Technical Specification Group Services and System Aspects
Meeting #23, Phoenix, Arizona, USA, 15-18 March 2004

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Source: **TSG-SA WG4 Chairman**

Title: **TSG-SA WG4 Status Report at TSG-SA#23**

Document for: **Information**

Agenda Item: **7.4.1**

Executive Summary

Since TSG-SA#22, TSG-SA WG4 (SA4) has met once at SA4#30 on 23-27 February, 2004.

Release 6

Performance characterisation of default codecs for PS conversational multimedia applications: Phase 2 of characterisation testing (comparison of quality offered by various speech codecs) has been completed; host and subjective testing report is presented for approval. Phase 1 testing (covering AMR-NB and AMR-WB codecs) was performed already earlier by TSG-SA#22. Global analysis of Phase 1 and Phase 2 results has now been carried out and a report is presented for approval. Draft TR 26.935 (v.1.0.0) on the performance characterisation is presented for information.

PS Streaming (PSS) Rel-6: TSs 26.244 "3GPP file format (3GP)" has been finalised and is brought for approval. Other PSS work such as QoE (Quality of Experience) metrics and the selection process of PSS/MMS audio and video codecs has been progressed. For video codecs, ITU-T H.264 (MPEG AVC) is the working assumption for an optional video decoder with working assumptions now agreed also on AVC levels and profiles for adoption to 3GPP services (PSS, MMS and PS conversational applications). Companies with concerns on current working assumption should provide input documents to next meeting for further debate. For PSS/MMS audio codecs, selection tests have been now completed - see next section for details.

Audio codecs (consideration of new audio codecs for PSS and MMS under WIs 'PS Streaming Rel-6' and 'MMS Enhancements', and Extended AMR-WB codec): Codec selection tests have been completed and the related laboratory reports are brought for approval. SA4 agreed to recommend both AMR-WB+ and Enhanced aacPlus codecs ("should be supported" for audio media type) for PSS. In addition, guidelines on the usage of these two codecs (their optimal operating ranges and information on their characteristics) will be given in specifications. A report of selection results, containing SA4 agreed draft text into TS 26.234 (PSS), is presented for information. For MMS, further discussion is needed on the specification text. No codec selection or specifications are yet brought for approval at TSG-SA since critical verification tasks (bit-exactness with codec in tests, complexity) for two codecs cannot be completed in time for TSG-SA#23. Also, further discussion on the details of specifications is still needed at next SA4 meeting. At TSG-SA#23, SA4 brings the status of the codec selection discussion for information, with request to endorse the SA4 aim to recommend two audio codecs. Formal approval of codecs for PSS and MMS as well as new codec specifications and related CRs to the impacted service specifications (TSs 26.140 and 26.234) are expected for approval at TSG-SA#24.

Speech Recognition and Speech Enabled Services: Codec Work to Support Speech Recognition Framework for Automated Voice Services: Selection tests to compare performances of AMR/AMR-WB and DSR Extended Advanced Front-End candidate codec have been carried out. The results show that DSR is to be recommended for narrowband speech at low data rates and also for wideband speech, while for narrowband speech at high data rates the results are in the "grey area" of the agreed Recommendation Criteria. SA4 debated the results and recommends the DSR Extended Advanced Front-end for Speech Enabled Services ("should be supported") into TS 26.235. AMR or AMR-WB may also be used for SES ("may be supported") but the performance advantages of DSR are noted. This selection outcome is brought for information to TSG-SA#23 (report on SES codec selection, draft TS on "ANSI-C code for the Fixed-Point DSR Extended Advanced Front-end" and intended formulation of CRs for the impacted TSs 26.235 and 26.236). The formal selection of the codecs, the new codec TS and related CRs are expected for approval at TSG-SA#24. By then the critical codec verification tasks are expected to be completed.

MMS Enhancements: MMS formats and codecs: SA4 internal working draft of TS 26.140 has been updated to include the addition of optional support for timed text in order to synchronise the media types between PSS and MMS. Ongoing audio and video codec selections will impact also MMS.

Media Codecs and Formats for IMS Messaging and Presence: There has been no input and no progress since SA4#28 (September 2003).

Definition of MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS): Forward Error Correction (FEC) and the proposed candidate FEC solutions have been further debated, but more work is needed. For evaluating the

proposed FEC solutions, SA4 sent a LS to relevant GERAN and RAN WGs asking information on simulation parameters and/or preparation of error patterns. HTTP was agreed as working assumption as the transport protocol for the point-to-point repair service. Some companies have expressed support to focus on download service in Rel-6 to finalise work in time, while some other companies disagreed and stated that both streaming and download should be included in Rel-6.

New WIDs: Two Rel-6 WIDs are brought for approval: 1) Codec Enhancements for PS Conversational Multimedia Applications and 2) 3G-324M updates in Release 6. The supporting companies of both WIs are aware of the limited time until Release 6 will be frozen, and the intention is to keep the work within Rel-6 timeframe. (Both WIs are on enhancements and updates and the work is therefore focused.)

Maintenance of releases: CRs to TS 26.073 (Rel-5), TS 26.104 (Rel-5 and Rel-6) and TR 26.937 (Rel-6) are brought for approval.

Other issues: TSG-SA#22 tasked SA4 to investigate whether signalling capabilities would be needed to allow the setting-up of connections with other Codecs than the chosen "Default" Video Codec. As a response to the request, SA4 clarifies the extensibility, signalling and usage of codecs. A document on this is presented for information.

TSG-SA WG4 Status Report at TSG-SA#23 - Table of Contents

1. General issues

This document presents the status report of TSG-SA WG4 (SA4) at TSG-SA#23. Slides presentation of the report is found in a separate file attached to this status report: "Annex 1 - SA4 Slides Presentation at TSG-SA#23.ppt".

1.1 Officials

There are no changes in the SA4 officials:

Chairman:	Kari Järvinen (Nokia, ETSI)	
Vice Chairpersons:	Catherine Quinquis (Orange, ETSI) and Frédéric Gabin (NEC Technologies, ETSI)	
Secretary:	Paolo Usai (3GPP Support)	
SWG Chairmen:		
	PSM (Packet Switched Multimedia)	Rolf Hakenberg (Panasonic, ETSI)
	SQ (Speech Quality)	Paolo Usai (ETSI)
Ad-hoc group chairmen:		
	Audio Codec Ad-Hoc	Imre Varga (Siemens, ETSI)
	Video Codec Ad-Hoc	Nikolaus Färber (Fraunhofer Gesellschaft, ETSI)

The second two year term of the current SA4 Chairman ends at the next SA4 meeting (SA4#31 in May), and therefore an election of the SA4 Chairman will take place at the next SA4 meeting.

1.2 Meetings

Since TSG-SA#22, SA4 has held one plenary meeting SA4#30 (in February). Three more SA4 meetings have been scheduled for the rest of 2004. Also, one meeting of the PSM SWG has been scheduled.

