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Foreword

This ETSI Technical Report (ETR) has been produced by the Special Mobile Group (SMG) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI).

This ETR recommends measures to be taken by the infrastructure to handle various mobile station implementations which diverge, in specific ways, from the Phase 1 standard of the digital cellular telecommunications system.

This ETR is an informative document resulting from SMG studies which are related to the digital cellular telecommunications system. This ETR is used to publish material which is of an informative nature, relating to the use or the application of ETSs and is not suitable for formal adoption as an ETS.

The specification from which this ETR has been derived was originally based on CEPT documentation, hence the presentation of this ETR may not be entirely in accordance with the ETSI/PNE rules.

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1 Scope

This ETSI Technical Report (ETR) clarifies recommended measures which may be adopted by the GSM infrastructure to enable interworking to be obtained between the GSM infrastructure and various Mobile Station (MS) implementations of the GSM Phase 1 standard. The objective is to obtain compatibility without changing the consolidated set of Phase 1 specifications. This ETR describes the recommended changes to the infrastructure to cater for specific faults within some Phase 1 MSs.

The lifetime of the herein described measures together with their potential impact on optimal network performance is out of the scope of this ETR.

2 References

This ETR incorporates by dated and undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETR only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

[1] GSM 01.04 (ETR 350): "Digital cellular telecommunications system (Phase 2+); Abbreviations and acronyms".

[2] GSM 04.08 Phase 1 (I-ETS 300 022-1): "Digital cellular telecommunications system (Phase 1); Mobile radio interface layer 3 specification; Part 1: Generic".

[3] GSM 05.05 (ETS 300 577): "Digital cellular telecommunications system (Phase 2); Radio Performance Aspects".

[4] GSM 05.05 (ETS 300 910): "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception".

[5] GSM 08.08: "Digital cellular telecommunications system (Phase 2+); Mobile Switching Centre - Base Station System (MSC - BSS) interface; Layer 3 specification".

3 Abbreviations

Abbreviations used in this ETR are listed in GSM 01.04 (ETR 350) [1].

4 General

In the implementation of the Phase 1 standard it has been found that some aspects of the specifications have been mis-interpreted by some MS manufacturers. These MSs require specific implementations of the Phase 1 standard in the infrastructure, to provide completely compatible interworking.

It has been assumed throughout this ETR that Phase 2 and later infrastructure will interwork with Phase 1 MSs in the same way as Phase 1 infrastructure, so no specific mention is made of Phase 2 operation.

The remainder of this ETR describes how to overcome the possible impacts of the above factors. Descriptions given are limited to specific implementations which are permissible for the infrastructure under the Phase 1 standard.

5 Specific implementation on the radio interface

This clause deals with the choice of specific infrastructure implementation options of the protocols at the radio interface. The protocols concerned are defined in GSM 04.08 (Phase 1) (I-ETS 300 022-1) [2].

5.1 Handovers and "Synchronization Indication"

5.1.1 Justification

In the HANDOVER COMMAND message there is a mandatory part consisting of nine octets followed by several optional information elements. The first optional information element is Synchronization Indication which is a type 1 Information Element (IE) and as such is coded, with IE Identifier (IEI), on one octet. Other optional IE follow the Synchronization Indication IE and are used to:

- indicate the frequency hopping sequence to use on the new channel;
- indicate the channel mode for the new channel;
- indicate a start time.

Some types of MS do not correctly decode these following information elements if the Synchronization Indication information element is omitted.

5.1.2 Solution

To ensure correct operation the infrastructure should always send the Synchronization Indication IE to a Phase 1 MS.

NOTE: In a few cases this will force an extra layer 2 segment to be sent to the MS.

5.2 "Directed Retry" type Handovers

5.2.1 Justification

In the HANDOVER COMMAND message there is an optional Channel Mode Information Element. When this information element is included in the handover command the MS should go to the new channel mode when it hands over to the new channel. This information element may be used for "directed retry" type handovers where a cell has an MS on a control channel but has no available traffic channel for the MS to use. The network may then choose to handover the MS to a new cell with traffic channel (TCH) capacity and change the channel mode at the same time.

