Source:	**TSG-S4 (Codec Working Group) Chairman**
Title:	**Status Report at TSG-SA#6**
Document for:	**Information and Decision**
Agenda Item:	**5.4.1**

TSG-S4 Codec Working Group Status Report

Executive Summary

TSG-S4 (Codec Working Group) held two plenary and one joint meeting with TSG-R1 since TSG-SA#5.

All missing AMR Technical Specifications (all TS) were completed and are presented to TSG-SA#6 for approval. This includes the AMR ANSI C-Code (3G TS 26.073), the AMR Test Sequences (GSM 06.74 and 3G TS 26.074), the AMR Frame Structure specification (3G TS 26.101) and the specification for the mapping over the Iu interface (3G TS 26.102). In addition, 7 CRs on R98 and R99 specifications are presented for approval.

Following discussions with N2, S4 agreed to prepare a specification listing the speech codec under SMG and 3GPP responsibility. This specification is required to implement Transcoder Free Operation as defined by TSG-CN, using the BICC protocol. This specification (3G TS 26.103) is also forwarded to TSG-SA for approval.

The only missing deliverable for this work item is the 3G AMR characterization Report. The corresponding subjective listening will be competed in 1Q00.

All S4 Specifications/Report regarding the support of Circuit-Switched H.324 based Multimedia Telephony service are already approved and considered stable. 5 CRs are presented in relation to this work item.

It was also decided to include in this work item the production of a floating-point version of the AMR C-Code. This version of the code targeting PC and Multimedia applications must demonstrate equivalent performances with the fixed-point implementation. The required evaluation and verification phase should be completed by March 2000.

The specification for 3G Terminal Acoustic Performances for Telephony is also presented to TSG-SA for approval. S4 propose to complete the work on the corresponding tests specification by June 2000, using recent developments in this area in ITU-T and other regional standard committees (ETSI STQ).

Tandem Free Operation is suffering from a lack of resources and support. A preliminary AMR Change Request on the Release 98 TFO specification (08.62) is presented for approval. However, the update of the TFO specifications to support AMR is still not considered complete. S4 proposes to delay the availability of the 3GPP specification to June 2000.

The development of the AMR Wideband Speech Codec is now under way. A preliminary set of performance requirements included in Annex C of this document is presented to TSG-SA for information. The current project plan is targeting December 2000 for the production of the corresponding specifications. Some members consider this objective too aggressive. A related liaison was sent to TSG-SA.

Following a request from T1P1 to evaluate the impact of a proposed solution to provide emergency call to the Hearing Impaired, S4 reviewed the key characteristics of the proposal and sent a response liaison to T1P1.

Annex B contains a copy of the slides presented to the TSG-SA#6 plenary. Annex B contains an updated status list of TSG-S4 deliverables.
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1. Introduction

The 3GPP Codec Working Group held two plenary meetings and one joint meeting with TSG-R1 since the last TSG-SA#5. TSG-S4#6 took place on October 18-22, 1999, hosted by Texas Instruments in St-Laurent-du-Var, France. TSG-S4#7 took place on December 6-10, 1999, hosted by Matsushita-Panasonic, NEC, Nippon Ericsson and Toshiba in Kyoto, Japan. Both plenary meetings were held simultaneously with SMG11 plenary. The joint meeting with TSG-R1 took place in Les Mesnuls, France on November 19, 1999 hosted by Nortel networks. It was dedicated to discussion on aspects of the support of the speech service over the Radio Networks (Compatibility with Blind Rate Format Detection, Transport of Codec Mode Command in case of Tandem Free Operation with GSM, Characterization Test Conditions).

Following the recent approval by SMG to transfer the AMR and TFO specifications to 3GPP, TSG-S4 has approved a number of Change Requests to existing GSM Release 98 specifications. These CRs are forwarded to TSG-SA for approval.

Meetings held:

TSG-S4#7/SMG11#12:	October 18-22	hosted by Texas Instruments in St-Laurent-du-Var, France.
Joint TSG-R1/S4:	November 19	hosted by Nortel Networks in Les Mesnuls, France
TSG-S4#8/SMG11#13:	December 6-10	hosted by Matsushita-Panasonic, NEC, Nippon Ericsson and Toshiba in Kyoto, Japan

Next Meetings dates:

TSG-S4#9/SMG11#14:	January 24-28	host required.
TSG-S4#10/SMG11#15:	May 15-19	host required.
TSG-S4#11/SMG11#16:	September 4-8	host required.
TSG-S4#12/SMG11#17:	October 23-27	host required.
TSG-S4#13/SMG11#18:	November 20-24	host required.

Annex A contains a copy of the slides presented at TSG-SA#6.

Annex B contains an updated list of TSG-S4 deliverables providing status information and target approval dates for each specification.

Annex C contains version 1.0 of the AMR Wideband Performance Requirements presented to TSG-SA for information.

2. Release 99: Mandatory Speech Codec - AMR

The complete status list of the AMR specifications is provided in the following table.

The AMR Frame structure specification (3G TS 26.101) and AMR Interface to Iu specification (3G TS 26.102) were completed taking into account the conclusion of the joint meeting with R1. Specifically, the allocation of Class A bits for the different AMR modes provide were set in both specifications to be compatible with the Blind Rate Format Detection. It should be noted that this allocation in the 3G TS 26.102 is provided as an example only since the definition of sub-flows for each Radio Format Combination is an operator matter. The 3G TS 26.102 defines the detailed mapping of the generic AMR Frame Structure defined in 3G TS 26.101 onto the Iu interface, according to the principles specified by 3G TS 25.415 (Iu User Plane Protocols Specification). Both specifications are considered stable and are presented to TSG-SA#6 for approval.

TSG-S4 approved the AMR sequences specifications R98 (GSM TS 06.74) and R99 (3G TS 26.074) following the review of the performances of the VAD Option 2 Test sequences. Both are presented to TSG-SA#6 for approval.

The AMR ANSI-Code specification (3G TS 26.073) was aligned on the last update of the R98 version (GSM 06.73) and is presented to TSG-SA#6 for approval.

Following an exchange of liaison statements with TSG-N2, it was decided to produce a new deliverable (3G TS 26.103) to define the list of existing codec under the responsibility of SMG and 3GPP. This specification is a key item in the definition of Out-of-Band-Transcoder-Control and Transcoder Free Operation using the BICC protocol

(under TSG-CN responsibility). The document defines the set of parameters associated to the different codec used in GSM and 3GPP networks (FR, HR, EFR and AMR). This new specification is also considered stable enough to be presented to TSG-SA#6 for approval.

