DL RLC BLOCKS IN ACKNOWLEDGED
RELEASE/CHANGED	MODE
	S10
EXPLANATION	Number of downlink RLC blocks in acknowledged mode. Does not contain retransmitted blocks.
UPDATED	When an RLC block is received.
COUNTER TYPE	Basic

No	079001
COUNTER NAME RELEASE/CHANGED	NUMBER OF DL RLC BLOCKS IN UNACKNOWLEDGED MODE S10
EXPLANATION	Number of downlink RLC blocks in unacknowledged mode. Does not contain retransmitted blocks.
UPDATED	When an RLC block is received.
COUNTER TYPE	Basic

No	079002
COUNTER NAME RELEASE/CHANGED	NUMBER OF UL RLC BLOCKS IN ACKNOWLEDGED MODE S10
EXPLANATION	Number of uplink RLC blocks in acknowledged mode.
UPDATED	When an RLC block is received.
COUNTER TYPE	Basic

No	079003
COUNTER NAME RELEASE/CHANGED	NUMBER OF UL RLC BLOCKS IN UNACKNOWLEDGED MODE S10
EXPLANATION	Number of uplink RLC blocks in unacknowledged mode.
UPDATED	When an RLC block is received.
COUNTER TYPE	Basic

No	079004
COUNTER NAME	NUMBER OF BAD RLC DATA BLOCKS WITH VALID
RELEASE/CHANGED	HEADER UL UNACK MODE
	S10
EXPLANATION	Number of bad uplink RLC data blocks received from the BTS, with a valid header in unacknowledged mode.
UPDATED	When a data block is expected but a bad frame is received instead.
COUNTER TYPE	Basic

No	079005
COUNTER NAME	NUMBER OF BAD RLC DATA BLOCKS WITH BAD
RELEASE/CHANGED	HEADER UL UNACK MODE
	S10
EXPLANATION	Number of bad uplink RLC data blocks received from the BTS, with a bad header in unacknowledged mode.
UPDATED	When a data block is expected but a bad idle is received instead.
COUNTER TYPE	Basic

No	079006
COUNTER NAME	NUMBER OF BAD RLC DATA BLOCKS WITH VALID
RELEASE/CHANGED	HEADER UL ACK MODE
	S10
EXPLANATION	Number of bad uplink RLC data blocks received from the BTS, with a valid header in acknowledged mode
UPDATED	When a data block is expected but a bad frame is received instead.
COUNTER TYPE	Basic

No	<i>079007</i>
COUNTER NAME	<i>NUMBER OF BAD RLC DATA BLOCKS WITH BAD</i>
RELEASE/CHANGED	<i>HEADER UL ACK MODE</i>
	<i>S10</i>
EXPLANATION	Number of bad uplink RLC data blocks received from the BTS, with a bad header in acknowledged mode.
UPDATED	When a data block is expected but a bad idle is received instead.
COUNTER TYPE	Basic

No	<i>079008</i>
COUNTER NAME	<i>RETRANSMITTED RLC DATA BLOCKS UL</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of retransmitted RLC data blocks in the uplink direction.
UPDATED	When an RLC block remains unacknowledged and it is retransmitted.
COUNTER TYPE	Basic

No	<i>079009</i>
COUNTER NAME	<i>RETRANSMITTED RLC DATA BLOCKS DL</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of retransmitted RLC data blocks in the downlink direction.
UPDATED	When an RLC block remains unacknowledged and it is retransmitted.
COUNTER TYPE	Basic

11.1.2 New counters related to EGPRS in Packet Control Unit Measurement

No	<i>072088</i>
COUNTER NAME	<i>NUMBER OF EGPRS TBFS UL</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of established uplink EGPRS TBFS.
UPDATED	Updated when the establishment of an uplink EGPRS TBF is started.
COUNTER TYPE	Basic

No	<i>072089</i>
COUNTER NAME	<i>NUMBER OF EGPRS TBFS DL</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of established downlink EGPRS TBFS.
UPDATED	Updated when the establishment of a downlink EGPRS TBF is started.
COUNTER TYPE	Basic

