Source:	**TSG-SA WG4 Chairman**
Title:	**TSG-SA WG4 Status Report at TSG-SA#12**
Document for:	**Information**
Agenda Item:	**7.4.1**

Executive Summary

Since TSG-SA#11, TSG-SA WG4 (Codec Working Group) has held one plenary meeting: SA4#17 (June 4th – 8th, 2001). In addition, one ad-hoc meeting on Packet Switched Multimedia has been held (April 9th – 10th, 2001).

AMR Wideband (AMR-WB) speech codec: AMR-WB codec characterisation Phase 1A has been completed. This phase covers testing of the codec without channel errors and also testing the performance in the GSM Full-Rate GMSK traffic channel. Phase 1B covering use of AMR-WB in 3G WCDMA channels is planned to be carried out later (to be completed by TSG-SA#14). Phase 2 covering AMR-WB use in EDGE 8-PSK channels will also be carried out later (after the channel codings are defined in TSG-GERAN). The results of Phase 1A characterisation verify the good performance of the AMR-WB codec. A draft version of TR 26.976 on AMR-WB Performance Characterisation (containing the Phase 1A results as well as results from the earlier Verification and Selection Phases) is presented for information to TSG-SA. SA4 asks TSG-SA#12 to approve the work of the listening and processing laboratories that participated in Phase 1A in order to authorise ETSI to pay the involved laboratories. The work to include AMR-WB into the in-band Tandem Free Operation of Speech Codecs (TS 28.062) has been started.

Multimedia Codecs and Protocols for Conversational Packet-Switched Services: As requested by SA4, Default Codecs specification (TS 26.235) was approved at TSG-SA#11 to Release 4. Since the specification belongs to Release 5 feature IMS (Provisioning of IP-based multimedia services), and requires introduction of IMS subsystem, SA4 requests from TSG-SA#12 revision of the approval of TS 26.235 to be for Release 5 (instead of Release 4).

Proposed Release 5 Work Item on "Extended Transparent End-to-end Packet Switched Streaming Service (PSS-E)" is brought for approval. This WI addresses more advanced streaming aspects than covered in Release 4 WI "Transparent End-to-end Packet Switched Streaming Service" (completed at TSG-SA#11). Prior to TSG-SA#12, SA4 has had dialogue on the content of the planned WI with other relevant WGs (SA1, SA2, SA3 and T2). Their comments and suggestions have been taken into account in the final WID proposal. PSS-E will be based on the Release 4 Streaming and should provide full backwards compatibility. The intended outputs are Release 5 versions of TSs 26.233 and 26.234. SA4 will keep the other WGs informed on the progress of the work (as was done during the development of Release 4 streaming), and will take into account the work carried out in the related WIs in the other WGs.

CRs: CRs are brought for approval to TSs 06.10/46.010, 06.12/46.012, 26.101, 26.104, 26.173, 26.174, 26.235, and 28.062

SA4 Vice-Chairman elections: Mr. Tomoyuki Ohya (NTT DoCoMo) was elected as SA4 Vice-Chairman at SA4#17.

Note: Annex B (separate file) of this report contains a copy of the slide presentation to TSG-SA#12.

1. Introduction

Since TSG-SA#11, TSG-SA WG4 (Codec Working Group) has held one plenary meeting SA4#17 in June. In addition, one Sub Working Group ad-hoc meeting (outside SA4 meetings) was held in April to progress the Packet Switched Multimedia (PSM) work.

Meetings held:
PSM SWG ad hoc #2:   Apr 9-10, 2001   hosted by Panasonic in Frankfurt, Germany
TSG-SA4#17:   Jun 4-8, 2001   hosted by Nokia in Naantali, Finland

Calendar of next SA4 (and SA4 SWG ad-hoc) meetings:
TSG-SA4#18:   Sep 3-7, 2001   to be hosted by Frauenhofer Institute in Erlangen, Germany
TFO SWG ad-hoc: Oct 11-12, 2001   to be hosted by Siemens in Munich, Germany
PSM SWG ad-hoc #3:   Oct 15-17, 2001 (tbc) host and venue to be defined
TSG-SA4#19:   Dec 3-7, 2001   to be hosted by NTT DoCoMo in Tokyo, Japan

Altogether 67 delegates participated in SA4#17. There were 141 documents for the meeting. Of the SWGs, the PSM SWG is clearly the largest as the number of participants.

Annex A of this document contains a list of all SA4 input documents to TSG-SA#12. Annex B (in a separate file) contains a copy of the slide presentation of SA4 progress report at TSG-SA#12. The input documents from SA4 to TSG-SA#12 are contained in Tdocs SP-0100301 until SP-0100311, and in Tdoc SP-0100281.

2. Progress in Release 5 Work items

2.1 AMR Wideband (AMR-WB) Speech Codec

AMR-WB speech codec Characterisation Phase 1A has been completed. This phase covers testing of codec performance without channel errors (application independent) and also testing of performance in the GSM Full-Rate GMSK traffic channel. Performance characterisation of AMR-WB in 3G WCDMA channel was postponed to Phase 1B due to lack of 3G Error Patterns in time. Phase 1B will be carried out after TSG-SA#12 and is preliminarily scheduled to be completed by TSG-SA#14. Phase 2 covering the use of AMR-WB in EDGE 8-PSK channels and in PS applications (conversational and streaming) will be carried out later when the 8-PSK channel codings become defined.

Table 1 shows a summary of all planned experiments for AMR-WB characterisation (including phases 1A, 1B and 2). The complete characterisation consists of 10 experiments. The first six experiments belong to Phase 1A. They have been carried out. Phase 1B contains experiments 7 and 8. Experiments 9 and 10 will be performed in Phase 2. A budget of 250 kEURO is available for the complete characterisation (funding from codec proponents that participated in the AMR-WB Selection Phase).

Table 1: Summary of AMR-WB characterisation phase experiments

Ph.	Exp.	Characterises systems:	Test type	Title	No. of test conditions	No. of languages
1A	1	All systems	ACR	Input levels and self-tandeming	56	2
	2	All systems	ACR	Interoperability Performance in Real World Wideband Scenarios.	56	2
	3	All systems	ACR	Interoperability Performance in Real World Narrowband Scenarios.	56	1
	4	All systems (GSM GMSK)	DCR	Performance of VAD/DTX/CNG Algorithm	40	1
	5	GSM GMSK	ACR	The Effect of Static Errors under Clean Speech Conditions.	48	2
	6a	GSM GMSK	DCR	The Effect of Background Noise 1 in Static C/I Conditions.	40	1
	6b	GSM GMSK	DCR	The Effect of Background Noise 2 in Static C/I Conditions.	40	1
1B	7a	3G (Note 1)	ACR	The Effect of Static Errors under Clean Speech Conditions.	56	1
	7b	3G (Note 1)	ACR	The Effect of Static Errors under Clean Speech Conditions.	56	1
	8a	3G (Note 1)	DCR	The Effect of Background Noise 3 in Static C/I Conditions.	48	1
	8b	3G (Note 1)	DCR	The Effect of Background Noise 4 in Static C/I Conditions.	48	1
	8c	3G (Note 1)	DCR	The Effect of Background Noise 5 in Static C/I Conditions.	48	1
2	9a	EDGE 8-PSK (Note 2)	ACR	EDGE Characterisation, FR/HR/QR-channel The Effect of Static Errors under Clean Speech Conditions, set 1	(tbd)	1
	9b	EDGE 8-PSK (Note 2)	ACR	EDGE Characterisation, FR/HR/QR-channel The Effect of Static Errors under Clean Speech Conditions, set 2	(tbd)	1

| 10 | PS-systems (Note 2) | ACR (tbd) | Testing for Packet-Switched (PS) conversational and streaming applications | (tbd) | 1 |
| | | | **Total Number of experiments:** | | 18 |

Note 1: Experiments 7 and 8 will be performed in Phase 1B.