Deliverable	Title	Latest version	Comment/Status	Approval
TS 26.071	AMR Speech Codec; General Description	3.0.1	Stable. Presented for approval at TSG-SA#4 in Tdoc SP-99244	Approved
TS 26.090	AMR Speech Codec; Transcoding functions	3.0.1	Stable. Presented for approval at TSG-SA#4 in Tdoc SP-99245	Approved
TS 26.073	AMR Speech Codec; ANSI C-Code	2.0.0	Stable. Presented for approval at TSG-SA#6 in Tdoc **SP-99560**	**TSG-SA#6**
TS 26.074	AMR Speech Codec; Test Sequences	2.0.0	Stable. Presented for approval at TSG-SA#6 in Tdoc **SP-99559**	**TSG-SA#6**
TS 26.091	AMR Speech Codec; Error Concealment of lost frames	3.0.1	Stable. Presented for approval at TSG-SA#4 in Tdoc SP-99246	Approved
TS 26.092	AMR Speech Codec; Comfort noise aspects	3.0.1	Stable. Presented for approval at TSG-SA#4 in Tdoc SP-99247	Approved
TS 26.093	AMR Speech Codec Source Controlled Rate operation	3.0.1	Stable. Presented for approval at TSG-SA#4 in Tdoc SP-99248	Approved
TS 26.094	AMR Speech Codec Voice Activity Detector	2.0.0	Stable. Presented for approval at TSG-SA#5 in Tdoc SP-99353	TSG-SA#5
TS 26.101	AMR Speech Codec Frame Structure	2.0.0	Stable. Presented for approval at TSG-SA#6 in Tdoc **SP-99562**	**TSG-SA#6**
TS 26.102	AMR Speech Codec Interface to Iu and Uu	2.0.0	Stable. Presented for approval at TSG-SA#6 in Tdoc **SP-99563**	**TSG-SA#6**
TS 26.103	Speech Codec List for GSM and UMTS	2.0.0	Stable. Presented for approval at TSG-SA#6 in Tdoc **SP-99564**	**TSG-SA#6**
TR 26.075	AMR Speech Codec Performances Characterization	1.0.0	Funding approved by PCG. Preparation of Test plan under way. Pending agreement on relevant Test Conditions. Test planned for 1Q00. Version 1.0.0 based on GSM 06.75 presented for information to SG-SA#6 in **SP-99561**	Approval Delayed to TSG-SA#7 (March 2000)

The only missing Release 99 deliverable for this Work Item is the Characterization Report, which should be updated once the corresponding subjective listening tests have been completed (1Q99). The required test plan is still under preparation. S4 and R1 reviewed potential 3G test conditions to include in the plan during their joint meting. This is activity is still not yet finalized.

A version 1.0.0 of the Characterization report derived from the GSM 06.75 (AMR Characterization Report) is presented for information.

7 Change Requests on AMR specifications included in **SP-99570** are presented to TSG-SA for approval (see list below).

S4 Tdoc.	Spec.	Ver.	CR	Rev.	Rel.	Subject
S4-99456	06.73	7.2.0	A020		R98	Correction to reset function in AMR decoder
S4-99523	06.75	7.0.0	A001		R98	Update of AMR Transmission Delay Figures
S4-99454R	06.93	7.2.0	A006	1	R98	Editorial clarifications concerning RATSCCH and RX/TX DTX handler synchronization at handover.
S4-99455R	06.93	7.2.0	A007	1	R98	Onset frame signaling by the TX RSS.
S4-99380	26.090	3.0.1	001		R99	Bit allocation of the adaptive multi-rate codec
S4-99392	26.091	3.0.1	001		R99	Use of random excitation when RX_NODATA and not in DTX.
S4-99538	26.093	3.0.1	001	2	R99	Alignment to GSM 06.93

3. Release 99: Codec for Circuit Switched H.324 Based Multimedia Telephony Service

An updated status list of all deliverables for this work item is provided below.

All S4 specifications on the support of Circuit Switched H.324M Based Multimedia Telephony service are now under change control and considered stable.

TSG-S4 agreed to complete this Work Item with the production a Floating Point C-Code of the AMR Speech Codec targeting PC and Multimedia applications. Preliminary benchmarks have shown significant speed gain for typical PC platform. Since the decoder part only represents a small part of the overall AMR speech codec, the floating point implementation will only cover the encoder. A first version of the code is being provided to organizations participating to the project. This version of the code must provide equivalent speech quality and must be compatible with the fixed-point implementation. Participating organizations will verify the correct operation and performances of this version. It was also decided that the specification will only be approved if this version is proven to be equivalent in quality to the fixed-point implementation. TSG-S4 proposes to complete this activity by March 2000 (see corresponding R99 Submission Form included in **SP-99575**.

Deliverable	Title	Latest Version	Comment/Status	Approval
TS 26.110	Codec(s) for Circuit Switched Multimedia Telephony Service General Description	3.0.1	Stable Presented for approval at TSG-SA#4 in Tdoc SP-99249	Approved
TS 26.111	Codec(s) for Circuit Switched Multimedia Telephony Service Modifications to H.324	3.0.1	Stable Presented for information at TSG-SA#4 in Tdoc SP-99250	Approved
TR 26.911	Codec(s) for Circuit Switched Multimedia Telephony Service Terminal Implementor's Guide	3.0.1	Stable Presented for approval at TSG-SA#4 in Tdoc SP-99251	Approved
TS 26.104	AMR Speech Codec; Floating Point C-Code	0.1.0	Software available under verification.	Completion planned for TSG-SA#7 (March 2000)

3 Change Requests included in **SP-99571** and listed below are presented to TSG-SA for approval.

S4 Tdoc.	Spec.	Ver.	CR	Rev.	Rel.	Subject
S4-99434R	26.111	3.0.2	002	2	R99	Specification of coding parameters for MPEG-4 video codec
S4-99514	26.111	3.0.2	003		R99	Transmission of MPEG-4 configuration information in 3G-324M
S4-99515R	26.911	3.1.0	003	2	R99	Disabling depth information for MPEG-4 video in 3G-324M terminals
S4-99513	26.911	3.1.0	004		R99	Error resilience improvements to using video in 3G-324M
S4-99516R	26.911	3.1.0	005	1	R99	Modification on MPEG-4 Visual implementation

4.Release 99: QoS for Audio and Multimedia Codecs

The complete list of deliverables for this work item is provided below. None is completed at this point.