No	<i>072090</i>
COUNTER NAME	<i>NUMBER OF ESTABLISHED UPLINK EGPRS TBFS IN UNACK MODE</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of established uplink EGPRS TBFS in unacknowledged mode.
UPDATED	Updated when the TBF establishment of an uplink EGPRS TBF is started with unacknowledged mode.
COUNTER TYPE	Basic

No	072091
COUNTER NAME RELEASE/CHANGED	NUMBER OF ESTABLISHED DOWNLINK EGPRS TBFS IN UNACK MODE S10
EXPLANATION	Number of established downlink EGPRS TBFS in unacknowledged mode.
UPDATED	Updated when the TBF establishment of a downlink EGPRS TBF is started with unacknowledged mode.
COUNTER TYPE	Basic

No	072094
COUNTER NAME RELEASE/CHANGED	UL EGPRS TBF RELEASE DUE NO RESPONSE FROM MS S10
EXPLANATION	Number of failed uplink EGPRS TBF establishments due to no response from the MS.
UPDATED	Updated when the EGPRS TBF establishment is aborted due to no response from the MS.
COUNTER TYPE	Basic

No	072095
COUNTER NAME RELEASE/CHANGED	DL EGPRS TBF RELEASE DUE NO RESPONSE FROM MS S10
EXPLANATION	Number of failed uplink EGPRS TBF establishments due to no response from the MS.
UPDATED	Updated when the EGPRS TBF establishment is aborted due to no response from the MS.
COUNTER TYPE	Basic

No	072096
COUNTER NAME	PACKET IMMED ASS UL MSG
RELEASE/CHANGED	S10
EXPLANATION	Number of PACKET_IMMEDIATE_ASSIGNMENT -messages that are sent because of UL TBF.
UPDATED	MAC/PABI updates when it commands the DX-side to send the message.

No	072097
COUNTER NAME	PACKET IMMED ASS DL DRX MSG
RELEASE/CHANGED	S10
EXPLANATION	Number of PACKET_IMMEDIATE_ASSIGNMENT -messages that are sent because of DL TBF and addressed to a DRX mode MS.
UPDATED	MAC/PABI updates when it commands the DX-side to send the message.

No	072098
COUNTER NAME	PACKET IMMED ASS DL NON-DRX MSG
RELEASE/CHANGED	S10
EXPLANATION	Number of packet immediate assignment -messages that are sent because of DL TBF and addressed to a non-DRX mode MS.
UPDATED	MAC/PABI updates when it commands the DX-side to send the message.

11.2 BSS10045 Dynamic Abis Allocation

Dynamic Abis allocation in BSS10 is a solution for higher EGPRS data rates that ensures a cost efficient and flexible Abis transmission capacity addition. The Dynamic Abis functionality allocates Abis transmission capacity to cells whenever it is needed instead of reserving a full fixed transmission link per TRX.

Since the data rates per radio time slot can vary between 8.8 and 59.2 kbps, the traditional static Abis allocation does not allow the transmission resources to be used to their full capacity. The Dynamic Abis feature uses the existing Abis more efficiently by splitting the PCMs into permanent time slots for signalling and to a dynamic pool for voice and data. The pool can be shared by a number of transceivers. The Dynamic Abis transmission solution saves up to 70% in Abis transmission expansion costs as it allows Abis dimensioning to be performed near the average data rates instead of peak rates. This also applies to the number of 2M BSC interfaces needed.

11.2.1 Dynamic Abis Measurement (NEW)

No	<i>076000</i>
COUNTER NAME	<i>TOTAL NBR OF PCM SUBTSLs IN EDAP</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Total number of subTSLs in the Dynamic Abis Pool.
UPDATED	When uplink and downlink Dynamic Abis resource allocation occurs. The counter is incremented by the size of the Dynamic Abis Pool.
DEPENDENCIES	This counter is updated along with counters 076001 and 076002 .