Note 2: Experiments 9 and 10 will be performed in Phase 2. The detailed test plan for these experiments is FFS.

The intended applications of AMR-WB are:
- Application A: GSM full-rate traffic channel with an additional constraint of 16 kbit/s A-ter sub-multiplexing
- Application B: GSM full-rate traffic channel
- Application C: Circuit Switched EDGE/GERAN 8-PSK Phase II radio channels
- Application E: 3G UTRAN WCDMA radio channel

Phase 1A covered clean channel performance in all applications (A, B, C, E) and also channel performance in applications A and B.

Listening tests were carried out during April and May 2001. Seven laboratories participated in the testing: Lockheed-Martin Global Telecommunications (LMGT), British Telecom, Deutsche Telekom, Dynastat, France Télécom, Nokia and Nortel Networks. ARCON and LMGT acted as processing laboratories for the speech samples (including cross checking of processing). Testing was carried out in several languages: English (both UK and North American English), Finnish, French and German. See Table 2 for details of language and laboratory allocation during Phase 1A.

Phase 1A consisted of 6 main experiments covering input levels and self-tandeming, tandem with both narrowband and wideband codec standards, performance of Voice Activity Detection / Discontinuous Transmission / Comfort Noise Generation (VAD/DTX/CNG) and the effect of static errors in GSM Full-Rate GMSK channel. Testing in the GSM FR GMSK channel was carried out for both clean speech and for speech under background noise (with two types and levels of background noise).

Table 2: Allocation of listening and host laboratories to experiments in Phase 1A

			Host Lab		Cross-check Lab	
Exp.	**Noise**	**Language**	**LM**	**AR**	**LM**	**AR**
1	Quiet	En/Fi	BT(En)	NO(Fi)	NO(Fi)	BT(En)
2	Quiet	En/Fr	LM(En)	FT(Fr)	FT(Fr)	LM(En)
3	Quiet	En	DY(En)	-	-	DY(En)
4	Ofc, Str, Car(15), Caf	En	NN(En)	-	-	NN(En)
5	Quiet	Fr/Ge	FT(Fr)	DT(Ge)	DT(Ge)	FT(Fr)
6A	Car(15)	En	LM(En)	-	-	LM(En)
6B	Ofc	Fi	-	NO(Fi)	NO(Fi)	-

Legend: Noise types: Ofc: Office noise at 20 dB SNR; Str: Street noise at 15 dB SNR; Car(15): Static car noise at 15 dB SNR; Car(10): Static car noise at 10 dB SNR; Caf: cafeteria noise at 15 dB SNR; Languages: En: English; Fi: Finnish; Fr: French; Ge: German; Sp: Spanish; Laboratories: LMGT (Lockheed-Martin Global Telecommunications), AR (ARCON), BT (British Telecom), DT (Deutsche Telekom), DY (Dynastat), FT (France Télécom), NN (Nortel Networks), NO (Nokia)

The results of Phase 1A verify the good performance of the AMR-WB codec shown in the Selection Tests. The test results confirm that the performance requirements (of conditions relevant to Phase 1A) are met by the AMR-WB codec.

- The quality provided by the 7 highest AMR-WB modes (23.85, 23.05, 19.85, 18.25, 15.85, 14.25, 12.65 kbit/s) is equal to or better than ITU-T wideband codec G.722-64 (operating at 64 kbit/s). Results are consistent over all tested input levels and also in tandeming. The 8.85 kbit/s mode gives still quality equal to G.722-48 (operating at 48 kbit/s). The lowest mode 6.6 kbit/s provides quality which is lower than the quality of G.722-48, especially in tandeming and with high input level. Note that the two lowest modes have been developed to be used temporarily during severe channel errors. [Experiment 1]

- In tandem with other wideband codecs G.722-64, G.722-48 and 24 kbit/s G.722.1, the performance is independent of the combination order of AMR-WB with the other codecs. One exception was noted: G.722-48 followed by the AMR-WB codec results in significantly better quality than tandeming in the opposite order. (This may be a result of AMR-WB being able to mask some of the coding noise as the second codec.) [Experiment 2]

- In tandem with narrowband codecs AMR 12.2 and 7.4 kbit/s modes and 8 kbit/s G.729, AMR-WB offers similar performance as AMR 12.2 kbit/s mode, when the corresponding bit-rate mode of 12.65 kbit/s (or higher) is used in AMR-WB. Tandeming AMR-WB with narrowband codecs does not degrade the quality

much when compared to the single coding of the same narrowband codec, except for cases when the two lowest bit-rates of the AMR-WB codec are used (and also when AMR 7.4 kbit/s coding is used after the AMR-WB coding). [Experiment 3]

- Operation with VAD/DTX/CNG activated was statistically rated at least no worse than without VAD/DTX/CNG. This result supports the conclusion that the VAD/DTX/CNG operation is transparent to the listener. [Experiment 4]

- In GSM FR GMSK channel (with clean speech), AMR-WB provides good error robustivity. The quality better or equal to G.722-64 is achieved at about 11 dB C/I and above. The quality at least equal to G.722-56 is obtained for error rates at about 10 dB C/I and above. [Experiment 5]

- Under background noise (15 dB Car Noise and 20 dB Office Noise), AMR-WB provides in the GSM FR GMSK channel quality equal to or better than G.722-64 at C/I-ratios about 12 dB and above. AMR-WB gives quality equal to or better than G.722-56 at C/I-ratios about 10 dB and above. These results show that AMR-WB gives good performance also under the joint impact of background noise and channel errors. (Note that the two highest AMR-WB bit-rates were not included in the test as they are not targeted for GSM FR GMSK use). [Experiment 6]

The above summary is based on draft version of Technical Report on AMR-WB Characterisation (TR 26.976, v.0.3.0). Further analysis of results is ongoing in SA4, and will be completed for later versions of the TR.

The draft version of TR 26.976 (v.0.3.0) is presented for information in Tdoc SP-010302. This document contains the results from Characterisation Phase 1A (in Chapters 7-12). The TR contains also results from the Verification Phase (in Chapters 15-25) and from the Selection Phase (in Annex A). (SA4 has decided to include the Selection Phase results in the Characterisation TR, and therefore a separate TR on Selection Phase results is not needed.) SA4 asks TSG-SA#12 to approve the work of the processing and listening laboratories of the AMR-WB Characterisation Phase 1A to authorise ETSI to pay the involved laboratories.

Phase 1B characterisation is expected to be finalised by TSG-SA#14. A provisional schedule has been prepared:
- 31 August 2001   Error Patterns available to Processing Labs
- 3-7 September 2001   SA4#18
- mid-September 2001   Processing Labs expected to complete processing work
- 19 September 2001   Processing Lab reports to SA4 reflector
- 21 September 2001   Processing Lab approval by correspondence (at SA4 level)
- 24 - 27 September 2001 SA#13: Processing Lab work approval (at TSG-SA level)
- mid November 2001   Reports from Listening Labs to SA4 reflector
- 3 -7 December 2001   SA4#19: Listening Lab work approval (at TSG-SA4 level)
- 17 - 20 December 2001   SA#14: Listening Lab work approval (at TSG-SA level)