Some MSs appear to accept the handover command, from Stand-alone Dedicated Control Channel (SDCCH) to TCH with speech mode, and make the required channel and mode change but do not through connect the speech path.

5.2.2 Solution

To ensure correct operation, of these MSs, the infrastructure should always initiate a channel mode change procedure according to GSM 04.08 (Phase 1) (I-ETS 300 022-1) [2] clause 3.4.6 once the MS has arrived at the new channel following a handover of a Phase 1 MS involving a channel mode change to full rate speech.

The additional channel mode change procedure shall only be performed for a directed retry handover to a full rate speech channel, and not for a data channel. First this will save performance in these cases, and secondly some MS's will release the call with this additional and unnecessary channel mode change procedure in case of fax or data calls.

For internal intra-Base Station System (BSS) handovers, this decision to initiate channel mode modify is taken by the BSS concerned. For external intra-BSS and inter-BSS handovers, the new BSS must know that there has been a change of mode from the previous BSS and that therefore a channel mode change procedure must be executed. The communication of this information is achieved by using the "current channel" element in the HANDOVER REQUEST and HANDOVER REQUIRED message as described in annex A.

In the case of external handover, the following will ensure correct operation with mobiles suffering from fault 5.2.1:

i) The change described in annex A shall be implemented by the MSC and BSS concerned.

ii) The new BSS, after receiving a HANDOVER REQUEST containing a current channel IE indicating "signalling only", and a channel type indicating full rate speech, shall behave as specified in GSM 08.08 and additionally, upon reception of the HANDOVER COMPLETE message, initiate a channel mode change procedure according to GSM 04.08 with the new mode indicating speech.

If the new BSS receives a HANDOVER REQUEST without the current channel IE but containing a cause value "directed retry", and a channel type indicating full rate speech, it shall also behave as ii) above.

NOTE: The performance of MSs not experiencing this problem has been checked for a sizeable subset of the MSs available in Phase 1, but it has not been possible to check all versions of all MSs.

5.3 Cell broadcast and frequency hopping

5.3.1 Justification

In the SYSTEM INFORMATION TYPE 4 message there is an optional Information Element "CBCH Channel Description" used when a cell broadcast channel is configured in the network.

Some Types of GSM 900 MSs may not obtain service whilst within reception range of a cell from any network having the CBCH configured with frequency hopping: i.e. the Hopping channel bit set to 1 in the "CBCH Channel description" information element.

5.3.2 Solution

To enable operation from the affected MS, the infrastructure could configure the CBCH on a non hopping channel:

- In combined type of configuration: the CBCH would be distributed on the SDCCH/4 with BCCH.

- In non-combined type of configuration, two types of solution are considered:

    - Type 1 CBCH distributed on a non hopping SDCCH broadcasted on TSx of C0 (x=1,2,3);

    - Type 2 CBCH distributed on a non hopping SDCCH broadcasted on TS0 of Cx ($x \neq 0$)

6 Use of VAD/DTX in conjunction with frequency hopping for a speech call

6.1 Scope

Clause 6 of this Technical Report is to identify limitations in the specification for phase 1 reflected in performance degradation in phase 1 terminal equipment. This report identifies possible ways of improving the service offered to subscribers using phase 1 terminals whilst using the two features - downlink DTX and frequency hopping at the same time.

6.2 General

The specification of acoustic performance of the MS when downlink DTX is implemented is in GSM 05.05 which restricts the MS performance to 1 undetected bad frame in 10 s when in the presence of random RF. In reality the MS does not experience random RF exclusively when downlink DTX is implemented.

There is a SIlence Descriptor (SID) frame sent on eight bursts every 104 bursts. Due to the interleaving scheme, half of the bits of the frame preceding the SID and half of the bits of the frame following the SID are sent and there is no specific requirement covering what is sent for these bits but in most cases it is every other bit of a correctly coded frame. The MS receives these bits

In addition, when the ARFCN used is C0, dummy bursts are sent when there is neither speech nor signalling to be transmitted.

Finally, when frequency hopping is used as well as downlink DTX, the MS may receive random RF on some TDMA frames and dummy bursts on others (C0).