No	<i>076001</i>
COUNTER NAME	<i>AVERAGE DL EDAP USAGE</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Average usage of DL Dynamic Abis Pool. The value is given as a percentage of the total amount of subTSLs in DL EDAP.
UPDATED	When DL Dynamic Abis resource allocation occurs. The counter is incremented by the value of reserved 16 kbit/s subTSLs in downlink.
DEPENDENCIES	This counter is updated along with counter 076003. 076003 is a common/shared counter for 076001 and 076002.
UNIT	Percent

No	076002
COUNTER NAME	AVERAGE UL EDAP USAGE
RELEASE/CHANGED	S10
EXPLANATION	Average usage of UL Dynamic Abis Pool. The value is given as a percentage of the total amount of subTSLs in DL EDAP.
UPDATED	When UL Dynamic Abis resource allocation occurs. The counter is incremented by the value of reserved 16 kbit/s subTSLs in uplink.
DEPENDENCIES	This counter is updated along with counter 076003. 076003 is a common/shared counter for 076001 and 076002.
UNIT	Percent

No	076003
COUNTER NAME	DYNAMIC ABIS DENOM 1
RELEASE/CHANGED	S10
EXPLANATION	Denominator for counters 076001 and 076002.
UPDATED	When UL and DL Dynamic Abis resource allocation occurs. Counter is incremented by 1 in every transmission turn.
DEPENDENCIES	This counter is updated along with counters 076001 and 076002. 076003 is a common/shared counter for 076001 and 076002.

No	076004
COUNTER NAME	PEAK DL EDAP USAGE
RELEASE/CHANGED	S10
EXPLANATION	Peak usage of used 16 kbit/s PCM subTSLs in downlink direction. The value is given as a percentage of the total amount of subTSLs in DL EDAP.
UPDATED	When Dynamic Abis resource allocation occurs.
UNIT	Percent

No	<i>076005</i>
COUNTER NAME	<i>PEAK UL EDAP USAGE</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Peak usage of used 16 kbit/s PCM subTSLs in uplink direction. The value is given as a percentage of the total amount of subTSLs in UL EDAP.
UPDATED	When Dynamic Abis resource allocation occurs.
UNIT	Percent

No	<i>076006</i>
COUNTER NAME	<i>UL TBFS WITHOUT EDAP RES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of cases where the scheduled UL TBF cannot be serviced due to a lack of EDAP resources.
UPDATED	Every time the UL TBF is left without Dynamic Abis service.

No	<i>076007</i>
COUNTER NAME	<i>DL TBFS WITHOUT EDAP RES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of cases where no EDAP channels can be given to a downlink TBF and only the EDGE master channel is granted.
UPDATED	Every time DL TBF is left without Dynamic Abis service.

No	<i>076008</i>
COUNTER NAME	<i>DL TBFS WITH INADEQUATE EDAP RES</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of cases where the required EDAP channels cannot be granted to the DL TBF and it is serviced with a reduced number of EDAP channels in addition to the EGPRS master channel.
UPDATED	Every time the DL TBF is serviced with a reduced number of channels.

11.3 BSS10087 Support for 850 MHz frequencies

The support for 850 MHz frequency band allows the TDMA service providers to offer GPRS data transferring possibilities to their customers. Support for the 850 MHz band is a standard feature in BSC.

11.3.1 New counters related to 850 MHz frequencies in MS Capability Indication Measurement

No	<i>071033</i>
COUNTER NAME	<i>REP TIME BY GSM 850 MS</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Cumulative reporting time made by GSM 850 subscribers.
UPDATED	When the BSC receives a MEASUREMENT_RESULT message from the MS.
COUNTER TYPE	Time
UNIT	0.48 s

No	<i>071034</i>
COUNTER NAME	<i>TCH RESERV BY GSM 850 MS</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of TCH reservations made by GSM 850 subscribers.
UPDATED	In a call setup or in a handover.

12 BSS10084 Priority Class Based Quality of Service

The concept of a *priority class* is introduced at a system level. The priority class is based on a combination of GPRS Delay class and GPRS Precedence class values. The packets are evenly scattered between different time slots within the (E)GPRS territory. After that, packets with a higher priority are sent before packets with a lower priority.