Table 3: Status list of AMR-WB codec specifications under SA4 responsibility

Deliverable	Title	Latest version	Comment/Status	Approval

Deliverable	Title	Latest version	Comment/Status	Approval
TS 26.171	AMR Wideband Speech Codec; General description	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010082.	(Approved at TSG-SA#11)
TS 26.173	AMR Wideband Speech Codec; C-source code	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010083.	(Approved at TSG-SA#11)
TS 26.174	AMR-WB speech codec; test sequences	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010084.	(Approved at TSG-SA#11)
TS 26.190	AMR Wideband Speech Codec; Transcoding Functions	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010085.	(Approved at TSG-SA#11)
TS 26.191	AMR Wideband Speech Codec; Error concealment of erroneous or lost frames	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010086.	(Approved at TSG-SA#11)
TS 26.192	AMR Wideband Speech Codec; CN for AMR Speech Traffic Channels	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010087.	(Approved at TSG-SA#11)
TS 26.193	AMR Wideband Speech Codec; Source Controlled Rate operation	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010088.	(Approved at TSG-SA#11)
TS 26.194	AMR Wideband Speech Codec; VAD for AMR Speech Traffic Channels	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010089.	(Approved at TSG-SA#11)
TS 26.201	AMR Wideband Speech Codec; Speech Codec Frame Structure	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010090.	(Approved at TSG-SA#11)
TS 26.202	AMR-WB speech codec; interface to Iu and Uu	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010091.	(Approved at TSG-SA#11)
TR 26.976	Wideband Speech Codec Performance Characterization	0.3.0	Characterisation Phase 1A carried out by TSG-SA#12. Draft TR v0.3.0 is provided for information at TSG-SA#12 in Tdoc SP-010302 Phase 1B planned to be performed by TSG-SA#14. Phase 2 schedule t.b.d	Approval expected at TSG-SA#14

CRs to the AMR-WB C-code (to correct some found minor bugs) and test sequences are presented for approval in Tdoc SP-010307. A CR updating the AMR-WB test sequences is presented for approval in Tdoc SP-010308. The work to include AMR-WB into the in-band Tandem Free Operation of Speech Codecs (TS 28.062) has been started.

2.2 Multimedia Codecs and Protocols for Conversational Packet-Switched Services

As requested by SA4, Default Codecs specification (TS 26.235) was approved at TSG-SA#11 to Release 4. Since the specification belongs to Release 5 feature IMS (Provisioning of IP-based multimedia services), and requires introduction of IMS subsystem, SA4 requests from TSG-SA#12 revision of the approval of TS 26.235 to be for Release 5 (instead of Release 4).

Table 4: Status list of specifications for Multimedia Codecs and Protocols for Conversational Packet Switched Services

Deliverable	Title	Latest Version	Comment/Status	Approval
TS 26.235	Packet Switched Conversational Multimedia Applications; Default Codecs	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010095.	Revision of approval for Release 5 requested at TSG-SA#12.
TR 26.xyz	Performance characterization of default codecs for PS conversational multimedia applications	-	-	TSG-SA#14
TS 26.xyz	Protocols for PS conversational multimedia applications	-	-	TSG-SA#14

2.3 Cellular Text Telephone Modem for Global Text Telephony (GTT)

All three Cellular Text Telephone Modem (CTM) specifications under the responsibility of SA4 were approved during TSG-SA#10 and TSG-SA#11. The agreements reached at GTT Workshop on 18-19 April 2001 should not have any impact on these TSs. SA4 is following the overall GTT work.

Table 5: Status list for GTT Specifications under the responsibility of SA4

Deliverable	Title	Latest Version	Comment/Status	Approval
TS 26.226	GTT Cellular Text Telephone Modem; General Description	2.0.0	Approved at TSG-SA#10 in Tdoc SP-000569.	(Approved at TSG-SA#10)
TS 26.230	GTT Cellular Text Telephone Modem; Transmitter C-code Description	2.0.0	Approved at TSG-SA#10 in Tdoc SP-000570.	(Approved at TSG-SA#10)
TS 26.231	GTT Cellular Text Telephone Modem; Minimum Performance Specification	2.0.0	Approved at TSG-SA#11 in Tdoc SP-010092.	(Approved at TSG-SA#11)

3. New Work Items

SA4 work on "Transparent End-to-end Packet Switched Streaming Service" was completed in time at TSG-SA#11 where Release 4 versions of TS 26.233 (Transparent End-to-End Packet Switched Streaming Service; General Description) and TS 26.234 (Transparent End-to-End Packet Switched Streaming Service; Protocols and codecs) were approved. These define a complete basic streaming service for Rel-4 (referred to as Simple Streaming). This includes definition of session set-up and control protocols, data transport protocols, media codecs, scene description, and interchange format with MMS. The definition of more advanced streaming service was left for later releases. (The Rel-4 specifications already refer to extended streaming to be developed for later releases.)

In Rel-5, there is a need to address more advanced streaming aspects than in Rel-4 (e.g., additional media types and enhanced codecs, up-streaming, interworking with MMS, capability exchange, interoperability with Internet, give consideration to digital rights management and security and charging aspects). Rel-5 would support all features defined for Rel-4 in a fully backwards compatible manner. As the extended streaming brings new advanced features, SA4 has prepared a new Rel-5 Work Item Description on "Extended Transparent End-to-end Packet Switched Streaming Service (PSS-E)". This is presented for approval in Tdoc SP-010311.

The WI objective is the standardization of the components of a mobile multimedia content delivery service, including streaming protocols, media transport protocols, multimedia codecs. Harmonization with existing and emerging 3GPP multimedia applications will be considered whenever possible. The intended outputs are Release 5 versions of Transparent End-to-End Packet-switched Streaming Services specifications TS 26.233 (General Description) and TS 26.234 (Protocols and codecs).

Prior to TSG-SA#12, SA4 has had dialogue on the content of the planned WI with the other relevant WGs (SA1, SA2, SA3 and T2). Their comments and suggestions have been taken into account in the final WID proposal. SA4 will keep the other WGs informed on the progress of the work (as was done during the development of Release 4 streaming), and will take into account the work carried out in the related WIs in the other WGs.

The proposed Work Item will cover:

Service optimisation: consideration of device capabilities and user preferences in the optimisation of multimedia content delivery

Enhanced transport aspects: consideration of improved robustness and flexibility in the delivery of multimedia content (adaptation to network conditions, adaptation to network type (GERAN, UTRAN), Enhanced streaming transport mechanisms, Up-streaming)

Multimedia media types: consideration of additional and enhanced media types and scene description (Graphics (2D, 3D), Synthetic Audio (e.g. MIDI), Enhanced audio and video codecs (e.g. higher levels and profiles and/or new codecs), Enhanced scene description (e.g., new features and/or functionality), Metadata)

Interworking with MMS: consideration of the various modes in which PSS-E may be utilised and the impact on other services and network elements (File download, Up-streaming, File formats)

Interoperability: consideration of interoperating with the Internet (File Formats, Codecs)

Commercial factors: consideration of the importance of rights management, security and charging aspects in the commercial implementation of PSS-E

The main responsibility is within SA4. However, SA4 intends to carry out the work in close collaboration with the relevant WGs.The work is linked to work carried out especially in SA1, SA2 and T2. Linked Work Items are IMS (SA1), end-to-end QoS for PS domain (SA2), and MMS (T2). Solutions developed in these related WIs will be taken into account in the SA4 work whenever possible. SA3 guidance on security and digital rights management will be taken into account. Also, the gross WG work on User Profiles will be closely followed.

SA1 has defined the basic requirements for the Simple Streaming Service and prepared CRs to include these into TS 22.101 (Rel-4 and Rel-5). SA1 will work to include the corresponding basic requirements for the Extended Streaming Service (Rel-5).

The Rel-5 PSS-E work considers also upload streaming. This means that Rel-5 MMS would need to support also upload streaming. (SA4#17 has informed T2 and SA1 on this.)

Dialogue with SA3 has been established on rights management, and security and charging aspects. SA4#17 requests information from SA3 on possible ways to approach Digital Rights Management (DMR) in PSS-E.