Meetings held:

SA4#30	23-27 February, 2004	Host: The European Friends of 3GPP; Venue: Malaga, Spain

Calendar of future meetings:

SA4 PSM SWG Ad-Hoc*	5-7 April, 2004	Host: Ericsson; Venue: Lund, Sweden
SA4#31	17 - 21 May, 2004	Host: VoiceAge; Venue: Montreal, Canada
SA4#32	16 - 20 August, 2004	Host: tbd; Venue: tbd
SA4#33	22 - 26 November, 2004	Host: The European Friends of 3GPP; Venue: Helsinki, Finland

*) The PSM ad-hoc meeting is provisionally scheduled to cover MBMS on 5-6 April and Video codecs and Optimisation of Voice over IMS on 7 April.

During SA4#30, all SA4 SWGs and ad-hoc groups met. Table 1 gives overall statistics from the meeting (including also statistics from some previous SA4 meetings for comparison).

Meeting	Number of (new) input documents	Number of participants	Number of incoming LSs	Number of outgoing LSs/communications
SA4#25	115	55	13	9
SA4#25bis	164	50	14	11
SA4#26	171	55	18	17
SA4#27	142	65	19	14
SA4#28	128	55	18	9
SA4#29	167	53	18	8
SA4#30	**215**	**74**	**27**	**9**

Table 1: Statistics from SA4#30 (and from some past SA4 meetings for comparison)

1.3 Input documents from SA4 to TSG-SA#23

Table 2 gives a complete list of input documents from SA4 to TSG-SA#23.

One new TS, two new WIDs and four CRs are brough for approval. In addition, approval is requested for reports on PS conversational default codecs characterisation (host and subjective testing, global analysis) and on PSS/MMS audio codec testing (subjective testing, processing and item selection, global analysis). TSG-SA approval of these reports means approval of the work done; this is required for ETSI to pay the

involved laboratories.

Reports on PSS/MMS audio codec selection and SES codec selection are brought for information. These documents give detailed description of the discussions and of the outcome. Other documents brought for information include one draft TS, one draft TR and reply to TSG-SA on signalling of codecs.

Tdoc	Title	Source	Agenda Item	Document for
SP-040061	TSG S4 Status Report at TSG-SA#23	SA WG4 Chairman	7.4.1	Information
SP-040062	Signaling of codecs (reply to SA#23)	SA WG4	7.4.1	Information
SP-040063	TR 26.935 "Packet switched conversational multimedia applications; Default codecs; Performance characterization" V1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-040064	TS 26.243 "Software documentation for fixed-point DSR Extended Advanced Front-end" V. 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-040065	3GPP TS 26.244 Transparent end-to-end packet switched streaming service (PSS);"3GPP file format (3GP)" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Approval
SP-040066	Work Item Description on Codec Enhancements for Packet Switched Conversational Multimedia Applications (Release 6)	SA WG4	7.4.3	Approval
SP-040067	Work Item Description on 3G-324M updates in Release 6	SA WG4	7.4.3	Approval
SP-040068	3G PS conversation tests Phase 2 : Report from FT R&D for Host Lab and Subjective Testing Lab functions	SA WG4	7.4.3	Approval
SP-040069	3G PS conversation tests Phase 2 : Report from Dynastat on Global Analysis of Phase 1 & Phase 2 Conversation Test results	SA WG4	7.4.3	Approval
SP-040070	Audio codec selection tests: Reports from Subjective Testing Labs	SA WG4	7.4.3	Approval
SP-040071	Audio codec selection tests: Reports from "Host" and "Selection of items" Laboratories	SA WG4	7.4.3	Approval
SP-040072	Audio codec selection tests: Reports from "Global Analysis" Laboratory	SA WG4	7.4.3	Approval
SP-040073	Audio codec selection: Report from SA4 to SA#23 on PSS/MMS audio codec selection	SA WG4	7.4.3	Information
SP-040074	Audio codec selection: Proposed text on audio media type into TS 26.234 Rel-6	SA WG4	7.4.3	Information
SP-040075	SES codec selection: Report from TSG SA WG4 to SA#23 Plenary on SES codec selection	SA WG4	7.4.3	Information
SP-040076	SES codec selection: Proposed CRs from TSG SA4 to introduce SES to Release 6 specifications	SA WG4	7.4.3	Information
SP-040077	SES codec selection: SES verification plan v 1.0 (for information)	SA WG4	7.4.3	Information
SP-040078	CR 26.073 019 Correction of AMR DTX functionality (Release 5)	SA WG4	7.4.3	Approval
SP-040079	CR 26.104 031-032 "Correction of floating point AMR DTX functionality" (Release 5 and Release 6)	SA WG4	7.4.3	Approval
SP-040080	CR 26.937 001 rev 2 on Rate Adaptation simulation results for PSS (Rel-6)	SA WG4	7.4.3	Approval

Table 2: List of input documents from SA4 to TSG-SA#23

2. Release 6 Work Items

2.1 Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications

Phase 2 of characterisation testing (comparison of quality offered by different speech coders) has been completed. The Phase 2 host and listening laboratory report is brought for approval in Tdoc SP-040068. Phase 1 testing (AMR-NB and AMR-WB codecs) was performed already and was reported to TSG-SA#22. Global analysis of test results has now been carried out (covering Phase 1 and Phase 2) and report is presented for approval in Tdoc SP-040069. TSG-SA approval of these reports means approval of the work

done and this is required for ETSI to pay the Phase 2 Host/Testing and Global Analysis Laboratories.

Phase 1 tests consisted of 24 test conditions both for the AMR codec (modes 6.7 and 12.2 kbit/s) and the AMR-WB codec (modes 12.65 and 15.85 kbit/s) with error conditions covering both IP packet loss of 0% and 3% and radio conditions with 10^{-2}, 10^{-3} and 5 10^{-4} BLER (Block Error Rate). End-to-end delays of 300 and 500 ms were included in the tests. Robust Header Compression (RoHC), an optional UMTS functionality, was included for some test cases for AMR-WB. France Telecom R&D acted as the host laboratory (provision of the test bed to carry out the conversation tests in real-time). The subjective testing laboratories were ARCON for the North American English language, France Telecom R&D for the French language and NTT-AT for Japanese language. In Phase 2, several codecs were tested in PS conversational use: AMR-NB (modes 6.7 and 12.2 kbit/s), AMR-WB (modes 12.65 and 15.85 kbit/s), ITU-T G.723.1 (mode 6.4 kbit/s), ITU-T G.729 (mode 8 kbit/s), ITU-T G.722 (mode 64 kbit/s) and ITU-T G.711 (64 kbit/s). Transmission error conditions covered IP packet loss of 0% and 3%. France Telecom R&D acted as host and listening laboratory in Phase 2. Two languages were used (French and Arabic). Dynastat performed the global analysis covering both testing phases.