Currently, all TBFs (GPRS calls) have the same priority level. As a result, all users and applications get the same service level. But since the needs of different applications differ, mechanisms that allow the use of separate service levels are required. In ETSI specifications, a QoS functionality has been defined that makes it possible to differentiate TBFs according to delay, throughput, and priority. Furthermore, Priority Based Scheduling was introduced as a first step towards QoS. With Priority Based Scheduling the operator can give users different priorities: a high priority user gets better service than a low priority user. There will be no extra blocking to any user, only the experienced service quality may change.

The scheduling algorithm applies to each link a so-called latest service time before which the connection should get a chance to use the radio resource. After the link has used the radio resource, it is given a new latest service time that is the current time plus a predefined step. The connection that has the smallest latest service time gets to use the radio resource. The scheduling algorithm also checks on the queue periodically. In release 1 these steps are set to the same constant value for all TBFs. This produces a round, robin-like queuing system.

The new algorithm is priority-based. It selects the best possible time slot within a territory and then prioritizes the TBFs residing in that time slot so that the TBF with the highest priority gets the most air interface. Since the solution does not affect the allocation process, the number of served customers remains constant when compared with the Nokia GPRS release 1.

Each time slot has a queue in which the TBFs wait for their turn to use the radio air interface. When a TBF has used its air interface time it increases its latest service time to the current time plus its scheduling step size.

The algorithm has a direct impact on the scheduling algorithm. The sizes of the scheduling steps have to be set in a way that reflects the handing out of radio resources because the amount of time a certain link has control of the radio resource is decided by the scheduling algorithm. Each service class is given a fair amount of radio time. The only exception are the best effort customers who are given a small share of the radio interface.

This algorithm applies priorities to the TBFs in the same time slot so that the TBFs that have the same QoS get an equal share of airtime. However, equal air time does not provide equal data rates for TBFs in the same time slot, it only guarantees that inside a QoS group the air time is divided equally and that a higher QoS class gets more air time.

Mobile-specific flow control is part of the QoS solution in the PCU. This feature works together with the SGSN in order to provide a steady data flow from the network to the mobile. It also is an effective countermeasure against buffer overflows in the PCU.

Priority Based Scheduling in BSC is a standard feature and is always active in active PCUs.

12.1 Quality of Service Measurement (NEW)

No	090000
COUNTER NAME	NUMBER OF TBF ALLOCATIONS
RELEASE/CHANGED	S10
EXPLANATION	Number of allocated TBFs.
UPDATED	When a TBF is released.

No	090001
COUNTER NAME	TOTAL NBR OF RLC BLOCKS
RELEASE/CHANGED	S10
EXPLANATION	Total number of RLC blocks transferred.
UPDATED	When a TBF is released or the priority is changed. Dropped RLC blocks are not included.

No	<i>090002</i>
COUNTER NAME	<i>TOTAL DURATION OF TBFS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Total duration of all TBFS.
UPDATED	When a TBF is released.

No	<i>090003</i>
COUNTER NAME	<i>DROPPED DL LLC PDUS DUE TO OVERFLOW</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Dropped downlink LLC PDUs due to either MS or BVC buffer overflow.
UPDATED	When a downlink LLC PDU is discarded due to buffer overflow.

No	<i>090004</i>
COUNTER NAME	<i>DROPPED DL LLC PDUS DUE TO LIFETIME EXPIRY</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Dropped downlink LLC PDUs due to lifetime expiry.
UPDATED	When a downlink LLC PDU lifetime expires.

No	<i>090005</i>
COUNTER NAME	<i>AVERAGE MS SPECIFIC BSSGP FLOW RATE</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	The average transmission rate of downlink TBFS controlled by an MS-specific flow control algorithm.
UPDATED	Once per second.
UNIT	Bytes per second.

No	<i>090006</i>
COUNTER NAME	<i>AVERAGE MS SPECIFIC BSSGP FLOW RATE DEN</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of samples for counter 090005.
UPDATED	Once per second.