As part of the communication on the proposed WID between the relevant WGs, SA4#17 has sent a Reply LS on "LS on Extended Streaming Service and LS regarding User Profile" to SA1, SA2, SA3 and T2 (Cc: SA, SA5). This is contained in Tdoc SP-010281. The LS explains that the WI description has been updated as a result of the comments from SA1 (and other WGs). SA4 fully supports SA1 in the work to coordinate all work regarding user profiles/capability exchange in 3GPP. SA4 is happy that SA1 takes the lead in this overall work regarding user profiles/capability exchange. SA4 will follow the work closely and contribute to it by, for example, supplying requirements specific to our applications. The purpose of the capability exchange work in SA4 described in the WI description is thus to define the application specific part of a capability exchange mechanism. This includes capability attributes relevant for PSS-E and the protocols to be used for conveying capability information to the streaming server. The intention of the work is that it shall interwork with the overall user profile mechanism defined in 3GPP.

4. Maintenance of Release 4 and earlier releases

The following maintenance CRs are presented for approval:

SP-010303:   CRs to TS 06.10 and TS 46.010 on Correction of Fig. 3.2 (from Phase 2 to Release 4)

SP-010304:   CRs to TS 06.12 and TS 46.012 on Corrections of the formula for averaging Xmax (from Phase 2 to Release 4)

SP-010305:   CRs to TS 26.101 on Correction to SID Frame Mapping (R99 and Release 4)

SP-010306:   CRs to TS 26.104 Corrections encoder-decoder operations AMR-NB floating point (R99 and Release 4)

SP-010309:   CRs to TS 26.235 on Update of AMR-NB and AMR-WB RTP payload (Release 4)

SP-010310:   CR to 28.062 on Reference to a deleted TFO message (Release 4)

5. Miscellaneous

- Mr. Tomoyuki Ohya (NTT DoCoMo) was elected as SA4 Vice-Chairman at SA4#17.

6. Approval requested

TSG-SA4 requests TSG-SA#12 to:

1. Approve the work of the processing and listening laboratories of the AMR-WB Characterisation Phase 1A to authorise ETSI to pay the involved laboratories. (The work and results of Phase 1A are explained in Tdoc SP-010302 Chapters 6-12)

2. Approve Work Item Description on Extended Transparent End-to-End Packet Switched Streaming Service (PSS-E) in Tdoc SP-010311

3. Approve the CRs in Tdocs SP-010303 to SP-010310

Tdoc SP-010303: Full Rate Speech Transcoding

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
06.10	A010		2	Correction of figure 3.2	F	4.2.1	S4	TSG-SA WG4#17	S4-010380
06.10	A011		R96	Correction of figure 3.2	A	5.2.1	S4	TSG-SA WG4#17	S4-010381

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
06.10	A012		R97	Correction of figure 3.2	A	6.1.1	S4	TSG-SA WG4#17	S4-010382
06.10	A013		R98	Correction of figure 3.2	A	7.1.0	S4	TSG-SA WG4#17	S4-010383
06.10	A014		R99	Correction of figure 3.2	A	8.1.1	S4	TSG-SA WG4#17	S4-010384
46.010	001		REL-4	Correction of figure 3.2	A	4.0.0	S4	TSG-SA WG4#17	S4-010385

Tdoc SP-010304: Comfort Noise Aspects for Full Rate Speech Traffic Channels

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

Tdoc SP-010305: AMR Speech Codec; Frame Structure

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.101	005	2	R99	Correction to SID Frame Mapping	F	3.1.0	S4	TSG-SA WG4#17	S4-010414
26.101	006		REL-4	Correction to SID Frame Mapping	A	4.0.0	S4	TSG-SA WG4#17	S4-010415

Tdoc SP-010306: AMR Speech Codec; Floating point C-Code

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.104	003	1	R99	Limiting predicted codebook gain computing in encoder	F	3.1.0	S4	TSG-SA WG4#17	S4-010407R
26.104	004	1	REL-4	Limiting predicted codebook gain computing in encoder	A	4.0.0	S4	TSG-SA WG4#17	S4-010407R
26.104	005	1	R99	Correction of decoder operation in error concealment of lost frames	F	3.1.0	S4	TSG-SA WG4#17	S4-010408R
26.104	006	1	REL-4	Correction of decoder operation in error concealment of lost frames	A	4.0.0	S4	TSG-SA WG4#17	S4-010408R
26.104	007	1	R99	Correction of mode state bug in AMR decoder	F	3.1.0	S4	TSG-SA WG4#17	S4-010409R
26.104	008	1	REL-4	Correction of mode state bug in AMR decoder	A	4.0.0	S4	TSG-SA WG4#17	S4-010409R
26.104	011	1	R99	Correction of decoder Reset	F	3.1.0	S4	TSG-SA WG4#17	S4-010411R
26.104	012	1	REL-4	Correction of decoder Reset	A	4.0.0	S4	TSG-SA WG4#17	S4-010411R
26.104	013	1	R99	Correction of comfort noise parameter interpolation bug of AMR decoder	F	3.1.0	S4	TSG-SA WG4#17	S4-010412R
26.104	014	1	REL-4	Correction of comfort noise parameter interpolation bug of AMR decoder	A	4.0.0	S4	TSG-SA WG4#17	S4-010412R
26.104	015	1	R99	Correction of the TX_TYPE and RX_TYPE identifiers	F	3.1.0	S4	TSG-SA WG4#17	S4-010413R
26.104	016	1	REL-4	Correction of the TX_TYPE and RX_TYPE identifiers	A	4.0.0	S4	TSG-SA WG4#17	S4-010413R

Tdoc SP-010307: AMR-WB Speech Codec; C-source code

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc

26.173	001	1	REL-5	Unnecessary printing in Az_isp-function	F	5.0.0	S4	TSG-SA WG4#17	S4-010365R
26.173	002	1	REL-5	Overflow in isp_az.c	F	5.0.0	S4	TSG-SA WG4#17	S4-010366R
26.173	003	1	REL-5	Error in the ISF extrapolation in 6.60 kbit/s mode	F	5.0.0	S4	TSG-SA WG4#17	S4-010367R
26.173	004	1	REL-5	14-bit masking to decoder	F	5.0.0	S4	TSG-SA WG4#17	S4-010368R
26.173	005	1	REL-5	Correction of the homing function	F	5.0.0	S4	TSG-SA WG4#17	S4-010369R
26.173	006	1	REL-5	Fixed codebook initialisation	F	5.0.0	S4	TSG-SA WG4#17	S4-010377R

Tdoc SP-010308: AMR-WB Speech Codec; Test sequences

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.174	001		REL-5	Update of AMR-WB test sequences	F	5.0.0	S4	TSG-SA WG4#17	S4-010419

Tdoc SP-010309: Packet switched conversational multimedia applications; Default codecs

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.235	001		REL-4	Update of AMR-NB and AMR-WB RTP payload	F	4.0.0	S4	TSG-SA WG4#17	S4-010343

Tdoc SP-010310: In-band Tandem Free Operation (TFO) of Speech Codecs

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
28.062	001	1	REL-4	Reference to a deleted TFO message	F	4.0.0	S4	TSG-SA WG4#17	S4-010417