Deliverable	Title	Latest Version	Comment/Status	Approval
TR 26.912	Quantitative performance evaluation of H.324 Annex C over 3G	1.0.0	Version based on ARIB test results Presented for Information at TSG-SA#4 in Tdoc SP-99254. New results to be included in new version.	Approval Delayed to TSG-SA#7 (March 2000)
TR 26.913	Quantitative performance evaluation of real-time packet switched multimedia services over 3G	0.0.1	Reviewed in TSG-S4#5 Inputs expected for next TSG-S4 meetings	Release 2000
TR 26.915	Transmission planning aspects of the services in 3G PLMN System	-	First draft now expected for 1/2000 (derived from GSM 03.50)	Approval Delayed to TSG-SA#7 (March 2000)

The only deliverables for this Work Item are Technical Reports providing performances data and considering typical network configurations for the different services and especially the speech service. No critical item or feature is supposed to be delivered.

Consequently, TSG-S4 proposes to keep the production of these reports as part of Release 99 and ask TSG-SA to approve to delay their availability and approval to TSG-SA#7 in March 2000 (see corresponding R99 Submission Form in **SP-99567** and **SP-99568**).

5. Release 99: 3G Audio-Visual Terminal Characteristics

In light of the small number of contributions for this Work Item, the list of deliverables was simplified by grouping the Terminal Acoustic Requirements specifications on one hand (Narrowband in Release 99 and Wideband in Release 2000) and the corresponding Test Specifications on the other end. The initially expected deliverables on Terminal Visual Characteristics were removed from the list of deliverables for Release 99.

The updated list of deliverables is provided in the table below.

Deliverable	Title	Latest Version	Comment/Status	Approval
TS 26.131	Terminal Acoustic Characteristics for Telephony; Requirements	2.0.0	Stable. Presented for approval at TSG-SA#6 in Tdoc **SP-99565**	TSG-SA#6
TS 26.132	Terminal Acoustic Characteristics for Telephony; Test Specifications	-	To be based on existing 2G specifications and relevant activities and recent developments in regional standard (ETSI STQ) and in ITU	Approval Delayed to TSG-SA#8 (June 2000)

A first specification containing the core 3G Terminal Acoustic Requirements for Telephony (3G TS 26.131) was produced using the relevant parts of the GSM 03.50 specification. This document is considered stable and is forwarded to TSG-SA for approval. It contains for the Narrowband telephony service only.

Following the model of previous decisions in TSG-SA and TSG-T, targeting the availability of Terminal Test specifications in the first half of 2000, after the completion and approval of the corresponding core specifications, TSG-S4 is targeting June 2000 for the availability of the Terminal Acoustic Test specification for Telephony (3G TS 26.132). TSG-S4 received multiple liaisons from ETSI STQ members on this issue, indicating that STQ is planning to edit new relevant specifications for this Work Item, in liaison with corresponding recent developments in ITU-T. It is critical to identify the most appropriate Test Methodology in the 3G environment and to take advantage of the work produced in other regional and international forum on this issue. Consequently, TSG-S4 ask TSG-SA to approve to delay the availability of the Terminal Acoustic Test Specification for Telephony to June 2000 in TSG-SA#8 (see corresponding R99 submission Form in **SP-99566**).

6. Tandem Free Operation in 3G systems and between 2G and 3G systems

The Tandem Free Operation Work Item is seriously impacted by the lack or resources, support and contributors. In average this item receives contributions from 2 organizations/individuals, the same individual being also involved in discussions on Transcoder Free Operation and TFO impact on the Iu interface.

As a result, it was not possible to complete this work on time for the approval of Release 99. To provide more visibility to the work already done, a preliminary CR for the introduction of AMR in the Release 98 TFO specification (GSM 08.62) is forwarded to TSG-SA#6 for approval. This work is still not considered complete, but key modifications were included in the specifications to cope with speech codecs with complex configuration like AMR. These modifications were prepared taking into account the message format for the BICC protocol, used to establish Transcoder Free Operation, and trying to have a much commonality as possible between TrFO and TFO message formats. Because of this approach, it is expected that once the Release 98 TFO definition is completed, the transfer and production of the corresponding Release 99 specification should be quite straightforward.

Consequently, TSG-S4 ask TSG-SA to approve to delay the production of the 3G specification to TSG-SA#8 in

June 2000 (see corresponding R99 Submission Form in **SP-99569**) This proposal assumes that the Work Item will receive a more significant support in the future.

A new list of deliverables for this Work Item is provided in the table below.

Deliverable	Title	Latest Version	Comment/Status	Approval
TS 22.053	Tandem Free Operation of speech codecs; Stage 1 service description	0.1.1	Evolution of GSM 02.53 Sent to TSG-S1 for review	tbd
TR 26.920	Architectural Model for the 3G Transcoders	0.1.1	Sent to TSG-S2 for comments. Necessity of this report still tbd	tbd
TS 28.062	Technical Specification for Tandem Free Operation of 2G and 3G networks	-	Do be derived from GSM 08.62 (R98) once finalized for AMR.	Approval Delayed to TSG-SA#8 (June 2000)

The sole Change Request on GSM 08.62 in included in **SP-99572**.

S4 Tdoc.	Spec.	Ver.	CR	Rev.	Rel.	Subject
S4-99499	08.62	7.0.0	A001		R98	Introduction of AMR in 08.62

7. Release 2000: Codec(s) for Wideband Telephony services

The development and selection of the AMR Wideband speech codec is progressing significantly.

A preliminary set of Performances Requirements was agreed and is provided to TSG-SA for information (included in Annex C of this report).

Similarly, a set of Design Constraints has been established and should be approved at the next TSG-S4 meeting.

The current Project Plan has been established with the objective to complete the AMR Wideband Speech Codec specifications on time for the approval of Release 2000 in December 2000. The principal milestones of this project plan are:

-   Test Plan for the complete project (all phases) to be completed for March 2000
-   Completion of Qualification or first phase of the selection by June 2000
-   Completion of the selection phase by September 2000
-   Approval of the specifications in December 2000

Few organizations have expressed some concerns that this development schedule was too aggressive and seemingly not in line with the consideration given to a Wideband Speech service in other 3GPP groups. A liaison statement was sent to this purpose to TSG-SA (included in **SP-99573**).

At this time 9 candidates/consortium have expressed some interest in participating in the selection process.

This large number of candidates will require a qualification or a pre-selection phase.

TSG-S4 also agreed that all candidates would have to contribute to the full cost of the project, including the Characterization Phase. The complete project cost has been estimated at 1M$ or 1Meuros. The level of participation to the last phases for candidates eliminated in the early stages of the process is still to be defined.