13 BSS10074 Support of PBCCH / PCCCH

This feature will bring dedicated CCCH capacity for (E)GPRS services.

A PCCCH comprises of logical channels for packet common control signalling. The following common control channels are available:

- PRACH is used by a mobile station to initiate uplink transfer for sending data or signalling information. Packet Access burst and Extended Packet Access burst are used on PRACH.
- PPCH is used to page a mobile station before a downlink packet transfer. The PPCH uses paging groups in order to allow usage of DRX mode. PPCH can be used for paging both circuit switched and packet data services. The paging of circuit switched services on PPCH is applicable for class A and B GPRS MSs in Network operation mode I.
- PAGCH is used in the packet transfer establishment phase to send a resource assignment to a MS before a packet transfer.
- PBCCH broadcasts packet data specific System Information (for example C31 and C32 cell selection criteria). C31/C32 are used to direct the GPRS traffic to cells which can serve the EGPRS most efficiently and are free of interference to CS traffic. C31/C32 apply in cells using PBCCH/PCCCH, otherwise existing C1/C2 are used.
- If PBCCH is not allocated, the packet data specific system information is broadcast on BCCH.

Note! PCCCH/PBCCH are mapped to their own timeslots.

13.1 PBCCH Availability Measurement (NEW)

No	091000
COUNTER NAME	NUMBER OF PRACH SLOTS
RELEASE/CHANGED	S10

EXPLANATION	With the denominator, this counter gives the average number of allocated PRACH slots per one 52-multiframe in UL PCCCH. The number of allocated PRACH slots is four times bigger than the number of allocated PRACH block periods.
UPDATED	Every 100 52-multiframes (about once in 24 seconds).
DEPENDENCIES	091001 NUMBER OF 52 MULTIFRAMES
COUNTER TYPE	Basic
UNIT	PRACH slot.

No	091001
COUNTER NAME	NUMBER OF 52 MULTIFRAMES
RELEASE/CHANGED	S10

EXPLANATION	Calculates the number of 52-multiframes. Used as a denominator for several counters.
UPDATED	Every 100 52-multiframes (about once in 24 seconds). The denominator is increased by 100 every time the counter 091000 is updated.
DEPENDENCIES	091000 NUMBER OF PRACH SLOTS, 091002 NBR OF PACKET CHANNEL REQUESTS
COUNTER TYPE	Denominator
UNIT	52-multiframe

No	091002
COUNTER NAME	<i>NBR OF PACKET CHANNEL REQUESTS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	With the denominator, this counter gives the average number of valid access bursts per one 52-multiframe.
UPDATED	When valid Packet Channel Requests or EGPRS Packet Channel Requests are received in a PCU Random Access Frame. One PCU Random Access Frame can contain 0 - 4 packet channel requests.
DEPENDENCIES	091001 NUMBER OF 52 MULTIFRAMES

No	091003
COUNTER NAME	<i>NUMBER OF BUSY PRACH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of PRACH burst periods during which the received signal level has exceeded a pre-configured threshold. The busy count value is the sum of the total access count and total clash count values during the measurement period.
UPDATED	When a PCU Random Access Frame is received.
DEPENDENCIES	091001 NUMBER OF 52 MULTIFRAMES

No	091004
COUNTER NAME	<i>MAX NON-DRX PPCH BUFFER</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Maximum number of buffered messages in a PPCH queue. The queue contains NON-DRX_PACKET_DOWNLINK_ASSIGNMENT messages.
UPDATED	Every time a message is added to the queue.