4. Revise the approval of TS 26.235 to be for Release 5 (instead of Release 4).

ANNEX A: List of input documents to TSG-SA#12 from TSG-SA WG4

Number	Title	Source	Agenda item	Comment
SP-010281	Reply to "LS on Extended Streaming Service" and "LS regarding User Profile"	SA WG4	7.4.1	Information
...	...	...	...	...
SP-010301	TSG S4 Status Report at TSG-SA#12	SA WG4 Chairman	7.4.1	Information
SP-010302	Preliminary Draft 3GPP TR 26.976 version 0.3.0 "AMR-WB Speech Codec Performance Characterization v 0.3.0" (Release 5)	SA WG4	7.4.3	Information
SP-010303	CRs to TS 06.10 and TS 46.010 on Correction of Fig. 3.2 (from Phase 2 to Release 4)	SA WG4	7.4.3	Approval
SP-010304	CRs to TS 06.12 and TS 46.012 on Corrections of the formula for averaging Xmax (from Phase 2 to Release 4)	SA WG4	7.4.3	Approval
SP-010305	CRs to TS 26.101 on Correction to SID Frame Mapping (R99 and Release 4)	SA WG4	7.4.3	Approval
SP-010306	CRs to TS 26.104 Corrections encoder-decoder operations AMR-NB floating point (R99 and Release 4)	SA WG4	7.4.3	Approval
SP-010307	CRs to TS 26.173 on AMR-WB Fixed codebook initialisation (Release 5)	SA WG4	7.4.3	Approval
SP-010308	CRs to TS 26.174 on Update of AMR-WB codec test sequences after CRs to TS 26.173 (Release 5)	SA WG4	7.4.3	Approval
SP-010309	CRs to TS 26.235 on Update of AMR-NB and AMR-WB RTP payload (Release 4)	SA WG4	7.4.3	Approval
SP-010310	CR to 28.062 on Reference to a deleted TFO message (Rel-4)	SA WG4	7.4.3	Approval
SP-010311	Work Item Description on Extended Transparent End-to-End Packet Switched Streaming Service (PSS-E)	SA WG4	7.4.3	Approval

TSG-SA WG4 (Codec WG) Status Report

TSG-SA#12
June 18-21, 2001
Stockholm, Sweden

Kari Järvinen
TSG-SA WG4 Chairman

Content

➔ • **Review of work progress**

• **Documents for information**

• **Approval of contributions**

Review of work progress

- **Input documents, SA4 meetings**

- **SA4 Vice-Chairman elections**

- **Work in Rel-5 Work Items**
  - **AMR Wideband (AMR-WB) Speech Codec**

  - **Multimedia Codecs and Protocols for Conversational PS Services**

  - **Global Test Telephony / Cellular Text Telephony Modem**

  - **New WI proposal: Extended Transparent End-to-end PS Streaming Service**

- **Maintenance of Rel-4 and earlier releases**

Input documents

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SP-010303	CRs to TS 06.10 and TS 46.010 on Correction of Fig. 3.2 (from Phase 2 to Release 4)	SA WG4	7.4.3	Approval
SP-010304	CRs to TS 06.12 and TS 46.012 on Corrections of the formula for averaging Xmax (from Phase 2 to Release 4)	SA WG4	7.4.3	Approval
SP-010305	CRs to TS 26.101 on Correction to SID Frame Mapping (R99 and Release 4)	SA WG4	7.4.3	Approval
SP-010306	CRs to TS 26.104 Corrections encoder-decoder operations AMR-NB floating point (R99 and Release 4)	SA WG4	7.4.3	Approval
SP-010307	CRs to TS 26.173 on AMR-WB Fixed codebook initialisation (Release 5)	SA WG4	7.4.3	Approval
SP-010308	CRs to TS 26.174 on Update of AMR-WB codec test sequences after CRs to TS 26.173 (Release 5)	SA WG4	7.4.3	Approval
SP-010309	CRs to TS 26.235 on Update of AMR-NB and AMR-WB RTP payload (Release 4)	SA WG4	7.4.3	Approval
SP-010310	CR to 28.062 on Reference to a deleted TFO message (Rel-4)	SA WG4	7.4.3	Approval
SP-010311	Work Item Description on Extended Transparent End-to-End Packet Switched Streaming Service (PSS-E)	SA WG4	7.4.3	Approval

SA4 meetings

– **Meetings held: SA4 has met once as "SA4 plenary"**
  - PSM SWG ad hoc #2 on Apr 9-10, 2001 hosted by Panasonic in Frankfurt, Germany
  - TSG-SA4#17 on June 4-8, 2001 hosted by Nokia in Naantali, Finland

– **Future meetings:**
  - TSG-SA4#18 on Sep 3-7, 2001 to be hosted by Frauenhofer Institute in Erlangen, Germany
  - PSM SWG ad-hoc #3 on Oct 15-17, 2001 (tbc) host and venue to be defined
  - TFO SWG ad-hoc on Oct 11-12, 2001 to be hosted by Siemens in Munich, Germany

– **Meeting statistics:**
  - 1 week, 67 participants, 141 documents
  - more than 560 people are registered on the SA4 e-mail list
  - 21 input LSs, 10 output LSs

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SA4 Vice-Chairman elections

- **One candidate**

- **Mr. Tomoyuki Ohya (NTT DoCoMo) was nominated at SA4#17**
  - **Congratulations!**

AMR Wideband (AMR-WB) codec

- **Characterisation testing**
  - **Phase 1A completed**
    - Performance without channel errors (all applications)
    - Performance in GSM FR GMSK channel
  - **Phase 1B postponed to after TSG-SA#12**
    - Performance in 3G WCDMA channel
  - **Phase 2 to be carried out later**
    - Preformance in EDGE 8-PSK channels
    - Performance in PS applications (conversational, streaming)

- **Other issues:**
  - **CRs: Minor bug corrections to C-code and test sequences in Tdocs SP-010307 and SP-010308**
  - **Work to include AMR-WB into in-band TFO (TS 28.062) started**

AMR Wideband (AMR-WB) codec

- **Characterisation listening tests**
  - **During April and May 2001**
  - **Seven participating laboratories:**
    - Lockheed-Martin Global Telecommunications (LMGT), British Telecom, Deutsche Telekom, Dynastat, France Télécom, Nokia and Nortel Networks.
    - ARCON and LMGT acted as processing laboratories
    - Several languages: English (both UK and North American English), Finnish, French and German.
  - **6 main experiments**
    - Input levels and self-tandeming
    - Tandem with wideband codecs
    - Tandem with narrowband codecs
    - Performance of VAD/DTX/CNG
    - Effect of static errors in GSM FR GMSK channel
    - Background noise and static errors in GSM FR GMSK channel

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AMR Wideband (AMR-WB) codec

- **Results verify the good performance of the AMR-WB codec**

- **Performance requirements relevant to Phase 1A confirmed to be met**

- **Further analysis of results ongoing in SA4**

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AMR Wideband (AMR-WB) codec

- ## **Results:**

  - ### **Experiment 1: Input levels and self-tandeming**

    - 7 highest AMR-WB modes (23.85, 23.05, 19.85, 18.25, 15.85, 14.25, 12.65 kbit/s) provide quality equal to or better than ITU-T wideband codec G.722-64 (64 kbit/s).

      - Results are consistent over all tested input levels and also in tandeming.

    - The 8.85 kbit/s mode equal to G.722-48 (48 kbit/s). The lowest mode 6.6 kbit/s provides quality lower than G.722-48, especially in tandeming and with high input level.

      - Note: the two lowest modes have been developed to be used temporarily during severe channel errors.

AMR Wideband (AMR-WB) codec

- **Experiment 2: Tandem with WB codecs**
  - In tandem with other wideband codecs G.722-64, G.722-48 and 24 kbit/s G.722.1, the performance is independent of the combination order of AMR-WB with the other codecs.
    - Except: G.722-48 followed by the AMR-WB codec results in significantly better quality than tandeming in the opposite order. (This may be a result of AMR-WB being able to mask some of the coding noise as the second codec.)