Finally TSG-S4 received a communication from ITU-T SQ16 Q20, proposing a close collaboration between ITU-T, 3GPP and 3GPP2 on their respective Wideband codec development process. S4 has already considered this proposal and is planning to send a response back before the next ITU-T meeting in February 2000. S4 welcome the ITU-T proposal for a closer collaboration, but believe that it could be difficult to establish a single combined development project. S4 will rather propose to continue to exchange information on our respective project with the possibility to agree on one harmonized solution rather than an harmonized standard. Some of the ITU requirements (existence of rates at 16 kbit/s and 24 kbit/s for example) were found restrictive and likely to introduce additional and undesirable complexity to the final 3GPP solution. As a consequence of this requirement and in order to close the gap between the ITU and S4 sets of performance requirement, S4 agreed on a new design constraint requiring that the candidates provide 2 modes capable of operating at 16 kbit/s and 24 kbit/s.

S4 will also ask ITU if solutions operating at rates slightly below these two rates would also be available for its own development. S4 will finally provide the existing 3GPP agreed AMR Wideband Performance Requirements, Design Constraints and Project development plan for ITU consideration.

8. Miscellaneous

Following a request from T1P1 to evaluate the impact of a Lucent proposal to provide emergency services to the hearing impaired, S4 had a comprehensive presentation of the corresponding proposal to improve the compatibility of the existing codecs (EFR and AMR) with TTY equipment.

After this presentation a Liaison was drafted in response to the T1P1 request. It is forwarded to TSG-SA for information in **SP-99574**. In the liaison, S4 indicate that further action in that matter would require directions from SA and/or S1.

TSG-S4 CODEC Working Group

Status Report

TSG-SA#6
December 15-17, 1999
Nice, France

Alain Ohana
TSG-S4 Chairman
GSM North America, T1

3GPP TSG-S4

TSG-S4 Documents

- SP-99557   TSG-S4 Status Report

- SP-99558   GSM TS 06.74 v2.0.0 (AMR Test Sequences)
- SP-99559   3G TS 26.074 v2.0.0 (AMR Test Sequences)
- SP-99560   3G TS 26.073 v2.0.0 (AMR ANSI C-Code)
- SP-99561   3G TR 26.075 v1.0.0 (AMR Characterization Report)
- SP-99562   3G TS 26.101 v2.0.0 (AMR Frame Structure)
- SP-99563   3G TS 26.102 v2.0.0 (AMR Interface to Iu)
- SP-99564   3G TS 26.103 v2.0.0 (Codec List for GSM & UMTS)
- SP-99565   3G TS 26.131 v2.0.0 (Acoustic Terminal Requir.)

3GPP TSG-S4

TSG-S4 Documents

- SP-99566   3G TS 26.132 R99 Submission Form
- SP-99567   3G TR 26.912 R99 Submission Form
- SP-99568   3G TR 26.915 R99 Submission Form
- SP-99569   3G TS 28.062 R99 Submission Form
- SP-99575   3G TS 26.104 R99 Submission Form

- SP-99570   7 CRs on AMR
- SP-99571   5 CRs on 3G-324M Specifications
- SP-99572   1 CR (R98) on TFO

- SP-99573   Response LS to T1P1 on "Requirements for Telephony Support for the Hearing Impaired"
- SP-99574   LS to TSG-SA on Wideband Speech System Aspects

3GPP TSG-S4

Meetings Schedule

- **3 Meetings since TSG-SA#5**
  - TSG-S4#7/SMG11#12: October 18-22, St-Laurent-du-Var, France hosted by Texas Instruments
  - Joint R1/S4: November 19, Les Mesnuls, France hosted by Nortel Networks
  - TSG-S4#8/SMG11#13: December 6-10, Kyoto, Japan hosted by Matsushita, NEC, Nippon Ericsson & Toshiba
- **Next Meetings Schedule: All Joint Meetings with SMG11**
  - TSG-S4#9: January 24-28   host required
  - TSG-S4#10: May 15-19   host required
  - TSG-S4#11: September 4-8   host required
  - TSG-S4#12: October 23-27   host required
  - TSG-S4#13: November 20-24   host required
- **Meetings Statistics (increasing load)**
  - ~50-75 Participants, 1 week, >100 Documents

3GPP TSG-S4

Highlights

AMR Speech Codec

- – All missing specifications forwarded to TSG-SA#6 for approval
- – Characterization Tests planned for 1Q00

■ Low Codec for Multimedia Telephony Service:

- – CS H.324 Based: All S4 specifications under change control
- – Work Item extended with production/verification of Floating Point AMR C-Code for PC and Multimedia applications

■ 3G Audio-Visual Terminal Characteristics

- – Requirement Specification presented to TSG-SA#6 for approval
- – Test Specification planned for June 2000

■ Tandem Free Operation

- – 3G TFO specification not yet completed

■ Wideband Speech Codec (R2000)

- – Agreement on Key Performance Requirements/Design Constraints

3GPP TSG-S4

Release 99: AMR Speech Codec

- Key discussions with R1 & R3 on AMR Frame structure and Interface to Iu during Joint Meeting
    - > Compatibility with Blind Rate Format Detection
    - > Definition of Sub-flows and mapping over Iu interface
    - > Compatibility with TFO (Transport of Codec Mode Command)
    - > Update of AMR Frame Structure Specification (3G TS 26.101)
    - > Completion of AMR Interface to Iu specification providing AMR frame mapping over Iu interface (3G TS 26.102)
- 3 other specifications presented for approval
    - AMR Test Sequences (R98 and R99): GSM 06.74 & 3G TS 26.074 including VAD Option Sequences
    - AMR C-Code: 3G TS 26.073
- 7 R98 & R99 CRs on previously approved specifications

3GPP TSG-S4

Release 99: AMR Speech Codec

- Only one missing deliverable:
  - 3G TR 26.075 (Characterization Phase Report): Pending execution Characterization Tests.
  - Version 1.0.0 based on GSM 06.75 presented to TSG-SA for information

- Characterization Phase
  - On-going discussion with R1 on most appropriate Test conditions.
  - Tests to be performed in 1Q2000

- Key on-going discussions with N2 on preparation of Specification of 'Codec List for GSM and UMTS' for support of Out-of-Band-Transcoder-Control and Transcoder Free Operation using BICC protocol
  - Codec List specification (3G TS 26.103) presented to TSG-SA#6 for approval

