Technical Specification Group Services and System Aspects **TSGS#12(01)0304**
Meeting #12, Stockholm, Sweden, 18-21 June 2001

Source: **TSG-SA WG4**

Title: **CRs to TS 06.12 and TS 46.012 on Corrections of the formula for averaging Xmax (from Phase 2 to Release 4)**

Document for: **Approval**

Agenda Item: **7.4.3**

The following CRs, agreed at the TSG-SA WG4 meeting #17, are presented to TSG SA #12 for approval.

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
06.12	A001		2	Corrections of the formula for averaging Xmax	F	4.0.4	S4	TSG-SA WG4#17	S4-010297
06.12	A002		R96	Corrections of the formula for averaging Xmax	A	5.0.1	S4	TSG-SA WG4#17	S4-010298
06.12	A003		R97	Corrections of the formula for averaging Xmax	A	6.0.1	S4	TSG-SA WG4#17	S4-010299
06.12	A004		R98	Corrections of the formula for averaging Xmax	A	7.0.1	S4	TSG-SA WG4#17	S4-010300
06.12	A005		R99	Corrections of the formula for averaging Xmax	A	8.0.1	S4	TSG-SA WG4#17	S4-010301
46.012	001		REL-4	Corrections of the formula for averaging Xmax	A	4.0.0	S4	TSG-SA WG4#17	S4-010302

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4-8 June 2001

Tdoc S4 (01)0297

CR-Form-v3

CHANGE REQUEST

⌘ **06.12** **CR** **A001** ⌘ rev **-** ⌘ Current version: **4.0.4** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of the formula for averaging Xmax
Source:	⌘	TSG-SA WG4
Work item code:	⌘	GSM maintenance
Date:	⌘	08-June-2001
Category:	⌘	**F**
Release:	⌘	2

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

Use one of the following releases:

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

Reason for change:	⌘	The formula for averaving the Xmax parameters is not completely correct.
Summary of change:	⌘	The formula for averaving the Xmax parameters is corrected.
Consequences if not approved:	⌘	Incorrect formula, will cause confusion and questions.

Clauses affected:	⌘	2.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

2 Functions on the transmit side

The comfort noise evaluation algorithm uses the unquantized block amplitude and Log Area Ratio (LAR) parameters of the full rate speech encoder, defined in section 4.2.15 and 4.2.6 of GSM 06.10. These parameters give information on the level and the spectrum of the background noise, respectively.

The evaluated comfort noise parameters are encoded into a special frame, called a SID (Silence Descriptor) frame, for transmission to the receive side.

The SID frame also serves to initiate the comfort noise generation on the receive side, as a SID frame is always sent at the end of a speech burst, ie before the radio transmission is cut.

The scheduling of SID or speech frames on the radio path is described in GSM 06.31.

2.1 Background acoustic noise evaluation

The comfort noise parameters to be encoded into a SID frame are calculated over N=4 consecutive frames marked with VAD=0, as follows:

The Log Area Ratio parameters shall be averaged according to the equation:

$$\text{mean}(LAR(i)) = 1/N \sum_{n=1}^{N} LAR[j-n](i) \qquad i = 1,2..8$$

where LAR[j](i) is the i'th Log Area Ratio coefficient of the current frame j and j-n indicates the previous frames.

The block amplitude parameter shall be averaged according to the equation:

$$\text{mean}(xmax) = 1/(4N) \sum_{n=1}^{N} \sum_{i=1}^{4} xmax[j-n](i) \qquad \sout{i = 1,2,..8}$$

where xmax[j](i) is the block amplitude in subsegment i of the current frame. The SID frame containing these averaged parameters is passed to the Radio Subsystem instead of frame number j.

2.2 SID-frame encoding

The SID-frame encoding algorithm exploits the fact that only some of the 260 bits in a frame are needed to code the comfort noise parameters. The other bits can then be used to mark the SID-frame by means of a fixed bit pattern, called the SID code word.

The log area ratio coefficients are replaced by the mean (LAR(i)) values defined above and encoded as described in GSM 06.10.

The block amplitude values are replaced by the mean (xmax) value defined above, repeated four times inside the frame and encoded as described in GSM 06.10.

The SID code word consists of 95 bits which are all zero. The bits of the SID code word are inserted in the SID field defined as the positions of those 95 bits of the encoded RPE-pulses Xmc, which are in the error protection class I (see GSM 05.03, table 2).

The remaining bits in the SID frame are set to zero. The use of these bits is for further study.