It is possible for the MS to receive combinations of transmitted bits at high confidence and random RF at low confidence. In some cases the MS can then decode the frame as good when in fact it was never intended to have been transmitted and the resultant bad frame can give a very annoying acoustic effect known as banjo noise. The occurrence of these noises, even if no more frequent than one in 10 s, is worse than one would expect from a high quality cellular system.

The three following subclauses refer to ways of improving the system performance for MS approved according to the existing phase 1 specification. Subclause 6.3 identifies some "normal" operation configurations which would improve undetected bad frame performance for MS's with the above fault (banjo noise), subclause 6.4 describes aspects for possible changed network implementation, subclause 6.5 relates the results of tests performed using combinations of the implementations described in subclause 6.4 and whether that combination was effective or not.

6.3 Implementation options to reduce the occurrence of undetected bad frames by utilizing normal system features

This subclause deals with a variety of options to improve the system performance which are implementable by normal system operational choices. These options typically improve matters in specific configurations and are not universal solutions for all configurations. It may be possible that some networks do not permit such configuration.

6.3.1 Number of frequency hopping channels

The number of undetected bad frames is related to the probability of getting sufficient dummy bursts transmitted to make a false good frame decision. The number of dummy bursts received depends on the number of ARFCN in the hopping list. Hence frequency hopping on 3 ARFCN gives better audio performance than frequency hopping on 2, likewise hopping on 4 ARFCN gives better performance than hopping on 3.

In tests of the comparison between hopping on 2 ARFCN and hopping on 3, some MS have been found to improve to approximately one tenth of the occurrence of bad frames, while others have improved from a slightly annoying level when hopping on 2 ARFCN, to give no audible disruption when hopping on 3. Not all MS have been tested and it is believed that the improvement for some MS may be less noticeable.

This solution is obviously not trivial to implement in a frequency plan, but could also be used to enable frequency hopping on cells which naturally have 3 or more ARFCN operational whilst selecting a solution for other parts of the network and operational scenarios.

6.3.2 Frequency hopping type

When utilizing pseudo-random frequency hopping, it is possible to get more dummy bursts in a speech frame than when utilizing cyclic frequency hopping. As an alternative to random frequency hopping, cyclic hopping may be used. It will minimize the banjo noise effect experienced by the faulty mobiles. This will however be done at the expense of a possible degradation of performance during speech activity period for all mobiles due to the absence of interferer diversity.

In tests of the comparison between pseudo-random frequency hopping and cyclic frequency hopping, some phones were found to improve with the use of cyclic hopping to approximately one third of the occurrence of bad frames when using pseudo-random hopping, while others have improved from a slightly annoying level to give no audible disruption. Not all phones have been tested for this.

6.3.3 Continuous SID frames on C0

At some times, a network implementing downlink DTX may hold a call on C0. In this case it would be possible for the network to send dummy bursts when it has nothing else to send. This is likely to cause a high level of unwanted noises for some MS. An alternative would be to send continuous SID frames in which case there should be no undesired effects.

6.4 Implementation options to reduce the occurrence of undetected bad frames by changing normal system operation

This subclause deals with implementation options which improve the audio quality of the faulty mobiles, suffering from banjo noise, by making changes to the network equipment. The solutions give varying performance improvements but not all solutions would be possible on all networks.

6.4.1 Changing the training sequence of the dummy burst to a new (ninth) training sequence

If a different training sequence code is used for all dummy bursts forming part of the TCH on C0, the MS will have difficulty training to the dummy burst frames and this would cause the bits to be received as low confidence. This would then give a performance rather more like that for random RF input and should then meet the 05.05 requirement.

6.4.2 Using an alternative training sequence out of the eight assigned

This option is similar in concept and performance to the one described in subclause 6.4.1. The advantage is that it may be usable in some networks where it is not easily possible to add a ninth training sequence. The following table gives a list of training sequence codes for the TCH and the preferred choice of training sequence code for the dummy burst.