Siemens provided the real time air interface simulator for Phase 1. France Telecom provided the IP core network simulator and terminal simulator used in both phases. IPv6 was employed in the testing. IPv6 is fully simulated over the radio interface. The CN simulator however employs IPv4 but since the only impact is a marginal difference in the end-to-end delay (of the order of ~16 µs) the use of a particular IP-version in the CN part has no impact on the performance results.

The test results will be contained in TR 26.935 "Packet switched conversational multimedia applications; Default codecs; Performance characterization". A draft version of this TR is presented for information in Tdoc SP-040063. This draft TR has been produced by Dynastat in compliance to the contract with ETSI. It gives information of the performance of PS conversational multimedia applications under various operating and transmission conditions (e.g., considering radio transmission errors, IP packet losses, end-to-end delays, and several types of background noise). The performance results may be used e.g. as guidance for network planning and to appropriately adjusting the radio network parameters.

The testing and analysis of results was funded by 160 kEuro allocated by 3GPP PCG and the contingency of 34 kEuro left from the earlier AMR-WB Characterisation Phase.

The results confirm that the default speech codecs (AMR-NB and AMR-WB) operate well for packet switched conversational multimedia applications over various operating conditions. The results also indicate that users prefer AMR-WB over AMR-NB. Final conclusions based on the test results are still under discussion and will be completed in the version to be brought for approval (expected at TSG-SA#24).

Table 3 lists the output specification for this WI (one TR).

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TR 26.935	Performance characterization of default codecs for PS conversational multimedia applications	SA4	-	Version 1.0.0 presented for information at TSG-SA#23.	TSG-SA#24 (June 2004)

Table 3: Status list of output TSs/TRs/CRs for Performance characterisation of default codecs for PS conversational multimedia applications

2.2 Packet Switched Streaming Rel-6 (excluding consideration of new PSS/MMS audio codecs)

TSs 26.244 “3GPP file format (3GP)" has been finalised and is brought for approval in Tdoc SP-040065. (OMA has requested early finalisation of the TS in order to be able to formally reference it in their DRM specifications.) Other PSS work such as QoE (Quality of Experience) metrics (for servers to receive information from the handset to provide the service providers means to evaluate the end user experience) and the consideration of new codecs (selection process ongoing for new PSS/MMS audio and video codecs) has been progressed. Also, Mobile DLS (Downloadable Sounds) and Mobile XMF (eXtensible Music Format) standards by the MIDI Manufacturers Association (MMA) and the Association of the Musical Electronics Industry (AMEI) were agreed as optional content formats for synthetic audio media type. RTP retransmission was agreed into Rel-6 PSS as the working assumption. One Rel-6 CR to TR 26.937 bringing simulation results on rate adaptation is brought for approval.

For PSS/MMS video codecs, it is the working assumption to adopt ITU-T H.264 (MPEG AVC) as an optional video decoder in Rel-6. It will not be adopted as a default codec, i.e., "shall be supported" will not be used in the specification text. Working assumptions have now been agreed also on AVC profiles (subset of algorithmic features) and levels (a set of limits mainly on memory and computation performance parameters) for adoption of AVC to 3GPP services. Baseline Profile at Level 1b is the working assumption for PSS, MMS,

PS conversational applications. At SA4#30 some concerns were expressed regarding the adoption of Baseline Profile at Level 1b since it is not finalised yet. If level 1b is not completed within Rel-6 time frame then level 1 would be used instead. Some further testing was also requested. Companies with still concerns about current working assumption should provide input documents to next meeting for further debate. The results of the formal subjective characterization/verification tests carried out to evaluate the performance of MPEG AVC / ITU-T Rec. H.264 compared to MPEG-4 Visual and MPEG-2 Video standards were reviewed at SA4#30 (contained in LS received from MPEG). The results verify that AVC/H.264 provides a significant coding efficiency improvement over the codecs to which it was compared.

TSG-SA#22 tasked SA4 to investigate whether signalling capabilities would be needed to allow the setting-up of connections with other Codecs than the chosen "Default" Video Codec. As a response to the request, SA4 clarifies the extensibility, signalling and usage of codecs in Tdoc SP-040062.

For PSS/MMS audio codecs, selection tests have now been completed and the selection has been progressed - see Section 2.3 for details.

Communication with OMA on DRM protection for streaming has continued. SA4 is currently working on the final specification text for the use of DRM in its specifications for Release 6: in TS 26.244 (File Format) which covers support for carrying encrypted and protected media as well as support for streaming servers to apply integrity protection using SRTP, and in TS 26.234 (Protocols and Codecs) which contains details on signalling encrypted media as well as the transport format (RTP payload wrapper format). A LS was sent to OMA giving information of the work progress in these DRM-related SA4 TSs.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.233	Transparent end-to-end PSS; General description	SA4	SA2	To be updated based on the content of PSS Rel-6.	TSG-SA#25 (September 2004)
CRs to TS 26.234	Transparent end-to-end PSS; Protocol and codecs	SA4	SA2	SA4 internal working draft (v.0.4.0) of the CR(s) exists in SA4.	TSG-SA#25 (September 2004)
TS 26.244	Transparent end-to-end PSS; File Format	SA4	SA2	Version 1.0.0 presented for information at TSG-SA#22. Version 2.0.0 presented for approval at TSG-SA#23.	TSG-SA#23 (March 2004)
TS 26.245	Transparent end-to-end PSS; Timed Text Format	SA4	SA2	SA4 internal working draft (v.0.1.7) exists in SA4.	TSG-SA#25 (September 2004)
TS 26.246	Transparent end-to-end PSS; SMIL Language Profile	SA4	SA2	Version 1.0.0 presented for information at TSG-SA#22.	TSG-SA#25 (September 2004)
CRs to TR 26.937	Transparent end-to-end PSS; RTP Usage Model	SA4		To be updated based on the content of PSS Rel-6.	TSG-SA#25 (September 2004)
CRs to TS 22.233	Stage 1	SA1		Under SA1 responsibility.	
Possible new TS	Stage2 (non-transparent aspects)	SA2		To be produced by SA2, if needed.	

Table 4: Status list of output TSs/TRs/CRs for Packet Switched Streaming Rel-6

ITU-T (SG 9) informed SA4#30 that they intend to refer to the 3GPP Timed text specification (TS 26.245). 3GPP2 (TSG-C) has already earlier explained the same to SA4 from their part.

2.3 Audio codecs (consideration of new audio codecs for PSS and MMS under WIs 'PS Streaming Rel-6'and 'MMS Enhancements', and 'Extended AMR-WB codec'[1])

PSS/MMS audio codec and Extended AMR-WB codec selection tests have been completed. Global analysis of the test results is presented for approval in Tdoc SP-040072. The results of audio codec selection at SA4#30 are brought for information in Tdoc SP-040073.