3GPP TSG-S4

Release 99: AMR Speech Codec

Specification	Title	Last Version	Status
3G TS 26.071	General Description	3.0.1	ö
3G TS 26.090	Transcoding Functions	3.0.1	ö
3G TS 26.073	ANSI C-Code	2.0.0	SP-99560
3G TS 26.074	Test Sequences	2.0.0	SP-99559
3G TS 26.091	Error Concealment of lost frames	3.0.1	ö
3G TS 26.092	Comfort Noise Aspects	3.0.1	ö
3G TS 26.093	Source Controlled Rate Operation	3.0.1	ö
3G TS 26.094	Voice Activity Detection	3.0.0	ö
3G TS 26.101	Frame Structure	2.0.0	SP-99562
3G TS 26.102	Interface to Iu	2.0.0	SP-99563
3G TS 26.103	Codec List for GSM & UMTS	2.0.0	SP-99564
3G TR 26.075	Characterization Phase Report	1.0.0	SP-99561(Version 1.0.0) Completion TSG-SA#7

Work Item almost Completed

3GPP TSG-S4

Release 99: Codec for Multimedia Telephony Service

- CS H.324 Based (3G 324) Multimedia Telephony Service
  - All S4 Specifications/Report under Change Control and fairly stable
  - 2 CRs on 26.111 and 3 CRs on 26.911 TS 26.911 (non critical)
- No R99 deliverable expected for Packet Based Multimedia Telephony Service
- Work Item extended to prepare and evaluate a Floating Point version of AMR C-Code
  - Targeted at PC and Multimedia applications
  - Significant gain in execution speed on typical PC platform
  - Code available for evaluation by contributing organizations
  - Code to be tested for equivalence with fixed point implementation
  - Specifications to be approved after completion of performance verification
  - Item proposed for completion by March 99 as part of Release 99

3GPP TSG-S4

Release 99: Codec for Multimedia Telephony Service & QoS for Speech and Multimedia Codec

Specification	Title	Last Version	Status
Codec for CS Multimedia Telephony Service:			
3G TS 26.110	General Description	3.0.1	ü
3G TS 26.111	Modifications to H.324	3.0.1	ü
3G TR 26.911	Implementor's Guide	3.0.1	ü
3G TS 26.104	AMR Floating Point C-Code	0.1.0	Approval delayed to TSG-SA#7
QoS for Speech and Multimedia Codec:			
3G TR 26.912	Quantitative Evaluation of H.324 Annex C over 3G	1.0.0	Approval delayed to TSG-SA#7
3G TR 26.913	Quantitative Evaluation of Real-Time Packet Multimedia services over 3G	-	Release 2000
3G TR 26.914	Transmission Planning Aspects of services in 3G PLMN systems	-	Approval delayed to TSG-SA#7

No critical item missing

3GPP TSG-S4

3G Terminal Acoustic Characteristics

- Reduced number of deliverables

- Key exchange with T1 and ETSI STQ for the preparation of the 3G Terminal Acoustic Test Specifications

- Requirement Specification prepared on the basis of relevant parts of GSM 03.50
  - Presented to TSG-SA#6 for approval (3G TS 26.131)

- Tests Specification to be prepared for June 2000
  - Agreement on most appropriate and most reliable Test Procedures for 3G environment
  - Using on-going activity/recent developments in ITU-T and ETSI STQ
  - Preliminary version expected for 1Q00

Specification	Title	Last Version	Status
3G TS 26.131	Terminal Acoustics Characteristics for Telephony; Requirements	2.0.0	SP-99565
3G TS 26.132	Terminal Acoustics Characteristics for Telephony; Tests Specification	-	Approval delayed to TSG-SA#8

3GPP TSG-S4

Tandem Free Operation

- Preliminary CR on Introduction of AMR in Release 98 TFO specification (GSM 08.62) presented for approval
  - Item still not considered completed
  - Critical lack of resources and contributions (usually only 2 regular contributors)
  - Same persons are also involved in discussions on BICC, Transcoder Free Operation, TFO support in 3GPP2, finalization of support of AMR over Iu interface
  - Procedure/message coding prepared for maximum commonality with Transcoder Free Operation
- Release 99 TFO specification (3G TS 28.062) will be based on Release 98 GSM specification once it is considered stable
  - Significant risk of further delay with current support level

Specification	Title	Last Version	Status
3G TS 28.062	Tandem Free Operation	-	Approval delayed to June 2000

3GPP TSG-S4

Release 2000: AMR Wideband Speech Codec

- Significant progress in preparation of AMR Wideband Speech Codec Selection
- Agreement on key Performance Requirements
  - Presented to TSG-SA#6 for Information
- Good Progress in defining Design Constraints
- 9 candidates/consortium identified
- Agreement reached on participation to overall project funding, including characterization (~1M$) by all candidates
- Current schedule targeting completion on time for approval of Release 2000 in December 2000
  - Concerns expressed by some members that schedule might be too aggressive
  - Liaison sent to TSG-SA on Wideband Speech service
- Received Communication from ITU-T SG16 Q20 on possible collaboration for harmonization of selected solutions

3GPP TSG-S4

Documents Presented for Approval

Document	Specification	Version	Title
SP-99558	GSM TS 06.74	2.0.0	AMR Speech Codec: Test Sequences
SP-99559	3G TS 26.074	2.0.0	AMR Speech Codec: Test Sequences
SP-99560	3G TS 26.073	2.0.0	AMR Speech Codec: ANSI C-Code
SP-99562	3G TS 26.101	2.0.0	AMR Speech Codec: Frame Structure
SP-99563	3G TS 26.102	2.0.0	AMR Speech Codec: Interface to Iu & Uu
SP-99564	3G TS 26.103	2.0.0	Codec List for GSM and UMTS

Document	Specification	Version	Title
SP-99565	3G TS 26.131	2.0.0	Terminal Acoustic Characteristics for Telephony

Delayed completion:

Document	Specification	Title	Proposed Completion Date
SP-99566	3G TS 26.132	Terminal Acoustic Characteristics for Telephony; Tests Specification	June 2000
SP-99567	3G TR 26.912	Quantitative Evaluation of H.324M over 3G Networks	March 2000
SP-99568	3G TR 26.915	Transmission aspects of Speech service in 3G networks	March 2000
SP-99569	3G TS 28.062	Tandem Free Operation	June 2000
SP-99575	3G TS 26.104	AMR Speech Codec: Floating Point C-Code	March 2000

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Change Requests Presented for Approval