- **Experiment 3: Tandem with NB codecs**
  - In tandem with narrowband codecs AMR 12.2 and 7.4 kbit/s modes and 8 kbit/s G.729, AMR-WB offers similar performance as AMR 12.2 kbit/s mode (when the corresponding bit-rate mode of 12.65 kbit/s is used in AMR-WB).
  - Tandem with AMR-WB does not degrade the quality much compared to single coding of the same narrowband codec, except for two lowest bit-rates of AMR-WB.

AMR Wideband (AMR-WB) codec

– **Experiment 4: VAD/DTX/CNG**

- Operation with VAD/DTX/CNG activated was statistically rated at least no worse than without VAD/DTX/CNG. VAD/DTX/CNG operation is transparent to the listener.

– **Experiment 5: GSM FR GMSK channel (with clean speech)**

- AMR-WB provides good error robustivity.

- The quality better or equal to G.722-64 is achieved at about 11 dB C/I and above.

- The quality at least equal to G.722-56 is obtained for error rates at about 10 dB C/I and above.

AMR Wideband (AMR-WB) codec

- **Experiment 6: Background noise and GSM FR GSMK channel**

  - Under background noise (15 dB Car Noise and 20 dB Office Noise), AMR-WB provides in the GSM FR GMSK channel quality equal to or better than G.722-64 at C/I-ratios about 12 dB and above.

  - AMR-WB gives quality equal to or better than G.722-56 at C/I-ratios about 10 dB and above.
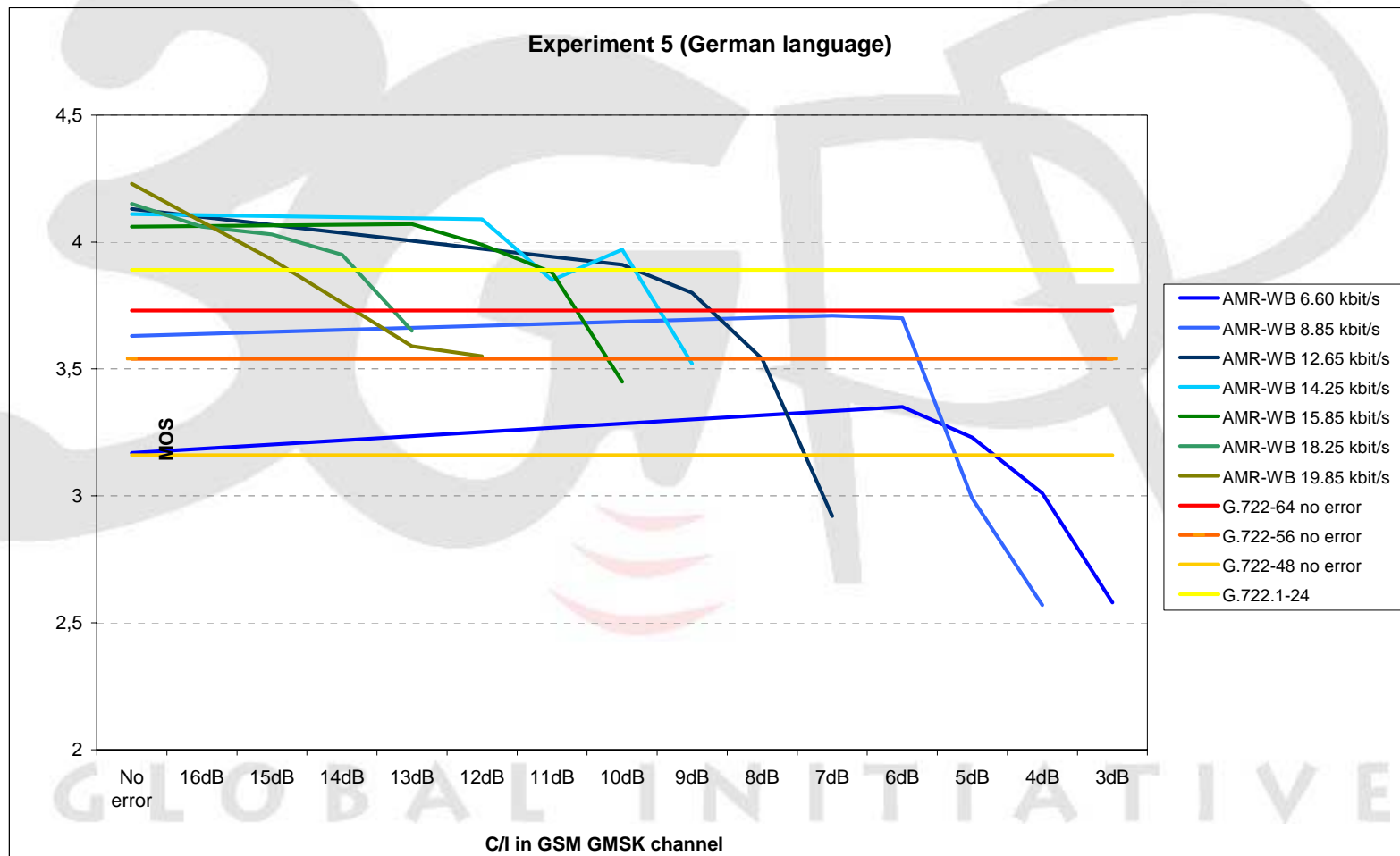   - Note: the two highest AMR-WB bit-rates were not included in the test as they are not targeted for GSM FR GMSK use

Examples of the results

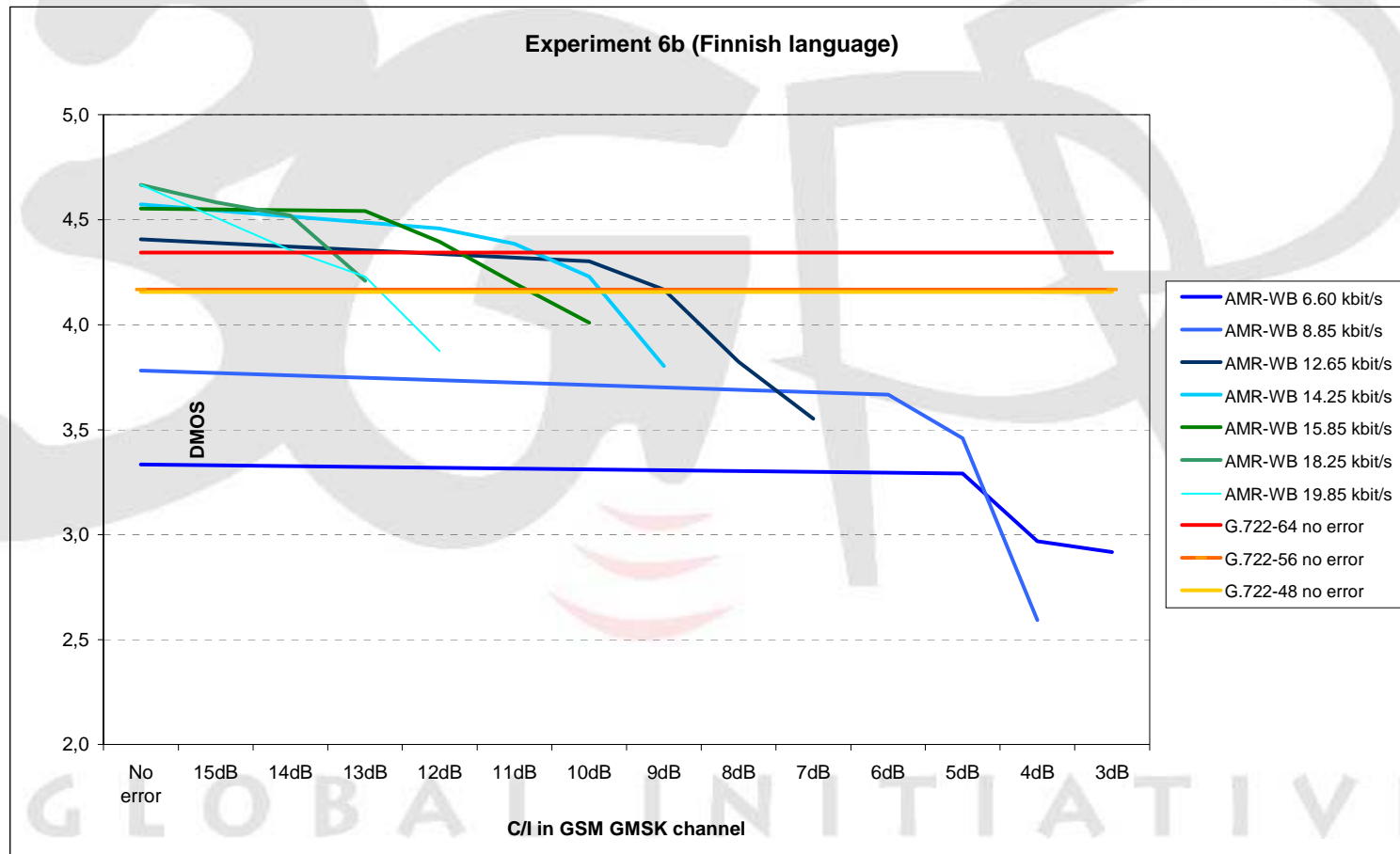– **Input levels and tandeming (English)**