2.3.1 The codec candidates

[1] Note: This section reports jointly the related audio codec work done within Work Items "PSS Rel-6", "MMS Enhancements" and "Extended AMR-WB codec". The work in all WIs is related as the AMR-WB+ codec is considered as one candidate for PSS/MMS default audio codec, and the testing of codec candidates for all has been carried out as combined testing. (The detailed audio codec work for all WIs has been progressed jointly by the SA4 audio codec ad-hoc group.)

There were three candidate codecs for the low bit-rate range (< 32 kbit/s):

1) MPEG4 HE-AAC codec (aacPlus)
2) AMR-WB+ candidate codec[2]
3) Enhanced aacPlus (CT codec)

For the high-rate range there were two candidates:

1) MPEG4 HE-AAC codec (aacPlus)
2) Enhanced aacPlus (CT codec)

Reference codecs in the tests were AAC and AMR-WB in the low bit-rate range, and AAC and RealAudio (for informative purposes) in the high bit-rate range.

2.3.2 The selection tests and participating laboratories

The selection test consisted of two main sets of experiments, one covering the low bit-rate range and the other the high bit-rate range. In the low bit-rate range, experiments were divided further into two main blocks, “Block A“ (Intrinsic quality comparison of candidate codecs) and “Block B” (Quality comparison under stressed operating conditions), each of which were further divided into four experiments.

- Block A: Intrinsic quality comparison of candidate codecs
  - A1: 14 kbps, mono, use case A (PSS)
  - A2: 18 kbps, stereo, use case A (PSS)
  - A3: 24 kbps, mono, use case A (PSS)
  - A4: 24 kbps, stereo, use case A (PSS)
- Block B: Quality comparison under stressed operating conditions
  - B1: 14 kbps, mono, use case B (MMS), 16 kHz input and output sampling rate.
  - B2: 18 kbps, stereo, use case B (MMS),
  - B3: 14 kbps, mono, use case A (PSS), 3% random frame error rate (FER)
  - B4: 24 kbps, stereo, use case A (PSS), 3% random FER

In the high bit-rate range, the following experiments were conducted:

- 1: 32 kbps, stereo, use case A (PSS) and use case B (MMS)
- 2: 48 kbps, stereo, use case A (PSS) and use case B (MMS)
- 3-1: 32 kbps, stereo, use case A (PSS) with 1% random FER
- 3-2: 32 kbps, stereo, use case A (PSS) with 3% random FER

Eight listening laboratories participated in the low-rate testing and six for the high-rate testing. Altogether the following laboratories participated: T-Systems, NTT-AT, France Telecom R&D, Dynastat, Nokia, Ericsson, Coding Technologies, and Fraunhofer Institute. Each test condition was tested twice by two different laboratories. T-Systems and Audio Research Laboratories acted as host laboratories (to process the test material). Each processing was done twice in the two different laboratories to cross check the processing.

Audio material used for the low-rate test was classified according to four content types: Speech, Speech over Music, Speech between Music, and Music. Audio material used for high-rate test consisted of the following categories: pop (with and/or without vocals), classic (with and/or without vocals), single instruments, a capella vocals (solo and/or choir), mixed speech and music, and speech with and/or without background noise. The test material was prepared by sending first a call out for test material according to the pre-defined audio signal categories. Then, an independent selection entity (France Telecom) chose the material to be used in the selection tests. The material was not made public before tests started to avoid the codecs being "tuned" to the particular sound samples used in tests. (For more information on the content of the tests and of the audio material see the detailed Test Plans in Tdocs SP-030437 and Tdoc SP-030438 presented and approved at TSG-SA#21.)

The laboratory reports are brought for approval in Tdoc SP-040070 (subjective testing laboratories) and Tdoc SP-040071 (host and material selection laboratories). Global analysis of the results was performed by Audio Research Laboratories and the global analysis reports (low bit-rate range, high bit-rate range) are brought for approval in Tdoc SP-040072. TSG-SA approval of these reports means approval of the work done and this is required for ETSI to pay these laboratories. (The testing has been funded by the codec proponents with total funding of 487.5 kEuro, as described earlier to TSG-SA. Part of the funding is reserved for post-selection characterisation tests.)

2.3.3 The codec selection discussions

The codec selection discussion in SA4 was based both on quality performance results as given in the global analysis reports in Tdoc SP-040072 and also on analysing the codec algorithms based on technical descriptions provided by the codec proponents. The quality performance was checked against performance requirements (requirements for audio quality) and the codec algorithms were checked against codec design

[2] The AMR-WB+ candidate codec is put forward as candidate codec also within the “Extended AMR-WB” Work Item.

constraints (e.g. for implementation complexity). Figures of merit to compare and rank the codec candidates were calculated based on the quality performance and on the implementation complexity. The selection discussion in SA4 complied with the pre-defined Selection Rules (document Tdoc SP-030675 approved at TSG-SA#22).[3]

2.3.3.1 Low bit-rate range

At low bit-rates, aacPlus did not meet all the PSS/MMS audio codec performance requirements due to failure at experiment A2 (18 kbps, stereo, use case PSS) where quality lower than for AMR-WB codec was demonstrated. AacPlus was therefore eliminated from further consideration complying with the Selection Rules. The other two candidates (AMR-WB+ and Enhanced aacPlus) met the performance requirements.

All candidates were found to meet the codec design constraints.

No consistent ranking of the remaining two candidates (AMR-WB+ and Enhanced aacPlus) was possible. However, the following conclusions were agreed based on the figures of merit:

- At 14 kbps, AMR-WB+ performs better than enhanced aacPlus
- At 24 kbps, enhanced aacPlus performs better than AMR-WB+
- At 18 kbps, the ranking of the performance of AMR-WB+, compared to enhanced aacPlus, depends on the application and/or content-type:
    - enhanced aacPlus performs better than AMR-WB+ in use case B (MMS)
    - AMR-WB+ performs better than enhanced aacPlus in use case A (PSS)
- enhanced aacPlus is strong in music and speech over music content at 18 and 24 kbps
- AMR-WB+ is strong in speech and speech between music content at 14, 18, and 24 kbps
- enhanced aacPlus performs worse than the reference for speech and speech-between-music content at rates 14 and 18 kbps

2.3.3.2 High bit-rate range

Both high bit-rate candidates (aacPlus and Enhanced aacPlus) met the performance requirements. Enhanced aacPlus was found to have the best performance of these two.

Both candidates were found to meet the codec design constraints.

Based on the figures of merit, the Enhanced aacPlus was ranked better than aacPlus.

2.3.3.3 Selection of PSS/MMS Audio codec(s) for low and high bit-rate ranges

After a discussion on the respective merits of the candidate codecs and after collecting views of companies, SA4 agreed that for PSS both Enhanced aacPlus and AMR-WB+ should be recommended (i.e. “should be supported” for audio media type). Both codecs were recognised to have merits depending on the bit-rate and content type – like the figures of merit analysis shows - and recommending both was therefore agreed. Guidelines for the usage of the two codecs (their optimal operating ranges and information on the characteristics) will be provided in specifications, e.g., in informative annex to TS 26.234 and in a separate audio codec characterisation TR.