SP-99570; CRs on AMR

S4 Tdoc.	Spec.	Ver.	CR	Rev.	Rel.	Subject
S4-99456	06.73	7.2.0	A020		R98	Correction to reset function in AMR decoder
S4-99523	06.75	7.0.0	A001		R98	Update of AMR Transmission Delay Figures
S4-99454R	06.93	7.2.0	A006	1	R98	Editorial clarifications concerning RATSCCH and RX/TX DTX handler synchronization at handover.
S4-99455R	06.93	7.2.0	A007	1	R98	Onset frame signaling by the TX RSS.
S4-99380	26.090	3.0.1	001		R99	Bit allocation of the adaptive multi-rate codec
S4-99392	26.091	3.0.1	001		R99	Use of random excitation when RX_NODATA and not in DTX.
S4-99538	26.093	3.0.1	001	2	R99	Alignment to GSM 06.93

SP-99571; CRs on 3G-324M

S4 Tdoc.	Spec.	Ver.	CR	Rev.	Rel.	Subject
S4-99434R	26.111	3.0.2	002	2	R99	Specification of coding parameters for MPEG-4 video codec
S4-99514	26.111	3.0.2	003		R99	Transmission of MPEG-4 configuration information in 3G-324M
S4-99515R	26.911	3.1.0	003	2	R99	Disabling depth information for MPEG-4 video in 3G-324M terminals
S4-99513	26.911	3.1.0	004		R99	Error resilience improvements to using video in 3G-324M
S4-99516R	26.911	3.1.0	005	1	R99	Modification on MPEG-4 Visual implementation

SP-99572; CRs on TFO

S4 Tdoc.	Spec.	Ver.	CR	Rev.	Rel.	Subject
S4-99499	08.62	7.0.0	A001		R98	Introduction of AMR in 08.62

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Documents Presented for Information Liaisons

Document	Spec.	Ver.	Title
SP-99561	TR 26.075	1.0.0	AMR Speech Codec: Characterization Report

Document	Title
SP-99557 Annex B	TSG-S4 Deliverables
SP-99557 Annex C	AMR Wideband Performance Requirements

Document	Liaison To	Title
SP-99573	T1P1	Response to the T1P1 Liaison on "Requirements for Telephony Support for the Hearing Impaired" cc TSG-SA
SP-99574	TSG-SA	Liaison to TSG-SA on Wideband Speech System Aspects

3GPP TSG-S4

Source:	**TSG-S4**
Title:	**Updated List of Deliverables at TSG-SA#6**
Document for:	**Information**

This document contains in Annex 1 an updated list of TSG-S4 deliverables following TSG-S4#8 (December 15-17, 1999).

The list is updated before each TSG-SA meeting to take into account any progress in the production of the specifications and/or newly identified deliverables.

Bold Tdoc numbers refer to documents presented to the TSG-SA#6 plenary.

Deliverable	Title	Features completed/under study	Editor	Date for approval	WI Rapporteur	Comment/Status
TS 26.071	AMR Speech Codec; General Description	None	Erik Ekudden Ericsson	Approved at TSG-SA#4	Erik Ekudden Ericsson	Version 3.0.1 as approved by TSG-SA#4 in Tdoc SP-99244
TS 26.090	AMR Speech Codec; Transcoding functions	None	Erik Ekudden Ericsson	Approved at TSG-SA#4	Erik Ekudden Ericsson	Version 3.0.1 as approved by TSG-SA#4 in Tdoc SP-99245. 1CR presented to TSG-SA#6 in **SP-99570**
TS 26.073	AMR Speech Codec; ANSI C-Code	None	Erik Ekudden Ericsson	Baseline: TSG-SA#5 Release 99: TSG-SA#6	Erik Ekudden Ericsson	Version 2.0.0 presented for approval at TSG-SA#6 in Tdoc **SP-99560**
TS 26.074	AMR Speech Codec; Test Sequences	Evaluation of VAD2 Test Sequences completed.	Erik Ekudden Ericsson	Release 99: TSG-SA#6	Erik Ekudden Ericsson	Version 2.0.0 presented for approval at TSG-SA#6 in Tdoc **SP-99559**
TS 26.091	AMR Speech Codec; Error Concealment of lost frames	None	Erik Ekudden Ericsson	Approved at TSG-SA#4	Erik Ekudden Ericsson	Version 3.0.1 as approved by TSG-SA#4 in Tdoc SP-99246.1CR presented to TSG-SA#6 in **SP-99570**
TS 26.092	AMR Speech Codec; Comfort noise aspects	None	Erik Ekudden Ericsson	Approved at TSG-SA#4	Erik Ekudden Ericsson	Version 3.0.1 as approved by TSG-SA#4 in Tdoc SP-99247
TS 26.093	AMR Speech Codec Source Controlled Rate operation	Updated and aligned on GSM 06.93	Erik Ekudden Ericsson	Approved at TSG-SA#4	Erik Ekudden Ericsson	Version 3.0.1 as approved by TSG-SA#4 in Tdoc SP-99248. 1CR presented to TSG-SA#6 in **SP-99570**
TS 26.094	AMR Speech Codec Voice Activity Detector	None	Jari Hagqvist Nokia	Approved at TSG-SA#5	Erik Ekudden Ericsson	Version 3.0.0 as approved by TSG-SA#4 in Tdoc SP-99353
TS 26.101	AMR Speech Codec Frame Structure	Updated and deeply revised after Joint S4/R1 meeting	Jari Hagqvist Nokia	Baseline: TSG-SA#4 Release 99: TSG-SA#6	Erik Ekudden Ericsson	Version 2.0.0 presented for approval at TSG-SA#6 in Tdoc **SP-99562**
TS 26.102	AMR Speech Codec Interface to Iu and Uu	Content finalized with R3	Frederic Gabin Nortel Networks	Release 99: TSG-SA#6	Erik Ekudden Ericsson	Version 2.0.0 presented for approval at TSG-SA#6 in Tdoc **SP-99563**
TS 26.103	Speech Codec List for GSM and UMTS	New deliverable for BICC protocol and Transcoder Free Operation	Karl Hellwig Ericsson	Release 99: TSG-SA#6	-	Version 2.0.0 presented for approval at TSG-SA#6 in Tdoc **SP-99564**
TS 26.104	AMR Speech Codec; Floating Point C-Code	New deliverable for PC and Multimedia application (WI-2). Software available, under verification and evaluation	Petri Haavisto Nokia	Release 99, but approval proposed for TSG-SA#7 **(March 2000)**	Barry Aronson Toshiba	Draft version 0.1.0 (text only) available in S4-99485
TR 26.075 (Replaces TS 26.901)	AMR Speech Codec Performances Characterization	Preparation of test plan for Characterization in 3G Channels, identification of Host and Listen. Labs Dependency: Agreement on Channel conditions to test and production of Error Patterns	Alain Ohana GSM North America	Release 99, but approval proposed for TSG-SA#7 **(March 2000)**	Erik Ekudden Ericsson	55kEuro Funding accepted by PCG Preparation of Test Plan through SMG11/S4 SQ Sub-group. Actual Tests expected for end 99 or 1Q00 Version 1.0.0 based on GSM 06.75 presented for information at TSG-SA#6 in Tdoc **SP-99561**
TS 26.110	Codec(s) for Circuit Switched Multimedia Telephony Service General Description	None	Barry Aronson Toshiba	Approved at TSG-SA#4	Barry Aronson Toshiba	Version 3.0.1 as approved by TSG-SA#4 in Tdoc SP-99249
TS 26.111	Codec(s) for Circuit Switched Multimedia Telephony Service Modifications to H.324	None	Hirokazu Tanaka Toshiba	Approved at TSG-SA#4	Barry Aronson Toshiba	Version 3.0.2 following TSG-SA#5. 2 CRs presented to TSG-SA#6 in Tdoc **SP-99571**
TS 26.112	Codec(s) for Circuit Switched Multimedia Telephony Service Call Set Up Requirements	Withdrawn. Content transferred in relevant CN specifications	Harri Honko Nokia	-	-	Version 1.0.0 presented for information at TSG-SA#3 in Tdoc SP-99204 Version 1.1.0 reviewed in TSG-S4#5 (S4-99177) and sent to TSG-N1,N2 N3 to transfer content in existing CN Specs.