Experiment 1 (English Language)
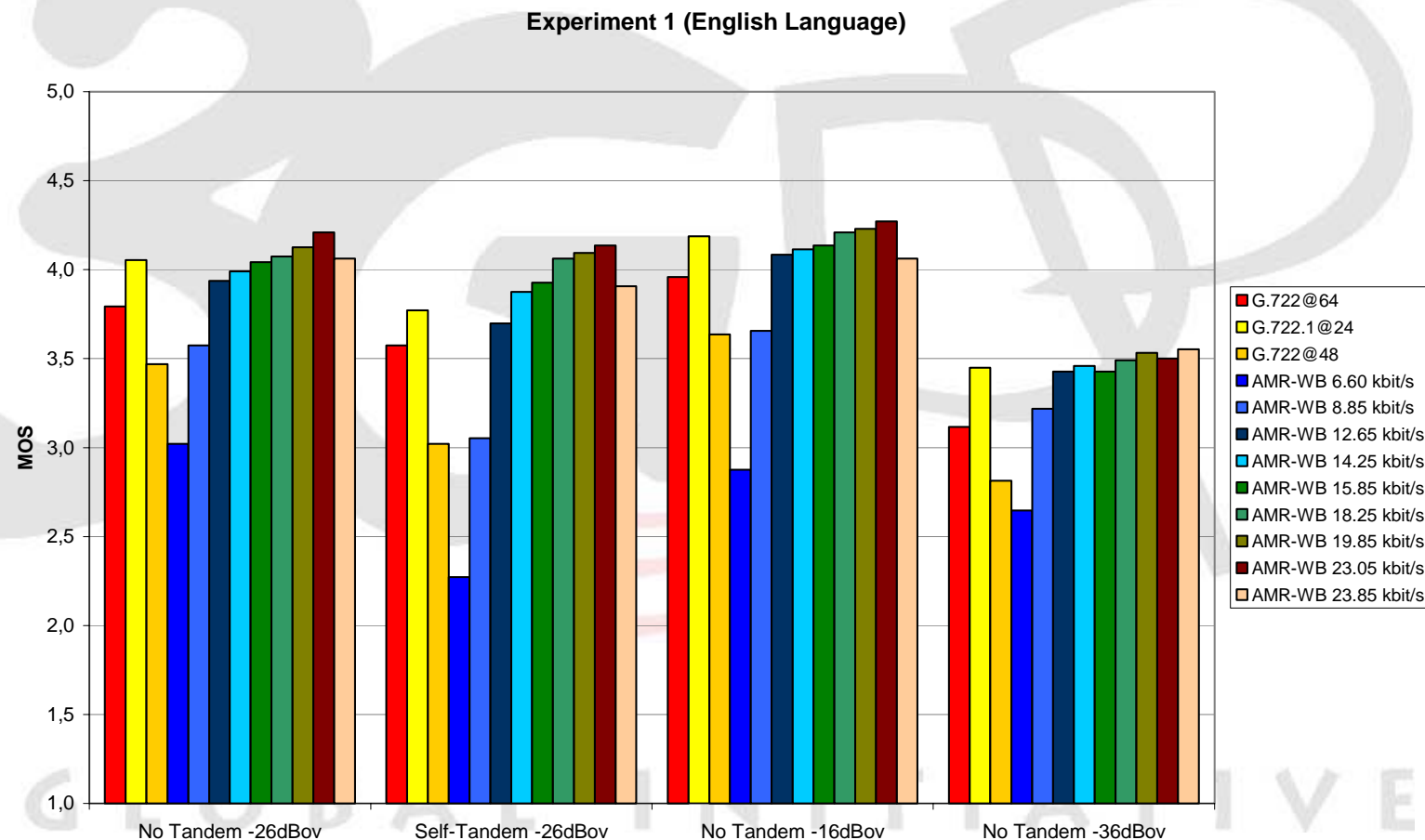
Examples of the results

– **GSM FR GMSK Channel (German)**

Examples of the results

- – **GSM FR GMSK channel, with office background noise 20 dB (Finnish)**

Experiment 6b (Finnish language)

AMR Wideband (AMR-WB) codec

– **TR 26.976 (v.0.3.0) for information in Tdoc SP-010302. Characterisation Phase 1A results in Chapters 7-12.**

– **Approval of processing and listening laboratory work Phase 1A requested to authorise ETSI to pay the involved laboratories.**

– **Phase 1B expected to be finalised by TSG-SA#14. A provisional schedule prepared: listening tests during October-November**

Multimedia Codecs and Protocols for Conversational PS Services

- **As requested by SA4, Default Codecs specification (TS 26.235) was approved at TSG-SA#11 to Rel-4**

- **This TS belongs to Rel-5 feature IMS (Provisioning of IP-based multimedia services), and requires introduction of IMS subsystem. SA4 requests revision of the approval of TS 26.235 to be for Rel-5**

Global Text Telephony / Cellular Text Telephony Modem

- **All three Cellular Text Telephone Modem (CTM) TSs under the responsibility of SA4 were approved during TSG-SA#10 and TSG-SA#11.**

- **GTT Workshop (April 2001) agreements should not have any impact on these TSs.**

- **SA4 is following the overall GTT work.**

New WI: Extended Transparent End-to-end PS Streaming Service

- **To address more advanced streaming aspects than covered in Rel-4 WI "Transparent End-to-end PS Streaming Service" (completed at TSG-SA#11).**

  - **Standardization of the components of a mobile multimedia content delivery service, including streaming protocols, media transport protocols, and multimedia codecs.**

  - **Harmonization with existing and emerging 3GPP multimedia applications will be considered whenever possible.**

  - **PSS-E will be based on the Rel-4 Streaming and should provide full backwards compatibility.**

New WI: Extended Transparent End-to-end PS Streaming Service

- The intended outputs are Rel-5 versions of TSs 26.233 (General Description) and 26.234 (Protocols and Codecs).

- Prior TSG-SA#12, dialogue on the content of the WI with other relevant WGs (SA1, SA2, SA3 and T2): comments and suggestions have been taken into account.

- SA4 will keep the relevant WGs informed on the progress of the work (as was done during the development of Rel-4 streaming), and will take into account the work carried out in the related WIs in the other WGs.