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4-8 June 2001

Tdoc S4 (01)0298

CR-Form-v3

CHANGE REQUEST

⌘ **06.12** **CR** **A002** ⌘ rev **-** ⌘ Current version: **5.0.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of the formula for averaging Xmax
Source:	⌘	TSG-SA WG4
Work item code:	⌘	GSM maintenance
Date:	⌘	08-June-2001
Category:	⌘	**A**
Release:	⌘	R96

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
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Use one of the following releases:

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R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	The formula for averaving the Xmax parameters is not completely correct.
Summary of change:	⌘	The formula for averaving the Xmax parameters is corrected.
Consequences if not approved:	⌘	Incorrect formula, will cause confusion and questions.

Clauses affected:	⌘	5.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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

5 Functions on the transmit side

The comfort noise evaluation algorithm uses the unquantized block amplitude and Log Area Ratio (LAR) parameters of the full rate speech encoder, defined in subclauses 4.2.15 and 4.2.6 of GSM 06.10 [3]. These parameters give information on the level and the spectrum of the background noise, respectively.

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The scheduling of SID or speech frames on the radio path is described in GSM 06.31 [4].

5.1 Background acoustic noise evaluation

The comfort noise parameters to be encoded into a SID frame are calculated over N=4 consecutive frames marked with VAD=0, as follows:

The Log Area Ratio parameters shall be averaged according to the equation:

$$mean(LAR(i)) = \frac{1}{N}\sum_{n=1}^{N} LAR[j-n](i) \qquad i = 1,2..8$$

where LAR[j](i) is the i'th Log Area Ratio coefficient of the current frame j and j-n indicates the previous frames.

The block amplitude parameter shall be averaged according to the equation:

$$mean(x_{max}) = \frac{1}{(4N)}\sum_{n=1}^{N}\sum_{i=1}^{4} x_{max}[j-n](i) \qquad \text{~~i = 1,2,..8~~}$$

where $x_{max}[j](i)$ is the block amplitude in sub-segment i of the current frame. The SID frame containing these averaged parameters is passed to the Radio Subsystem instead of frame number j.

5.2 SID-frame encoding

The SID-frame encoding algorithm exploits the fact that only some of the 260 bits in a frame are needed to code the comfort noise parameters. The other bits can then be used to mark the SID-frame by means of a fixed bit pattern, called the SID code word.

The log area ratio coefficients are replaced by the mean (LAR(i)) values defined above and encoded as described in GSM 06.10 [3].

The block amplitude values are replaced by the mean (x_{max}) value defined above, repeated four times inside the frame and encoded as described in GSM 06.10 [3].

The SID code word consists of 95 bits which are all zero. The bits of the SID code word are inserted in the SID field defined as the positions of those 95 bits of the encoded RPE-pulses Xmc, which are in the error protection class I (see GSM 05.03 [2], table 2).

The remaining bits in the SID frame are set to zero. The use of these bits is for further study.

3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4-8 June 2001

Tdoc S4 (01)0299

CR-Form-v3

CHANGE REQUEST

⌘ **06.12** **CR** **A003** ⌘ rev **-** ⌘ Current version: **6.0.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of the formula for averaging Xmax
Source:	⌘	TSG-SA WG4
Work item code:	⌘	GSM maintenance
Date:	⌘	08-June-2001
Category:	⌘	**A**
Release:	⌘	R97

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
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Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	The formula for averaving the Xmax parameters is not completely correct.
Summary of change:	⌘	The formula for averaving the Xmax parameters is corrected.
Consequences if not approved:	⌘	Incorrect formula, will cause confusion and questions.

Clauses affected:	⌘	5.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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5 Functions on the transmit side

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The Log Area Ratio parameters shall be averaged according to the equation:

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The SID code word consists of 95 bits which are all zero. The bits of the SID code word are inserted in the SID field defined as the positions of those 95 bits of the encoded RPE-pulses Xmc, which are in the error protection class I (see GSM 05.03 [2], table 2).

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3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4-8 June 2001

Tdoc S4 (01)0300

CR-Form-v3

CHANGE REQUEST

⌘ **06.12** **CR** **A004** ⌘ rev **-** ⌘ Current version: **7.0.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of the formula for averaging Xmax
Source:	⌘	TSG-SA WG4
Work item code:	⌘	GSM maintenance
Date:	⌘	08-June-2001
Category:	⌘	**A**
Release:	⌘	R98

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

Use one of the following releases:

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

Reason for change:	⌘	The formula for averaving the Xmax parameters is not completely correct.
Summary of change:	⌘	The formula for averaving the Xmax parameters is corrected.
Consequences if not approved:	⌘	Incorrect formula, will cause confusion and questions.