A detailed report from SA4 on the codec selection with outcome draft text for PSS (into TS 26.234) is presented for information in Tdoc SP-040073 “Audio codec selection: Report from SA4 to SA#23 on PSS/MMS audio codec selection”. (The draft text to PSS TS 26.234 is also presented in Tdoc SP-040074 for information.)

At TSG-SA#23, SA4 brings the status of the codec selection discussion for information, with request to endorse the SA4 aim to recommend two audio codecs (“should be supported”) instead of defining default codec(s) (“shall be supported”).

2.3.4 Further audio codec work

Further work is needed for the final specification text for TS 26.234 (PSS) and agreeing on codec selection and specification text for TS 26.140 (MMS). Also, since two codecs would only be recommended (instead of defining a default codec as originally targeted), SA4 acknowledged that the situation has changed. As a consequence, the format of the specification should be discussed at next SA4 meeting and the provision of deliverables (draft specifications, C-code for verification) was suspended until the format of the specification is agreed. Furthermore, the draft TS 26.234 text was requested to specify bit-rate ranges to be recommended for AMR-WB+, but this could not be agreed at SA4#30 and the issue remained to be discussed further at next SA4 meeting. Also, the critical verification tasks (verification of bit-exactness of the codec to be included in specifications against the one used during testing, and verification of implementation complexity meeting design constraints) for two codecs cannot be completed in time for TSG-SA#23. Because of all these

[3] “PSS/MMS Audio Codec and Extended AMR-WB Selection Rules” and “PSS/MMS Audio Codec Design Constraints and Performance Requirements” documents are attached in the audio codec selection report in Tdoc SP-040073.

remaining issues, SA4 is not yet bringing the codec selection for approval to TSG-SA#23.

Formal approval of codecs for PSS and MMS as well as new codec specifications and related CRs to the impacted service specifications (TSs 26.140 and 26.234) are expected to be finalised at SA4#31 and to be brought for approval at TSG-SA#24. Also, the critical verification tasks need to be completed by TSG-SA#24. The post-selection characterisation tests and possibly some remaining verification tests will be carried out after TSG-SA#24.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to 26-series AMR-WB TSs/TRs	(Relevant AMR-WB specifications of 26 –series)	SA4	-	To be prepared at SA4#31.	TSG-SA#24 (June 2004)
New audio codec TS(s)		SA4	-	Drafts to be delivered after SA4#31.	TSG-SA#24 (June 2004)
CRs to TSs 26.234 and 26.140	Transparent end-to-end PSS; Protocols and codecs, MMS; Media formats and codecs	SA4	SA2	To be prepared at SA4#31.	TSG-SA#24 (June 2004)

Table 6: List of output TSs/TRs/CRs for audio codecs.

2.4 MMS Enhancements: MMS formats and codecs

SA4 internal working draft of TS 26.140 (MMS; Media formats and codecs) has been updated to include the addition of optional support for timed text feature in order to synchronise the media types between PSS and MMS. Ongoing audio and video codec selections will impact also MMS.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.140	MMS; Media formats and codecs	SA4	SA2	Working draft (v.0.2.0) of the CR(s) exists in SA4.	TSG-SA#25 (September 2004)

Table 5: Status list of output TSs/TRs/CRs for MMS Rel-6

2.5 Speech Recognition and Speech Enabled Services: Codec Work to Support Speech Recognition Framework for Automated Voice Services

Selection tests to compare the performance of the two candidate codecs 1) AMR/AMR-WB and 2) DSR Extended Advanced Front-End candidate codec (ETSI Standard 202 212) have been carried out. Two Automatic Speech Recognition (ASR) vendors, IBM and ScanSoft carried out the testing (on voluntary basis) and provided the results by SA4#30. The vendors had a free choice over the recogniser back-end configuration.

The recognition test experiments covered a range of tasks: connected digit recognition task, sub-word trained model recognition task and tone confusability task. Testing was done in error-free channel as well as under packet loss conditions. The channel error experiments covered average channel Block Error Rates (BLER) of 1% and 3%. (The testing covered Error Patterns for UTRAN and EGPRS/GPRS channels.) In addition, performance at BLER of 10% and reconstruction quality were tested for informative purposes.

Three separate comparison cases were identified in the Recommendation Criteria (Tdoc SP-030440 approved at TSG-SA#21) for the selection with the following results:

- At low data rate at 8 kHz sampling rate (AMR 4.75 vs. DSR AFE with extension 5.6 kbit/s), DSR provided an average of 36% relative reduction in word error rate compared to AMR 4.75.
- At high data rate 8 kHz sampling rate (AMR 12.2 vs. DSR AFE and extension 5.6 kbit/s), DSR provided an average of 24% relative reduction in word error rate compared to AMR 12.2.
- At the high data rate at 16 kHz sampling rate (AMR 12.65 vs. DSR AFE and extension 5.6 kbit/s), DSR provided an average of 31% relative reduction in word error rate compared to AMR-WB 12.65.

According to the recommendation criteria, DSR is to be recommended for low data rate at 8 kHz sampling rate and for 16 kHz sampling rate, while for high data rate at 8 kHz sampling rate the result is in the “grey area” (there is no selection “winner”). The recognition performance in terms of word error rates varied from 0.6 % to 13.8 % for DSR and from 0.8 % to 21.7 % for AMR/AMR-WB, depending on the database.

SA4#30 debated the results and agreed that DSR codec is to be recommended ("should be supported") in TS 26.235. AMR or AMR-WB may also be used for SES ("may be supported") but the substantial performance advantages of DSR are recognised.

This outcome with further details is brought for information to TSG-SA#23 in altogether three documents:

1) Report on SES codec selection in Tdoc SP-040075: "SES codec selection: Report from TSG SA WG4 to SA#23 Plenary on SES codec selection",
2) Draft TS on "ANSI-C code for the Fixed-Point DSR Extended Advanced Front-end" in Tdoc SP-040064, and
3) Intended formulation into CRs for TSs 26.235 and 26.236 in Tdoc SP-040076.

The formal selection of the codecs, new codec specifications and related CRs to the impacted service specifications (TSs 26.235 and 26.236) are expected for approval at TSG-SA#24. By then the critical verification is expected to completed (verification of bit-exactness of the codec to be included in specifications against the one used during testing, and verification of implementation complexity meeting design constraints). SES codec verification plan v 1.0 is presented for information in Tdoc SP-040077. Verification is scheduled to be completed by 26th March.