No	091005
COUNTER NAME	AVE NON-DRX PPCH BUFFER
RELEASE/CHANGED	S10
EXPLANATION	Average number of buffered messages in a PPCH queue. The queue contains NON-DRX_PACKET_DOWNLINK_ASSIGNMENT messages.
UPDATED	Every 20 seconds.
DEPENDENCIES	091006 AVE NON-DRX PPCH BUFFER DEN

No	091006
COUNTER NAME	AVE NON-DRX PPCH BUFFER DEN
RELEASE/CHANGED	S10
EXPLANATION	Denominator for counter 091005. This calculates the number of samples.
UPDATED	Every 20 seconds.
DEPENDENCIES	091005 AVE NON-DRX PPCH BUFFER

No	091007
COUNTER NAME	MAX PAGCH BUFFER
RELEASE/CHANGED	S10
EXPLANATION	Maximum number of buffered messages in a PAGCH queue. The queue contains PACKET_ACCESS_REJECT and PACKET_UPLINK_ASSIGNMENT messages.
UPDATED	Every time a message is added to the queue.

No	<i>091008</i>
COUNTER NAME	<i>AVE PAGCH BUFFER</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Average number of buffered messages in a PPCH queue. The queue contains PACKET_ACCESS_REJECT and PACKET_UPLINK_ASSIGNMENT messages.
UPDATED	Every 20 seconds.
DEPENDENCIES	091009 AVE PAGCH DEN

No	<i>091009</i>
COUNTER NAME	<i>AVE PAGCH DEN</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Denominator for counter 091008. This calculates the number of samples.
UPDATED	Every 20 seconds.
DEPENDENCIES	091008 AVE PAGCH BUFFER

No	<i>091010</i>
COUNTER NAME	<i>MAX DRX BUFFER OCCUPANCY</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Maximum number of buffered DRX messages in a DRX array. The array can contain EGPRS_PACKET_PAGING_REQUEST, PACKET_PAGING_REQUEST and PACKET_DOWNLINK_ASSIGNMENT messages.
UPDATED	Every time a message is added to the array.

No	091011
COUNTER NAME	AVERAGE DRX BUFFER OCCUPANCY
RELEASE/CHANGED	S10
EXPLANATION	Average number of buffered DRX messages in a DRX array. The array can contain EGPRS_PACKET_PAGING_REQUEST, PACKET_PAGING_REQUEST and PACKET_DOWNLINK_ASSIGNMENT messages.
UPDATED	Every 20 seconds.
DEPENDENCIES	091012 AVERAGE DRX BUFFER OCCUP DEN

No	091012
COUNTER NAME	AVERAGE DRX BUFFER OCCUP DEN
RELEASE/CHANGED	S10
EXPLANATION	Denominator for counter 091011. This calculates the number of samples.
UPDATED	Every 20 seconds.
DEPENDENCIES	091011 AVERAGE DRX BUFFER OCCUPANCY

No	091013
COUNTER NAME	NBR OF DELETED DRX PPCH MSGS
RELEASE/CHANGED	S10
EXPLANATION	Number of DRX mode PACKET_DOWNLINK_ASSIGNMENT messages that have been discarded because of a shortage of DRX buffer space.
UPDATED	Every time a DRX mode PACKET_DOWNLINK_ASSIGNMENT message is discarded.

No	091014
COUNTER NAME	<i>NBR OF DEL NON-DRX PPCH MSGS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of non-DRX mode PACKET_DOWNLINK_ASSIGNMENT messages that have been discarded because of a shortage of PPCH queue space.
UPDATED	Every time a non-DRX mode PACKET_DOWNLINK_ASSIGNMENT message is discarded.

No	091015
COUNTER NAME	<i>NBR OF DELETED PAGCH MSGS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of PACKET_ACCESS_REJECT and PACKET_UPLINK_ASSIGNMENT messages that have been discarded because of a shortage of PAGCH queue space.
UPDATED	Every time a PACKET_ACCESS_REJECT or PACKET_UPLINK_ASSIGNMENT message is discarded.

No	091016
COUNTER NAME	<i>NBR OF PACKET DL ASSIGNMENT MSGS DELETED FROM DRX BUFFER</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of DRX mode PACKET_DOWNLINK_ASSIGNMENT messages that have been discarded because of a shortage of DRX buffer space (DRX array).
UPDATED	Every time a DRX mode PACKET_DOWNLINK_ASSIGNMENT message is discarded.