Training sequence code for TCH	Training sequence code for dummy bursts on C0
0	2
1	5
2	0
3	4
4	5
5	2
6	3
7	5

6.4.3 Setting the stealing flag for the bits transmitted which are not intended to be part of the TCH

When bits are transmitted which are not intended for reception in the TCH path, such as dummy bursts and the half burst before and after a discrete, wanted frame, it would be possible to set the stealing flag for these bits and so bias the decision of the majority vote on stealing flags in favour of routeing the frame as control information rather than speech information. The channel protection on the control channel is much greater and the chance of getting an undetected bad control channel frame is very low.

6.4.4 Sending partial SID frames on C0

It has been observed that improvements in the undetected bad frame rate are seen when the BTS sends partial SID frames on the otherwise unused TCH bursts on C0. This is because the high confidence bits are correctly coded for the relevant speech frame and the normal design of the MS receiver is expected to cope with such errors. This proposal works best for DCS 1 800 because very early GSM models are not represented in DCS 1 800.

6.5 Tested Combinations

This subclause identifies tests that have been performed and the results that have been obtained. The reporting of result is limited to acceptable or not acceptable and a brief additional comment is sometimes made. If the result is deemed to be acceptable, most products which suffer from the described problem have been improved to a point where extraneous noises are significantly reduced to virtually nothing and no product has got worse. No solution completely corrected all products but significant improvements have been achieved if the result is deemed acceptable.

6.5.1 "Normal" system

Test configuration:

Sent on C0:
Dummy bursts using training sequence from TCH.

Stealing flag on C0:
Set to 0

Half burst filling bits:
Partial SID information from the SID frame otherwise scheduled for transmission.

Half burst stealing flags:
Set to 0

Result:

Unacceptable; Several products exhibit frequent noises from undetected bad frames.

6.5.2 New training sequence

Test configuration:

Sent on C0:
Dummy bursts using new (ninth) training sequence.

Stealing flag on C0:
Set to 0

Half burst filling bits:
Partial SID information from the SID frame otherwise scheduled for transmission.

Half burst stealing flags:
Set to 0

Result:

Acceptable.

6.5.3 Alternative training sequence from the eight assigned

Test configuration:

Sent on C0:
Dummy bursts using alternative training sequence according to table in 6.4.2.

Stealing flag on C0:
Set to 0

Half burst filling bits:
Partial SID information not necessarily related to the SID frame otherwise scheduled for transmission.

Half burst stealing flags:
Set to 0

Result:

Acceptable.

6.5.4 Setting stealing flag for unintentionally transmitted bits

Test configuration:

Sent on C0:
Partial SID information from the two SID frames otherwise scheduled for transmission.

Stealing flag on C0:
Set to 1

Half burst filling bits:
Partial SID information from the SID frame otherwise scheduled for transmission.

Half burst stealing flags:
Set to 1

Result:

Acceptable.

6.5.5 Setting stealing flag for unintentionally transmitted bits and modifying training sequence for Dummy Bursts

Test configuration:

Sent on C0:
Dummy bursts using new (ninth) training sequence.

Stealing flag on C0:
Set to 1

Half burst filling bits:
Dummy burst mixed bits

Half burst stealing flags:
Set to 1

Result:

Acceptable; This configuration gave marginally the best performance of all tested.

6.5.6 Sending partial SID information on C0

Test configuration:

Sent on C0:
Part SID frames

Stealing flag on C0:
Set to 0

Half burst filling bits:
Partial SID information from the SID frame otherwise scheduled for transmission.

Half burst stealing flags:
Set to 0

Result:

Acceptable for DCS 1 800.

Annex A: Amendment Request 08.08 - 021 R4: Information on channel in use in HO REQUEST

NOTE: This annex A reflects the Amendment Request 08.08 - 021 R4 which was approved by SMG#15 and is part of the GSM 08.08 version 4.9.0.

A.3.1.5.1.1 Generation of the HANDOVER REQUIRED message

Generation of the HANDOVER REQUIRED message can be for the following reasons:

- The BSS has detected that a radio reason exists for a handover to occur.

- The MSC has initiated a handover candidate enquiry procedure, and this MS is currently a candidate.

- A cell change is required at call setup due to congestion, e.g. directed retry.

The HANDOVER REQUIRED message contains the following information elements:

- Message Type;
- Cause;
- Cell Identifier List (preferred).

It should also contain the "Current channel" information element.

Subclause 3.2.1.9. gives coding details of the above message.