- Related WIs:
  - IMS (SA1)
  - End-to-end QoS for PS domain (SA2)
  - MMS (T2)

New WI: PSS-E content

- **Service optimisation**:
  - consideration of device capabilities and user preferences in the optimisation of multimedia content delivery
- **Enhanced transport aspects:**
  - consideration of improved robustness and flexibility in the delivery of multimedia content (adaptation to network conditions, adaptation to network type (GERAN, UTRAN), Enhanced streaming transport mechanisms, Up-streaming)
- **Multimedia media types:**
  - consideration of additional and enhanced media types and scene description (Graphics (2D, 3D), Synthetic Audio (e.g. MIDI), Enhanced audio and video codecs (e.g. higher levels and profiles and/or new codecs), Enhanced scene description (e.g., new features and/or functionality), Metadata)

New WI: PSS-E content

- **<u>Interworking with MMS</u>:**
  - consideration of the various modes in which PSS-E may be utilised and the impact on other services and network elements (File download, Up-streaming, File formats)
- **<u>Interoperability</u>:**
  - consideration of interoperating with the Internet (File Formats, Codecs)
- **<u>Commercial factors</u>:**
  - consideration of the importance of rights management, security and charging aspects in the commercial implementation of PSS-E

Maintenance of Release 4

- **SP-010303 (FR Speech Transcoding) : CRs to TS 06.10 and TS 46.010 on Correction of Fig. 3.2 (from Phase 2 to Release 4)**

- **SP-010304 (FR Comfort Noise Aspects) : CRs to TS 06.12 and TS 46.012 on Corrections of the formula for averaging Xmax (from Phase 2 to Release 4)**

- **SP-010305 (AMR Speech Codec Frame Structure): CRs to TS 26.101 on Correction to SID Frame Mapping (R99 and Release 4)**

- **SP-010306 (AMR Speech Codec Floating Point C-code): CRs to TS 26.104 Corrections encoder-decoder operations AMR-NB floating point (R99 and Release 4)**

- **SP-010307 (AMR-WB Speech Codec C-code): CRs to TS 26.173 on AMR-WB Fixed codebook initialisation (Release 5)**

- **SP-010308 (AMR-WB Speech Codec Test Sequences): CRs to TS 26.174 on Update of AMR-WB codec test sequences after CRs to TS 26.173 (Release 5)**

- **SP-010309 (PS Conversational Multimedia Applications; Default Codecs): CRs to TS 26.235 on Update of AMR-NB and AMR-WB RTP payload (Release 4)**

- **SP-010310 (In-band TFO): CR to 28.062 on Reference to a deleted TFO message (Rel-4)**

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Content

- **Report of work progress**
→ • **Documents for information**
- **Approval of contributions**

Documents for information

- **Tdoc SP-010302: Draft TR 26.976 (v.0.3.0) on AMR-WB Performance Characterisation**
  - Characterisation Phase 1A results in Chapters 7-12
  - Verification Phase results in Chapters 15-25
  - Selection Phase results in Annex A

- **Tdoc SP-010281: "LS on Extended Streaming Service and LS regarding User Profile" to SA1, SA2, SA3 and T2 (Cc: SA, SA5)**
  - SA1 comments to PSS-E WID taken into account
  - SA1 has lead in User Profile / Capability Exhange work
  - SA4 will follow the UP work closely and contribute to it by, for example, supplying requirements specific to our applications.

Content

- **Report of work progress**

- **Documents for information**

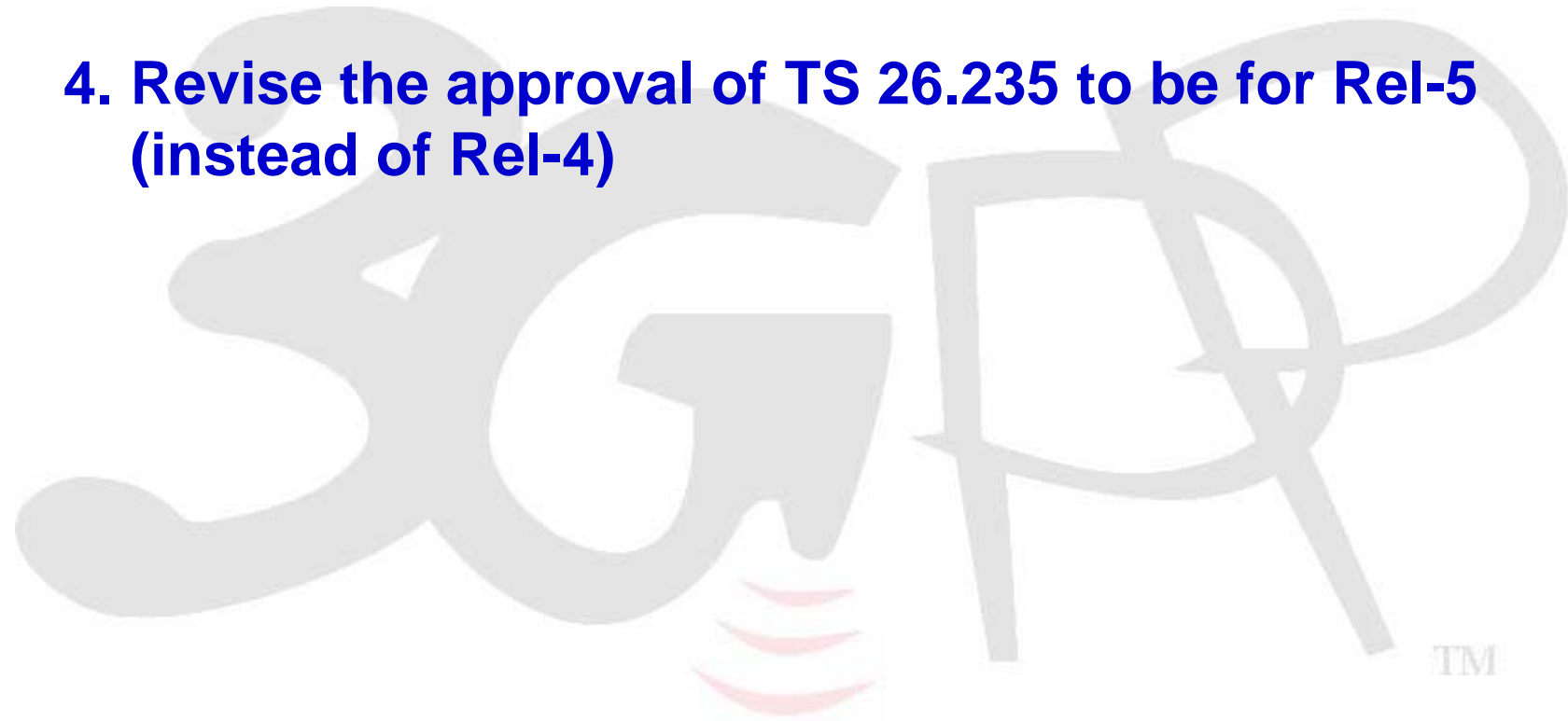➔ - **Approval of contributions**

Approval requested for

1. The work of the processing and listening laboratories of the AMR-WB Characterisation Phase 1A to authorise ETSI to pay the involved laboratories. (The work and results are explained in Tdoc SP-010302 Chapters 6-12)

2. WID on "Extended Transparent End-to-End Packet Switched Streaming Service" in Tdoc SP-010311

3. CRs in Tdocs SP-010303 to SP-010310:

Approval requested for

– **SP-010303 (FR Speech Transcoding) : CRs to TS 06.10 and TS 46.010 on Correction of Fig. 3.2 (from Phase 2 to Release 4)**

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Approval requested for

4. Revise the approval of TS 26.235 to be for Rel-5 (instead of Rel-4)

End of presentation