Table 7 lists the intended output specifications and their status.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.235	PS Conversational Multimedia Applications; Default Codecs	SA4	SA2, T2	A document containing draft CRs presented for information at TSG-SA#23 in Tdoc SP-040076.	TSG-SA#24 (June 2004)
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	A documet containing draft CRs presented for information at TSG-SA#23 in Tdoc SP-040076.	TSG-SA#24 (June 2004)
TS 26.243	Software documentation for fixed-point DSR Extended Advanced Front-end	SA4		v. 1.0.0 is presented for information at TSG-SA#23	TSG-SA#24 (June 2004)

Table 7: Status list of output TSs/TRs/CRs for Codec Work to Support Speech Recognition Framework for Automated Voice Services

2.6 Media Codecs and Formats for IMS Messaging and Presence

A first "skeleton" working draft of TS 26.141 "IMS Messaging and Presence; Media Formats and Codecs" was prepared at SA4#28 (September 2003). Since then there has been no contributions or progress for this WI.

Table 8 lists the status of the output specification.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TS 26.141	IMS Messaging and Presence; Media formats and codecs	SA4	SA2, CN1	First skeleton working draft prepared at SA4#28. No progress at SA4#29 and SAS4#30. Lack of input.	TSG-SA#25 (September 2004)

Table 8: Status list of output TSs/TRs/CRs for Media Codecs and Formats for IMS Messaging and Presence

2.7 Definition of MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS)

Forward Error Correction (FEC) has been further debated, but more work is needed. In order to run application layer FEC simulation and comparison of proposed FEC solutions, SA4 would need bit and/or SDU error patterns for the MBMS radio bearer(s) and has therefore requested (in LS to GERAN1, GERAN2, RAN1, RAN2 and RAN3) information on simulation parameters and/or preparation of such error patterns reflecting realistic statistical distributions.

At SA4#30, SA4 agreed on a working assumption to use HTTP as the transport protocol for the point-to-point repair service.

The SA4 TS 26.346 (MBMS Protocols and Codecs), is still at an early development stage. The foreseen content of the TS was clarified at SA4#30 by the WI rapporteur to be:

MBMS download:

1. Definition of application system architecture
2. Specification of FLUTE transport usage
3. Specification of error robustness mechanisms (e.g., point-to-point repair)
4. Specification of MBMS service announcement
5. Specification of security features
6. Specification of media codecs
7. Advanced applications (e.g., carousel downloading)

MBMS streaming:

1. Definition of application system architecture
2. Specification of transport protocols
3. Specification of error robustness mechanisms (e.g., FEC)
4. Specification of MBMS service announcement
5. Specification of security features
6. Specification of media codecs
7. Other features

Some concern was expressed at SA4#30 on SA4 being able to cover all the above items within Rel-6 timeframe. Some companies supported to focus on download service in Rel-6, while some other companies disagreed and stated that both streaming and download should be included in Rel-6. It was concluded that the work is contribution driven and if companies are interested to make certain features or services happen in Rel-6 they are invited to make contributions.

To progress the work, the SA4 MBMS issues will be discussed in the PSM SWG ad-hoc meeting on 5-6 April.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TS 26.346	MBMS Protocols and Codecs	SA4	SA2, SA3	First skeleton working draft prepared. FEC studies in progress in SA4.	TSG-SA#26 (December 2004); or earlier by focusing the content of TS 26.346
TS 22.246	MBMS user services; Stage 1	SA1			Approved at TSG-SA#22

Table 9: Status list of output TSs/TRs/CRs for Definition of MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS)

3. Work Item Descriptions

Two new Release 6 WIDs are brought for approval: 1) “Codec Enhancements for Packet Switched Conversational Multimedia Applications” in Tdoc SP-040066 and 2) “3G-324M updates in Release 6” in Tdoc SP-040067. The supporting companies of both WIDs are aware of the limited time until Rel-6 will be frozen, and the intention is to keep the work within Rel-6 timeframe. Both WIs are on enhancements and updates and therefore the work will be very focused.

3.1 Codec Enhancements for Packet Switched Conversational Multimedia Applications (Rel-6)

Enhancements for the set of codecs for PS Conversational Multimedia Applications should be considered for each 3GPP release in order to provide the best possible QoS and also to enable harmonisation of the set of codecs throughout 3GPP. Release 6 Work Items exist for the consideration of codecs for all other services/applications (PSS, MMS, MBMS, IMS Messaging and Presence) but such is missing for Packet Switched Conversational Multimedia Applications. The objective is to consider enhanced codecs (and the related transport protocols) into TSs 26.235 and 26.236. Any changes in the set of codecs (and in the related transport protocols) should be well studied and justified as giving improved performance. The priority in this work is in the harmonisation of codecs with other services and especially to consider if any of the enhanced codecs to be (potentially) included in Rel-6 for other services should be added also for PS conversational applications to obtain improved performance and harmonisation benefits. (E.g. the AVC video codec has been proposed also for PS conversational applications.)

3.2 3G-324M Improvements (Rel-6)

The 3GPP circuit-switched mobile video telephony standard 3G-324M is now being deployed in several countries and is one of the major services distinguishing 3G networks from 2G. The interest for the 3G324M service is high and will probably continue to be so in the near future. No major changes have been made to the 3G-324M specifications since 1999, although there now exist better alternatives for media encoding than originally specified and the service requirements have also become clearer. The objective in the WID is to specify and agree on a number of minor backwards-compatible changes to the 3G-324M specifications (TS 26.111 and TR 26.911) that will improve the standard and are possible to incorporate in Release 6.

4. Communication with other WGs/TSGs/groups

Table 10 gives a complete list of the LSs sent out (to other WGs/TSGs and 3GPP external groups) from SA4#30.

Tdoc no.	Title	Intended for	Copy to
TD S4-040132	Reply LS on Multiple MBMS Issues	TSG RAN WG3	TSG SA WG2, TSG SA WG1, TSG RAN WG1, TSG RAN WG2, TSG RAN WG4, TSG GERAN WG1, TSG GERAN WG2
TD S4-040154	Reply LS on Harmonisation of AMR Configurations	TSG SA WG2, TSG GERAN WG1, TSG GERAN WG2, TSG RAN WG2, TSG CN WG4, TSG T WG1	
TD S4-040157	Reply to “LS on service announcement and UE joining procedure”	TSG SA WG3	TSG SA WG1, TSG SA WG2
TD S4-040123	Liaison Statement to MPEG on generalized container files	ISO/IEC SC29 WG11 (MPEG)	OMA BAC DLDRM
TD S4-040160	Reply LS on S4-030781 GZip Extensions	W3C SVG Working Group	
TD S4-040122	LS on Status of the PSS and 3GP file format specifications	OMA-BAC DL+DRM	
TD S4-040190	Reply to Reply LS on Optimisation of Voice over IMS	TSG RAN WG2, TSG SA WG2	TSG CN WG1, TSG RAN WG3
TD S4-030133	Reply LS on "LS on LS on HTTP based services and other procedures"	TSG SA WG3	TSG SA WG2, TSG CN WG1
TD S4-040130	LS on Request for simulation parameters and/or error patterns for MBMS	TSG GERAN1, TSG GERAN2, TSG RAN WG1, TSG RAN WG2, TSG RAN WG3	TSG SA WG2