The "Cause" field indicates the reason for the HANDOVER REQUIRED message e.g. "uplink quality poor" or "response to MSC invocation" in the case of traffic reasons indicated by the MSC.

If present the "Response Request" Information Element indicates, that the BSS requires an indication if the HANDOVER REQUIRED message does not result in a HANDOVER COMMAND message.

If the BSS wants to change the CIC due to a channel change, the BSS sends a HANDOVER REQUIRED message with the cause "switch circuit pool" and the "circuit pool list" information element. The "circuit pool list" information element will allow the BSS to indicate to the MSC from which circuit pool or pools the new CIC should be chosen.

The "Cell Identifier List (preferred)" shall identify "n" preferred cells. The identified cells are given in order of preference. The algorithm by which the BSS produces this list is Operator dependent and is not addressed in this Technical Specification. The "n" number of preferred cells is a parameter set by O&M and shall range from 1 to 16. If "n" number of cells cannot be identified, then only as many as are available shall be encoded and sent (as specified in subclause 3.2.2.27).

It is mandatory for the BSS to be able to produce this "Cell Identifier List (preferred)". The sending of this list is controlled by the O&M parameter "n". It is mandatory for the MSC to be able to receive and interpret this Information Element.

The HANDOVER REQUIRED message shall be updated and repeated by the BSS with a periodicity of T7 until:

- A HANDOVER COMMAND message is received from the MSC, or;

- A RESET message is received, or;

- The reason for the original HANDOVER REQUIRED message disappears e.g. the MS transmission improves, or;

- All communication is lost with the MS as defined in GSM 04.08, and the transaction is abandoned, or;

- The transaction ends, e.g., call clearing.

A.3.1.5.2 Handover Resource allocation

This procedure has been defined to allow the MSC to request resources from a BSS in a manner similar to that used for the assignment case. However it does not result in the transmission of any messages over the radio interface, only in the reservation of the resource identified at the BSS, which awaits access of a MS on the reserved channel. These reserved resources are then indicated back to the MSC.

In order to support this procedure the MSC sets up a BSSAP SCCP connection to the BSS. This connection is then used to support all BSSAP messages related to this dedicated resource.

A.3.1.5.2.1 Operation of the procedure

The correct operation of the handover resource allocation procedure is as follows:

The MSC sends a HANDOVER REQUEST message to the new BSS (note 1) from which it requires radio resources. This message contains details of the resource that is required. If the requested resource is for speech or data it also indicates the terrestrial resource that shall be used between the MSC and the BSS. The type of channel required can be different from the type of channel in use, e.g. in the case of directed retry. The description of the resource can either specify it completely, or give the BSS some freedom in the selection. The message may also specify the channel in use.

On receipt of this message the new BSS shall choose a suitable idle radio resource.

The management of priority levels - relating to the Information Element "Priority" within the HANDOVER REQUEST message - is implementation dependent, under operator control.

If queuing is managed, new requests which cannot be served immediately are put in the queuing file according to the indicated priority levels.

(Refer to subclause 3.1.17 for Queuing Procedure)

As a further operator option, the pre-emption indicators may (alone or along with the priority levels) be used to manage the pre-emption process, which may lead to the forced release or forced handover of lower priority connections.

However, the pre-emption indicators (refer to subclause 3.2.2.18), if given in the HANDOVER REQUEST, shall be treated on a per connection basis as follows:

- the last received "Pre-emption Vulnerability" indicator and priority levels shall prevail;

- if the "Pre-emption Capability" bit is set to "1", then this allocation request can trigger the running of the pre-emption procedure;

- if the "Pre-emption Capability" bit is set to "0", then this allocation request cannot trigger the pre-emption procedure;

- if the "Pre-emption Vulnerability" bit is set to "1", then this connection is vulnerable and shall be included in the pre-emption process or procedure and as such may be subject to forced release or forced handover;

- if the "Pre-emption Vulnerability" bit is set to "0", then this connection is not vulnerable to pre-emption and shall not be included in the pre-emption process and as such may not be subject to forced release or forced handover;

- if no Priority Information Element has been received, both "Pre-emption Capability" and "Pre-emption Vulnerability" bits shall be regarded as set to "0".