Deliverable	Title	Features completed/under study	Editor	Date for approval	WI Rapporteur	Comment/Status
TR 26.911	Codec(s) for Circuit Switched Multimedia Telephony Service Terminal Implementor's Guide	None	Petri Haavisto Nokia	Approved at TSG-SA#4	Barry Aronson Toshiba	Version 3.1.0 following TSG-SA#5 3 CRs presented to TSG-SA#6 in Tdoc **SP-99571**
TR 26.912	Quantitative performance evaluation of H.324 Annex C over 3G	To be completed with additional results.	Olle Franceschi, Ericsson	Release 99, but approval proposed for TSG-SA#7 **(March 2000)**	Harri Honko Nokia	Version 1.0.0 presented for Information at TSG-SA#4 in Tdoc SP-99254
TR 26.913	Quantitative performance evaluation of real-time packet switched multimedia services over 3G	-	Harri Honko Nokia	Release 2000: TSG-SA#10	Harri Honko Nokia	Version 0.0.1 reviewed in TSG-S4#5 (S4-99160)
TR 26.915	Transmission planning aspects of the services in 3G PLMN System	To be derived from GSM03.50 and adapted to 3G environment.	Ian Goetz Tellabs	Release 99, but approval proposed for TSG-SA#7 **(March 2000)**	Harri Honko Nokia	First draft now expected for 1/2000
TS 26.131	Terminal Acoustic Characteristics for Telephony; Requirements	-	Paul Barrett BT	Release 99: TSG-SA#6	Ian Goetz Tellabs	Version 2.0.0 presented for approval at TSG-SA#6 in Tdoc **SP-99565**
TS 26.132	Terminal Acoustic Characteristics for Telephony; Test Specifications	Agreement on most appropriate Test Procedures	Ian Goetz Tellabs	Release 99, but approval proposed for TSG-SA#7 **(June 2000)**	Ian Goetz Tellabs	First draft expected for 1/2000
TS 26.133	Wide Band Speech Telephony Terminal Acoustic Characteristics	Withdrawn. Expected content to be included in TS 26.131				
TS 26.134	Wide Band Speech Telephony Terminal Acoustic Test Specification	Withdrawn. Expected content to be included in TS 26.132				
TS 26.135	Terminal Display and Camera Characteristics For H.324 Narrow-band Video Telephony Service	Withdrawn. No input received so far.				
TS 26.136	Terminal Display and Camera Test Specifications For H.324 Narrow-band Video Telephony Service	Withdrawn. No input received so far.				
TS 26.137	Terminal Display and Camera Characteristics For H.323 Narrow-band Video Telephony Service	Withdrawn. No input received so far.				
TS 26.138	Terminal Display and Camera Test Specifications For H.324 Narrow-band Video Telephony Service	Withdrawn. No input received so far.				
TS 22.053	Tandem Free Operation of speech codecs; Stage 1 service description	Evolution of GSM 02.53 Sent to TSG-S1 for review	No Editor Identified	Release 99, but delayed approval	No Rapporteur Identified	Version 0.1.1 reviewed in TSG-S4#4 (S4-99138)

Deliverable	Title	Features completed/under study	Editor	Date for approval	WI Rapporteur	Comment/Status
TR 26.920	Architectural Model for the 3G Transcoders	Version 0.1.1 sent to TSG-S2 for comments. Necessity of this report still pending	No Editor Identified	Release 99, but delayed approval	No Rapporteur Identified	Version 0.1.1 reviewed in TSG-S4#4 (S4-99147)
TS 28.062 (Replaces TS 26.121)	Technical Specification for Tandem Free Operation of 2G and 3G networks	Do be derived from GSM 08.62 (R98) once finalized for AMR.	No Editor Identified	Release 99, but approval proposed for TSG-SA#8 **(June 2000)**	William Navarro Nortel Networks	First draft now expected for 3/2000
TS 26.122	Technical Specification for Tandem Free Operation between 3G and 2G networks	Withdrawn. Expected content to be included in TS 28.062				

Work Programs:

WI-S4-1: Mandatory Speech Codec for Narrow band Speech Telephony Service/AMR
    Work Item completed except for 3G Characterization

WI-S4-2: Codec for Low bit rate Multimedia Telephony Service
    Work Item completed

WI-S4-3: QoS for Speech and Multimedia Codec
    Work Program version 0.2.0 presented for information at TSG-SA#3 (Tdoc SP-99130)
    Technical Report for H.323 Evaluation reported to Release 2000.

WI-S4-4: 3G Audio-Visual Terminal Characteristics
    No Work Program

WI-S4-5: Codec(s) for Wideband Telephony Services
    Project Plan Version 0.2 available in Tdoc S4-99488R

WI-S4-6: Tandem Free Operation in 3G systems and between 2G and 3G systems
    Work Program version 0.3.0 reviewed in TSG-S4#5 (Tdoc S4-99174)

Source:	**TSG-S4 / SMG11**
Title:	**AMR Wideband Performance Requirements (WB-3) Version 1.0**
Document for:	**Information**

Introduction

This document contains the performance requirements for the AMR WB speech coder.