No	091017
COUNTER NAME	<i>NBR OF DEL PACK PAGING REQS</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of packet paging requests that have been discarded because of a shortage of DRX buffer space (DRX array).
UPDATED	Every time a packet paging request is discarded.

No	091018
COUNTER NAME	<i>NBR OF CS PAGING REQS ON PCCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of circuit switched paging requests sent on the PCCCH.
UPDATED	When a circuit switched paging request is sent.

No	091019
COUNTER NAME	<i>NBR OF PS PAGING REQS ON PCCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of packet switched paging requests sent on the PCCCH.
UPDATED	When a packet switched paging request is sent.

No	091020
COUNTER NAME	<i>NBR OF PP REQ MSGS ON PCCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of PACKET_PAGING_REQUEST messages sent on the PCCCH.
UPDATED	When a PACKET_PAGING_REQUEST message is sent.

No	<i>091021</i>
COUNTER NAME	<i>P UL ASS MSGS ON PCCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of PACKET_UPLINK_ASSIGNMENT messages sent on the PCCCH.
UPDATED	When a PACKET_UPLINK_ASSIGNMENT message is sent.

No	<i>091022</i>
COUNTER NAME	<i>NON DRX P DL ASS MSGS ON PCCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of non-DRX mode PACKET_DOWNLINK_ASSIGNMENT messages sent on the PCCCH.
UPDATED	When a non-DRX mode PACKET_DOWNLINK_ASSIGNMENT message is sent.

No	<i>091023</i>
COUNTER NAME	<i>DRX P DL ASS MSGS ON PCCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of DRX mode PACKET_DOWNLINK_ASSIGNMENT messages sent on the PCCCH.
UPDATED	When a non-DRX mode PACKET_DOWNLINK_ASSIGNMENT message is sent.

No	<i>091024</i>
COUNTER NAME	<i>P ACCESS REJECT MSGS ON PCCCH</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of PACKET_ACCESS_REJECT messages sent on the PCCCH.
UPDATED	When a PACKET_ACCESS_REJECT message is sent.

No	091025
COUNTER NAME	PACKET IMMED ASS UL MSG
RELEASE/CHANGED	S10
EXPLANATION	Number of PACKET_IMMEDIATE_ASSIGNMENT messages sent because of UL TBF.
UPDATED	When the PCU commands the DX-side to send the message.

No	091026
COUNTER NAME	PACKET IMMED ASS DL DRX MSG
RELEASE/CHANGED	S10
EXPLANATION	Number of PACKET_IMMEDIATE_ASSIGNMENT messages sent because of DL TBF and addressed to a DRX mode MS.
UPDATED	When the PCU commands the DX-side to send the message.

No	091027
COUNTER NAME	PACKET IMMED ASS DL NON-DRX MSG
RELEASE/CHANGED	S10
EXPLANATION	Number of PACKET_IMMEDIATE_ASSIGNMENT messages sent because of DL TBF and addressed to a non-DRX mode MS.
UPDATED	When the PCU commands the DX-side to send the message.

14 Other new counters

14.1 New counters in Traffic Measurement

No	<i>001189</i>
COUNTER NAME	<i>TCH REQ FOR 96 DAT CALL</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of TCH requests for a 9.6 kbit/s data call.
UPDATED	When the Radio Resource Management receives a TCH request for a single slot 9.6kbit/s data connection in a call or a handover attempt.

No	<i>001190</i>
COUNTER NAME	<i>SUCC TCH SEIZ FOR 96 DAT CALL</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of successful TCH seizures for a 9.6 kbit/s data call.
UPDATED	When the Radio Resource Management allocates a TCH/F as a response to a single slot 9.6kbit/s request in a call or handover attempt.

14.2 New counters in Handover Measurement

No	<i>004141</i>
COUNTER NAME	<i>HO ATT DUE TO HSCSD</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of intra cell handover attempts that are made due to HSCSD traffic.
UPDATED	When an intra cell handover attempt is initiated for a single slot call in order to enable an upgrade for an GSCSD call.