If a radio resource is available then this will be reflected back to the MSC in a HANDOVER REQUEST ACKNOWLEDGE message. The HANDOVER REQUEST ACKNOWLEDGE message sent by the new BSS shall contain the radio interface message HANDOVER COMMAND within its "Layer 3 Information" Information Element. This "Layer 3 Information" (which is in fact the RR-Layer 3 HANDOVER COMMAND) is transferred by the controlling MSC to the old BSS using the BSSMAP message HANDOVER COMMAND also within the Information Element "Layer 3 Information" of that BSSMAP message. The old BSS then sends to the MS over the radio interface the RR-Layer 3 HANDOVER COMMAND message. Information about the appropriate new channels and a handover reference number chosen by the new BSS are contained in the HANDOVER COMMAND. Knowledge of the channel in use at the old BSS allows the new BSS to minimize the size of the HANDOVER COMMAND message (i.e. to decide whether the mode of the first channel IE need not be included in the HANDOVER COMMAND).

NOTE: The new BSS and the old BSS may be the same.

When several circuit pools are present on the BSS MSC interface, the "circuit pool" information field shall be included in the HANDOVER REQUEST ACKNOWLEDGE. The "circuit pool" field will indicate to the MSC the circuit pool of the CIC given in the HANDOVER REQUEST message.

The sending of the HANDOVER REQUEST ACKNOWLEDGE by the new BSS to the MSC ends the Handover Resource Allocation procedure. The Handover Execution procedure can now proceed and this is given in subclause 3.1.5.3.

The new BSS shall then take all necessary action to allow the MS to access the radio resource that the new BSS has chosen, this is detailed in the GSM 05 series of Technical Specifications. If the radio resource is a traffic channel then the new BSS shall at this point switch it through to the terrestrial resource indicated in the HANDOVER REQUEST message, and the necessary transcoding/rate adaption/encryption equipment enabled as detailed in GSM 04.08.

The optimum procedure for switching through to the target cell at the MSC is not defined in these Technical Specifications.

A.3.2.1.8 HANDOVER REQUEST

This message is sent from the MSC to the BSS via the relevant SCCP connection to indicate that the MS is to be handed over to that BSS.

Information element	Reference	Direction	Type	Len
Message type	3.2.2.1	MSC-BSS	M	1
Channel type	3.2.2.11	MSC-BSS	M	5
Encryption information	3.2.2.10	MSC-BSS	M	3-n
Classmark information 1 or	3.2.2.30	MSC-BSS	M#	2
Classmark information 2	3.2.2.19	MSC-BSS	M#	4-5
Cell identifier (serving)	3.2.2.17	MSC-BSS	M	5-10
Priority	3.2.2.18	MSC-BSS	O	3
Circuit identity code	3.2.2.2	MSC-BSS	O##	3
Downlink DTX flag	3.2.2.26	MSC-BSS	O*	2
Cell identifier (target)	3.2.2.17	MSC-BSS	M	3-10
Interference band to be used	3.2.2.21	MSC-BSS	O	2
Cause	3.2.2.5	MSC-BSS	O	3-4
Classmark information 3	3.2.2.20	MSC-BSS	O**	3-14
Current channel	3.2.2.49	MSC-BSS	O§	2

* This element may be included in the case of a speech TCH, and only in this case. If not included, this has no impact on the DTX function in the BSS.

** This element is included if the MSC has received such information.
# One of these two elements is sent.

This element is included when the channel type Information Element indicates speech or data, and only in those cases.

§ This element is included at least when the message is sent as a reaction to reception of a HANDOVER REQUIRED message containing a "Current channel" information element. In this case it shall be equal to the received element.

Typical Cause values are:

uplink quality;
uplink strength;
downlink quality;
downlink strength;
distance;
better cell;
response to MSC invocation;
O and M intervention;
directed retry;
switch circuit pool.

A.3.2.1.9 HANDOVER REQUIRED

This message is sent from the BSS to the MSC to indicate that for a given MS which already has a dedicated radio resource assigned, a handover is required for the reason given by the cause element.

The message is sent via the BSSAP SCCP connection associated with the dedicated resource.