The performance requirements are defined for static and dynamic error conditions as well as speaker dependency, tandeming and input level dependency.

The requirements define the minimum acceptable performance of the candidate algorithm. Candidates are expected to pass all of the requirements. Objectives identify areas where particular emphasis should be placed by candidate developers who have met the requirements.

1.   Definitions

The following systems/applications have been identified:

A   GSM full-rate traffic channel (22.8 kbit/s gross bit-rate) with an additional constraint of 16 kbit/s A-ter sub-multiplexing

B   GSM full-rate traffic channel (22.8 kbit/s gross bit-rate)

C   EDGE phase II channels

D   GSM multi-slot traffic channels (n*22.8 kbit/s)

E   3G UTRAN channels

Unless otherwise stated, the performance requirements and objectives shall be interpreted as "not worse than" the performance of the reference codec. The conditions "not worse than" and "better than" shall be determined statistically at the 95% confidence interval.

2.   Static conditions

Static conditions refer to channel cases where there is no shadowing. The speech quality of the codec modes applicable to the TCH-FS channel will be assessed over a range of C/I and background noise conditions to provide a 'family' of performance curves.

Requirements and objectives are specified for clean speech and background noise. The requirements and objectives for the TCH-FS traffic channels under static test conditions are specified in Table 1.

For AMR WB bit-rates exceeding 22.8 kbit/s, the requirement for speech and speech in background noise is G.722 at 64 kbit/s.

C/I	Application A		Application B	
	Performance requirement	**Performance objective**	**Performance requirement**	**Performance objective**
no errors	better than G.722-48k	G.722-56k	G.722-56k	G.722-64k
19 dB	better than G.722-48k		G.722-56k	
16 dB	G.722-48k		G.722-48k	
13 dB	G.722-48k		G.722-48k	

Table 1a: Clean speech requirements under static test conditions.

C/I	Application A		Application B	
	Performance requirement	**Performance objective**	**Performance requirement**	**Performance objective**
no errors	G.722-48k	G.722-56k	G.722-56k	G.722-64k
19 dB	G.722-48k		G.722-48k	
16 dB	G.722-48k		G.722-48k	
13 dB	G.722-48k		G.722-48k	

Table 1b: Background noise requirements under static test conditions.

The AMR WB performance requirement for C/I values below 13dB is the following: the degradation in subjective performance with each 3dB reduction in C/I shall not be greater than the degradation in subjective performance demonstrated by EFR over the same C/I interval. The specific intervals of interest are 13dB to 10dB, 10dB to 7dB, and 7dB to 4dB. [The test methodology for this requirement is FFS by SQ.]

3.   *Dynamic conditions*

Dynamic conditions refer to channel cases where shadowing is present. Specifically derived channel profiles with varying C/I or C/N will be used.

The requirements for the TCH-FS 22.8 kbit/s traffic channels (applications A and B) under dynamic test conditions are specified in Table 2.

TCH-FS Full-Rate Channel	
Requirement for typical C/I conditions	Better than the EFR under the same conditions
Requirement for difficult C/I conditions ([typical conditions -6dB])	Same or better than the EFR under the same conditions

Table 2: Requirements under dynamic test conditions

4.   *Additional speech codec performance requirements and objectives*

The reference speech codecs for Applications A and B under tandeming, talker dependency, level dependency and language dependency conditions are specified in Table 3; the performance requirements and objectives under bit-rate switching and DTX are specified in Table 4; the performance requirements and objectives for DTMF, information tones and idle noise are specified in Table 5.

Tandeming performance and level dependency will be evaluated in the selection phase. It is anticipated that the other additional requirements will be evaluated in the characterisation phase.

Condition	Application A		Application B	
	Performance requirement	**Performance objective**	**Performance requirement**	**Performance objective**
Tandeming for clean speech signals (2 asynchronous encodings)	G.722-48k with 2 asynchronous encodings	G.722-56k with 2 asynchronous encodings	G.722-56k with 2 asynchronous encodings	G.722-64k with 2 asynchronous encodings
Low level input speech (-36dBov nominal input level)	better than G.722-48k with -36dBov nominal input level	G.722-56k with -36dBov nominal input level	G.722-56k with -36dBov nominal input level	G.722-64k with -36dBov nominal input level
High level input speech (-16dBov nominal input level)	better than G.722-48k with <u>-26dBov</u> nominal input level	G.722-56k with <u>-26dBov</u> nominal input level	G.722-56k with <u>-26dBov</u> nominal input level	G.722-64k with <u>-26dBov</u> nominal input level
Talker dependency	G.722-48k		G.722-56k	
Language dependency	G.722-48k		G.722-56k	

Table 3a: Additional performance requirements for clean speech signals for Applications A and B

Condition	Application A		Application B	
	Performance requirement	**Performance objective**	**Performance requirement**	**Performance objective**
Tandeming for speech signals with background noise (2 asynchronous encodings)	G.722-48k with 2 asynchronous encodings	G.722-56k with 2 asynchronous encodings	G.722-56k with 2 asynchronous encodings	G.722-64k with 2 asynchronous encodings

Table 3b: Additional performance requirements for speech signals with background noise for Applications A and B

Condition	Requirement	Objective
Switching between different AMR-WB bit-rates	No annoying artefacts	
Clean speech with DTX enabled	Performance with DTX disabled	
Speech and background noise with DTX enabled	Performance with DTX disabled	

Table 4: Additional performance requirements for speech signals (all applications)

Condition	Requirement	Objective
DTMF		Transparent transmission of DTMF.
Information tones	Recognisable as given information tone.	
Idle noise	-66dBm0 (unweighted)	
Music		G.722-56k (applies only to AMR-WB bit-rates exceeding 22.8 kbit/s)

Table 5: Requirements and objectives for speech codec performance with non-speech inputs

5.   Open Issues

This section lists open issues currently under discussion.

- Performance in tandem with other standards:
    - G.722 (selection and/or characterisation phase)
    - Other WB standards
    - NB standards (selection and/or characterisation phase)
- Performance under mode switching between NB and WB AMR
- Performance definition and testing for applications C, D and E (and during which phases these are to be addressed)

Document History

Version	Date	Comment
0.1	October 1999	Initial version
0.2	October 1999	ETSI-SMG11#12/3GPP-SA4#7
0.3	December 1999	ETSI-SMG11#13/3GPP-SA4#8
1.0	December 1999	Presented for Information to TSG-SA#6