Table 10: SA4 LSs sent out since TSG-SA#22

The main issues in the LSs are:

- Discussion on un-synchronisation of MBMS flows between cells causing data losses has continued. For developing FEC schemes (to reduce the amount of data losses the codecs have to cope with), SA4 asks indication from RAN3 on the expected average and maximum (worst case) duration of data losses in case of inter RNC cell changes.
- SA4 agrees with SA2 that harmonisation of AMR configurations for CS Speech Telephony in Rel-6 would be a valuable enhancement for systems supporting TFO/TrFO. SA4 agrees to co-ordinate the task of selecting a single preferred combination and plans to agree on the final combination at SA4#31. SA4 further requests GERAN1, GERAN2, RAN2, CN4, T1 to inform SA4 of any limitations they might have in reducing the set of preferred AMR combinations to a single set from Release 6.
- As a response to SA3, SA4 sees no problems on inclusion of traffic protection mechanism indication in the MBMS Service Announcement . On “Joining availability time” (not seen needed or reservations expressed by SA1 and SA2), SA4 prefers to refrain from specifying such a feature until this is clearly seen required and/or described in the MBMS architecture.
- Information of work related to packaging of media files has been exchanged with MPEG.
- SA4 has reviewed SVG (Scalable Vector Graphics) v. 1.2 draft specification received from W3C, and acknowledges its merits but sees it providing only partial solution for SA4 needs for Rel-6 and asks W3C to take SA4 comments for improvement into consideration.
- Communication with OMA on DRM protection of streams has continued. SA4 has explained the content of DRM

related SA4 specifications (TSs 26.244 and 26.234) and their expected approval dates.

- Discussion on optimisation of the radio bearer to support voice services over IMS has continued with RAN2, SA2, CN1 and RAN3. SA4 has responded to RAN2 complementing earlier answers from SA2 to RAN3's questions (e.g. on differentiation of RTP and RTCP Packets and QoS attributes).
- SA4 is currently not in the position to answer the questions from SA3 on using HTTP based authentication mechanism for MBMS. SA4 however informs SA3 that it has a working assumption to use HTTP as the transport protocol for the repair service.
- In order to run application layer FEC simulation, SA4 would need bit and/or SDU error patterns for the MBMS radio bearer and therefore asks information on simulation parameters and/or preparation of such error patterns from GERAN1, GERAN2, RAN1, RAN2 and RAN3.

5. Maintenance of Releases

One CR to TS 26.073 (Rel-5) "ANSI-C code for the AMR speech codec" is brought for approval in Tdoc SP-040078:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.073	019		Rel-5	Correction of AMR DTX functionality	F	5.2.0	S4	TSG-SA WG4#30	S4-030752

Two CRs toTS 26.104 (Rel-5, Rel-6) "ANSI-C code for the floating-point AMR speech codec" are brought for approval in Tdoc SP-040079:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.104	031		Rel-5	Correction of floating point AMR DTX functionality	F	5.3.0	S4	TSG-SA WG4#30	S4-030753
26.104	032		Rel-6	Correction of floating point AMR DTX functionality	A	6.0.0	S4	TSG-SA WG4#30	S4-040158

One CR to TR 26.937 (Rel-6) "PSS: RTP Usage Model" is brought for approval in Tdoc SP-040080:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.937	001	2	Rel-6	Rate Adaptation simulation results for PSS	D	5.0.0	S4	TSG-SA WG4#30	S4-040159

6. Miscellaneous

- TSG-SA#22 tasked SA4 to investigate whether signalling capabilities would be needed to allow the setting-up of connections with other Codecs than the chosen "Default" Video Codec. As a response to the request, SA4 clarifies the extensibility, signalling and usage of codecs in Tdoc SP-040062. SA4 notes that it is possible to signal both 3GPP-endorsed codecs (e.g. default codecs and recommended codecs) and other codecs since the signalling protocols allow for the use of other codecs in 3GPP multimedia services. However, the use of other codecs is outside the scope of 3GPP specifications and is considered as a proprietary extension from the 3GPP service perspective. Therefore, for such extensions the exact details, formats and behavior of the signalling need to be defined outside of 3GPP specifications. Extensions can be used in 3GPP compliant implementations, provided that they can utilize the signalling protocols and structures of the base 3GPP service.

7. Documents presented for information

Draft TR:

SP-040063	TR 26.935 "Packet switched conversational multimedia applications; Default codecs; Performance characterization" V1.0.0 (Release 6)	SA WG4	7.4.3	Information

Audio codec selection:

SP-040073	Audio codec selection: Report from SA4 to SA#23 on PSS/MMS audio codec selection	SA WG4	7.4.3	Information
SP-040074	Audio codec selection: Proposed text on audio media type into TS 26.234 Rel-6	SA WG4	7.4.3	Information

SES codec selection (including one draft TS):

SP-040064	TS 26.243 "Software documentation for fixed-point DSR Extended Advanced Front-end" V. 1.0.0 (Release 6)	SA WG4	7.4.3	Information

SP-040075	SES codec selection: Report from TSG SA WG4 to SA#23 Plenary on SES codec selection	SA WG4	7.4.3	Information
SP-040076	SES codec selection: Proposed CRs from TSG SA4 to introduce SES to Release 6 specifications	SA WG4	7.4.3	Information
SP-040077	SES codec selection: SES verification plan v 1.0 (for information)	SA WG4	7.4.3	Information

Others:

SP-040062	Signaling of codecs (reply to SA#23)	SA WG4	7.4.1	Information

8. Approval requested

SA4 requests TSG-SA#23 to approve the following:

PS conversational default codec characterisation laboratory reports:

SP-040068	3G PS conversation tests Phase 2 : Report from FT R&D for Host Lab and Subjective Testing Lab functions	SA WG4	7.4.3	Approval
SP-040069	3G PS conversation tests Phase 2 : Report from Dynastat on Global Analysis of Phase 1 & Phase 2 Conversation Test results	SA WG4	7.4.3	Approval

(Note: Approval of these reports means approval of the work and this is required for ETSI to pay the laboratories.)

PSS/MMS Audio Codec laboratory reports:

SP-040070	Audio codec selection tests: Reports from Subjective Testing Labs	SA WG4	7.4.3	Approval
SP-040071	Audio codec selection tests: Reports from "Host" and "Selection of items" Laboratories	SA WG4	7.4.3	Approval
SP-040072	Audio codec selection tests: Reports from "Global Analysis" Laboratory	SA WG4	7.4.3	Approval

(Note: Approval of these reports means approval of the work and this is required for ETSI to pay the laboratories.)