14.3 New counters BSC Level Clear Code Measurement

No	<i>500370</i>
COUNTER NAME	<i>ESTAB IND CORRUPTED</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of the corrupted ESTABLISH_INDICATION messages received by the Abis interface.
UPDATED	When the Abis interface receives an ESTABLISH_INDICATION message with corrupted content.

14.4 New counters in BSC Level Clear Code (PM) Measurement

No	<i>051149</i>
COUNTER NAME	<i>INTRA HO DUE TO HSCSD</i>
RELEASE/CHANGED	<i>S10</i>
EXPLANATION	Number of successful intra-cell handovers made to enable the HSCSD upgrade.
UPDATED	After the HO_PERFORMED message is sent to the MSC.
DEPENDENCIES	Counters 051014 and 004141 are updated along with this counter.

14.5 New counters in RLC Blocks per TRX Measurement

No	<i>073003</i>
COUNTER NAME	<i>DL RLC MAC BLOCKS</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of downlink RLC/MAC blocks.
UPDATED	When a valid downlink RLC/MAC block is transmitted. Downlink block is counted in if the idle/data bit has value data.

14.6 New counters in PCU Measurement

No	<i>072092</i>
COUNTER NAME	<i>NBR OF UL TBF ESTABLISHMENT FAILED</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of uplink TBF establishments that have failed due to no response from MS.
UPDATED	When the TBF establishment is aborted due to no response from MS.
COUNTER TYPE	Basic

No	<i>072093</i>
COUNTER NAME	<i>NBR OF DL TBF ESTABLISHMENT FAILED</i>
RELEASE/CHANGED	<i>S10</i>

EXPLANATION	Number of downlink TBF establishments that have failed due to no response from MS.
UPDATED	When the TBF establishment is aborted due to no response from MS.
COUNTER TYPE	Basic

No	072099
COUNTER NAME	AVER TBFS PER TSL UL
RELEASE/CHANGED	S10
EXPLANATION	Average number of uplink TBFS per timeslot.
UPDATED	Every 20 seconds.
COUNTER TYPE	Average

No	072100
COUNTER NAME	AVER TBFS PER TSL UL DEN
RELEASE/CHANGED	S10
EXPLANATION	Denominator of average number of uplink TBFS per timeslot.
DEPENDENCIES	Counter 072099 is updated along with this counter.

No	072101
COUNTER NAME	AVER TBFS PER TSL DL
RELEASE/CHANGED	S10
EXPLANATION	Average number of downlink TBFS per timeslot.
UPDATED	Every 20 seconds.
COUNTER TYPE	Average

No	072102
COUNTER NAME	AVER TBFS PER TSL DL DEN
RELEASE/CHANGED	S10
EXPLANATION	Denominator of average number of downlink TBFS per timeslot.
DEPENDENCIES	Counter 072101 is updated along with this counter.

No	072103
COUNTER NAME	MAX TBFS PER TSL UL
RELEASE/CHANGED	S10
EXPLANATION	Maximum number of uplink TBFS per timeslot.
UPDATED	Every 20 seconds if the previous maximum value is exceeded.

No	072104
COUNTER NAME	MAX TBFS PER TSL DL
RELEASE/CHANGED	S10
EXPLANATION	Maximum number of downlink TBFS per timeslot.
UPDATED	Every 20 seconds if the previous maximum value is exceeded.

No	072105
COUNTER NAME	DL REALLOC DUE TERR DOWNGR
RELEASE/CHANGED	S10
EXPLANATION	Number of downlink TBF reallocations due to a territory downgrade.
UPDATED	When a DL TBF is reallocated due to territory downgrade.
DEPENDENCIES	The counter 072028 is updated in parallel with this counter.

No	072106
COUNTER NAME	DUMMY DL MAC BLOCKS SENT
RELEASE/CHANGED	S10
EXPLANATION	Number of dummy downlink MAC blocks sent.
UPDATED	When a downlink dummy control block is sent. If the network has nothing else to send, it will send a Packet DL Dummy Control Block to carry the USF.