Clauses affected:	⌘	5.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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5 Functions on the transmit side

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5.1 Background acoustic noise evaluation

The comfort noise parameters to be encoded into a SID frame are calculated over N=4 consecutive frames marked with VAD=0, as follows:

The Log Area Ratio parameters shall be averaged according to the equation:

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The block amplitude parameter shall be averaged according to the equation:

$$mean(x_{max}) = \frac{1}{(4N)}\sum_{n=1}^{N}\sum_{i=1}^{4} x_{max}[j-n](i) \qquad \text{~~i = 1,2,..8~~}$$

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3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4-8 June 2001

Tdoc S4 (01)0301

CR-Form-v3

CHANGE REQUEST

⌘ **06.12** **CR** **A005** ⌘ rev **-** ⌘ Current version: **8.0.1** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of the formula for averaging Xmax
Source:	⌘	TSG-SA WG4
Work item code:	⌘	GSM maintenance
Date:	⌘	08-June-2001
Category:	⌘	**A**
Release:	⌘	R99

Use one of the following categories:
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B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
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R97	*(Release 1997)*
R98	*(Release 1998)*
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REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	The formula for averaving the Xmax parameters is not completely correct.
Summary of change:	⌘	The formula for averaving the Xmax parameters is corrected.
Consequences if not approved:	⌘	Incorrect formula, will cause confusion and questions.

Clauses affected:	⌘	5.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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3GPP TSG-SA WG4 Meeting #17
Naantali, Finland, 4-8 June 2001

Tdoc S4 (01)0302

CR-Form-v3

CHANGE REQUEST

⌘ **46.012** **CR** **001** ⌘ rev **-** ⌘ Current version: **4.0.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Correction of the formula for averaging Xmax
Source:	⌘	TSG-SA WG4
Work item code:	⌘	GSM maintenance
Date:	⌘	08-June-2001
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
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Summary of change:	⌘	The formula for averaving the Xmax parameters is corrected.
Consequences if not approved:	⌘	Incorrect formula, will cause confusion and questions.

Clauses affected:	⌘	5.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

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

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.

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

5 Functions on the transmit side

The comfort noise evaluation algorithm uses the unquantized block amplitude and Log Area Ratio (LAR) parameters of the full rate speech encoder, defined in clauses 4.2.15 and 4.2.6 of GSM 06.10 [3]. These parameters give information on the level and the spectrum of the background noise, respectively.

The evaluated comfort noise parameters are encoded into a special frame, called a SID (Silence Descriptor) frame, for transmission to the receive side.

The SID frame also serves to initiate the comfort noise generation on the receive side, as a SID frame is always sent at the end of a speech burst, i.e. before the radio transmission is cut.

The scheduling of SID or speech frames on the radio path is described in GSM 06.31 [4].

5.1 Background acoustic noise evaluation

The comfort noise parameters to be encoded into a SID frame are calculated over N=4 consecutive frames marked with VAD=0, as follows:

The Log Area Ratio parameters shall be averaged according to the equation:

$$mean(LAR(i)) = \frac{1}{N}\sum_{n=1}^{N} LAR[j-n](i) \qquad i = 1,2..8$$

where LAR[j](i) is the i'th Log Area Ratio coefficient of the current frame j and j-n indicates the previous frames.

The block amplitude parameter shall be averaged according to the equation:

$$mean(x_{max}) = \frac{1}{(4N)}\sum_{n=1}^{N}\sum_{i=1}^{4} x_{max}[j-n](i) \qquad i = 1,2,..8$$

where $x_{max}[j](i)$ is the block amplitude in sub-segment i of the current frame. The SID frame containing these averaged parameters is passed to the Radio Subsystem instead of frame number j.

5.2 SID-frame encoding

The SID-frame encoding algorithm exploits the fact that only some of the 260 bits in a frame are needed to code the comfort noise parameters. The other bits can then be used to mark the SID-frame by means of a fixed bit pattern, called the SID code word.

The log area ratio coefficients are replaced by the mean (LAR(i)) values defined above and encoded as described in GSM 06.10 [3].

The block amplitude values are replaced by the mean (x_{max}) value defined above, repeated four times inside the frame and encoded as described in GSM 06.10 [3].

The SID code word consists of 95 bits which are all zero. The bits of the SID code word are inserted in the SID field defined as the positions of those 95 bits of the encoded RPE-pulses Xmc, which are in the error protection class I (see GSM 05.03 [2], table 2).

The remaining bits in the SID frame are set to zero. The use of these bits is for further study.