Information element	Reference	Direction	Type	Len
Message type	3.2.2.1	BSS-MSC	M	1
Cause	3.2.2.5	BSS-MSC	M	3-4
Response request	3.2.2.28	BSS-MSC	O	1
Cell identifier list (preferred)	3.2.2.27	BSS-MSC	M	2n+3 to 7n+3
Circuit pool list	3.2.2.46	BSS-MSC	O*	V
Current channel	3.2.2.49	BSS-MSC	O**	2

* Shall be included when cause "switch circuit pool".
** This information element should always be included.

Typical Cause values are:

uplink quality;
uplink strength;
downlink quality;
downlink strength;
distance;
better cell;
response to MSC invocation;
O&M intervention;
directed retry;
switch circuit pool.

Element Identifier Coding	Element name	Reference
0000 0001	Circuit identity code	3.2.2.2.
0000 0010	Reserved	*
0000 0011	Resource available	3.2.2.4.
0000 0100	Cause	3.2.2.5.
0000 0101	Cell identifier	3.2.2.17.
0000 0110	Priority	3.2.2.18.
0000 0111	Layer 3 header information	3.2.2.9.
0000 1000	IMSI	3.2.2.6.
0000 1001	TMSI	3.2.2.7.
0000 1010	Encryption information	3.2.2.10.
0000 1011	Channel type	3.2.2.11.
0000 1100	Periodicity	3.2.2.12.
0000 1101	Extended resource indicator	3.2.2.13.
0000 1110	Number of MSs	3.2.2.8.
0000 1111	Reserved	*
0001 0000	Reserved	*
0001 0001	Reserved	*
0001 0010	Classmark information type 2	3.2.2.19.
0001 0011	Classmark information type 3	3.2.2.20.
0001 0100	Interference band to be used	3.2.2.21.
0001 0101	RR Cause	3.2.2.22.
0001 0110	Reserved	*
0001 0111	Layer 3 information	3.2.2.24.
0001 1000	DLCI	3.2.2.25.
0001 1001	Downlink DTX flag	3.2.2.26.
0001 1010	Cell identifier list	3.2.2.27.
0001 1011	Response request	3.2.2.28.
0001 1100	Resource indication method	3.2.2.29.
0001 1101	Classmark information type 1	3.2.2.30.
0001 1110	Circuit identity code list	3.2.2.31.
0001 1111	Diagnostic	3.2.2.32.
0010 0000	Layer 3 message contents	3.2.2.35.
0010 0001	Chosen channel	3.2.2.33.
0010 0010	Total resource accessible	3.2.2.14.
0010 0011	Cipher response mode	3.2.2.34.
0010 0100	Channel needed	3.2.2.36.
0010 0101	Trace type	3.2.2.37.
0010 0110	TriggerId	3.2.2.38.
0010 0111	Trace reference	3.2.2.39.
0010 1000	TransactionId	3.2.2.40.
0010 1001	Mobile identity	3.2.2.41.
0010 1010	OMCId	3.2.2.42.
0010 1011	Forward indicator	3.2.2.43.
0010 1100	Chosen encryption algorithm	3.2.2.44.
0010 1101	Circuit pool	3.2.2.45.
0010 1110	Circuit pool list	3.2.2.46.
0010 1111	Time indication	3.2.2.47.
0011 0000	Resource situation	3.2.2.48.
0011 0001	Current channel	3.2.2.49.

* Information Element codes marked as "reserved are reserved for use by previous versions of this interface specification.

A.3.2.2.49 CURRENT CHANNEL

This Information Element contains a description of the channel allocated to the MS.

It is coded as follows:

8	7	6	5	4	3	2	1	
Element identifier								octet 1
Channel mode				Channel				octet 2

The channel mode field is coded as follows:

Bit 8765
0000 signalling only
0001 speech (full rate or half rate)
0011 data, 12.0 kbit/s radio interface rate
0100 data, 6.0 kbit/s radio interface rate
0101 data, 3.6 kbit/s radio interface rate

All other values are reserved.

The channel field is coded as follows:

Bit 4321
0001 SDCCH
1000 Full rate TCH
1001 Half rate TCH

All other values are reserved.

History

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