New TS:

SP-040065	3GPP TS 26.244 Transparent end-to-end packet switched streaming service (PSS);"3GPP file format (3GP)" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Approval

New WIDs:

SP-040066	Work Item Description on Codec Enhancements for Packet Switched Conversational Multimedia Applications (Release 6)	SA WG4	7.4.3	Approval
SP-040067	Work Item Description on 3G-324M updates in Release 6	SA WG4	7.4.3	Approval

Change Requests:

SP-040078	CR 26.073 019 Correction of AMR DTX functionality (Release 5)	SA WG4	7.4.3	Approval
SP-040079	CR 26.104 031-032 "Correction of floating point AMR DTX functionality" (Release 5 and Release 6)	SA WG4	7.4.3	Approval
SP-040080	CR 26.937 001 rev 2 on Rate Adaptation simulation results for PSS (Rel-6)	SA WG4	7.4.3	Approval

List of Annexes:

Annex 1 (in a separate .ppt-file attached to this status report): SA4 Slides Presentation at TSG-SA#23

TSG-SA WG4 (SA4) - CODEC Status Report at TSG-SA#23

Kari Järvinen
TSG-SA WG4 Chairman

- ***SA4 status report in Tdoc SP-040061***
- ***These slides in separate .ppt file in Annex 1 of Tdoc SP-040061***

Content

- **General issues** 
- **Review of SA4 work progress for Release 6**
- **Maintenance of releases**
- **Miscellaneous**
- **Documents for information**
- **Documents for approval**

General: SA4 officials

(No changes)

- **Chairman:** **Kari Järvinen (Nokia, ETSI)**
- **Vice Chairpersons:** **Catherine Quinquis (Orange, ETSI) and Frédéric Gabin (NEC Technologies, ETSI)**
- **Secretary:** **Paolo Usai (3GPP Support)**
- **Sub Working Groups / Ad-Hoc groups:**
  - **Speech Quality (SQ) SWG** — **Paolo Usai (ETSI)**
  - **PS Multimedia (PSM) SWG** — **Rolf Hakenberg (Panasonic, ETSI)**
  - **Audio Codec Ad-Hoc group** — **Imre Varga (Siemens, ETSI)**
  - **Video Codec Ad-Hoc group** — **Nikolaus Färber (Fraunhofer Gesellschaft, ETSI)**

The second two year term of the current SA4 Chairman ends at the next SA4 meeting (SA4#31 in May), and therefore an election of the SA4 Chairman will take place at the next SA4 meeting.

General: SA4 meetings

- **Meetings held**
  - **SA4#30** — **23-27 February, 2004** — **Host: The European Friends of 3GPP; Venue: Malaga, Spain**
- **Future meetings**
  - **SA4 PSM SWG Ad-Hoc** — **5-7 April, 2004** — **Host: Ericsson; Venue: Lund, Sweden**
  - **SA4#31** — **17 - 21 May, 2004** — **Host: VoiceAge; Venue: Montreal, Canada**
  - **SA4#32** — **16 - 20 August, 2004** — **Host: tbd; Venue: tbd**
  - **SA4#33** — **22 - 26 November, 2004** — **Host: The European Friends of 3GPP; Venue: Helsinki, Finland**
- **Meeting statistics**

Meeting	Number of (new) input documents	Number of participants	Number of incoming LSs	Number of outgoing LSs/communications
SA4#25	115	55	13	9
SA4#25bis	164	50	14	11
SA4#26	171	55	18	17
SA4#27	142	65	19	14
SA4#28	128	55	18	9
SA4#29	167	53	18	8
SA4#30	**215**	**74**	**27**	**9**

General: Input documents

- SP-040061, TSG S4 Status Report at TSG-SA#23, SA WG4 Chairman, 7.4.1, Information
- SP-040062, Signaling of codecs (reply to SA#23), SA WG4, 7.4.1, Information
- SP-040063, TR 26.935 "Packet switched conversational multimedia applications; Default codecs; Performance characterization" V1.0.0 (Release 6), SA WG4, 7.4.3, Information
- SP-040064, TS 26.243 "Software documentation for fixed-point DSR Extended Advanced Front-end" V. 1.0.0 (Release 6), SA WG4, 7.4.3, Information
- SP-040065, 3GPP TS 26.244 Transparent end-to-end packet switched streaming service (PSS);"3GPP file format (3GP)" Version 2.0.0 (Release 6), SA WG4, 7.4.3, Approval
- SP-040066, Work Item Description on Codec Enhancements for Packet Switched Conversational Multimedia Applications (Release 6), SA WG4, 7.4.3, Approval
- SP-040067, Work Item Description on 3G-324M updates in Release 6, SA WG4, 7.4.3, Approval
- SP-040068, 3G PS conversation tests Phase 2 : Report from FT R&D for Host Lab and Subjective Testing Lab functions, SA WG4, 7.4.3, Approval
- SP-040069, 3G PS conversation tests Phase 2 : Report from Dynastat on Global Analysis of Phase 1 & Phase 2 Conversation Test results, SA WG4, 7.4.3, Approval
- SP-040070, Audio codec selection tests: Reports from Subjective Testing Labs, SA WG4, 7.4.3, Approval
- SP-040071, Audio codec selection tests: Reports from "Host" and "Selection of items" Laboratories, SA WG4, 7.4.3, Approval
- SP-040072, Audio codec selection tests: Reports from "Global Analysis" Laboratory, SA WG4, 7.4.3, Approval
- SP-040073, Audio codec selection: Report from SA4 to SA#23 on PSS/MMS audio codec selection, SA WG4, 7.4.3, Information
- SP-040074, Audio codec selection: Proposed text on audio media type into TS 26.234 Rel-6, SA WG4, 7.4.3, Information
- SP-040075, SES codec selection: Report from TSG SA WG4 to SA#23 Plenary on SES codec selection, SA WG4, 7.4.3, Information
- SP-040076, SES codec selection: Proposed CRs from TSG SA4 to introduce SES to Release 6 specifications, SA WG4, 7.4.3, Information
- SP-040077, SES codec selection: SES verification plan v 1.0 (for information), SA WG4, 7.4.3, Information
- SP-040078, CR 26.073 019 Correction of AMR DTX functionality (Release 5), SA WG4, 7.4.3, Approval
- SP-040079, CR 26.104 031-032 "Correction of floating point AMR DTX functionality" (Release 5 and Release 6), SA WG4, 7.4.3, Approval
- SP-040080, CR 26.937 001 rev 2 on Rate Adaptation simulation results for PSS (Rel-6), SA WG4, 7.4.3, Approval

General: Input documents - highlights

- **For approval:**
  - **1 TS**
  - **2 new WIDs**
  - **4 CRs**
  - **Laboratory reports on PS conversational default codecs characterisation (host and subjective testing, global analysis)**
  - **Laboratory reports on PSS/MMS audio codec testing (subjective testing, host and item selection, global analysis)**

    Note: TSG-SA approval of these laboratory reports means approval of the work done; this is required for ETSI to pay the involved laboratories
- **For information:**
  - **1 draft TS**
  - **1 draft TR**
  - **Report on PSS/MMS audio codec selection (and a related document)**
  - **Report on Speech Enabled Services codec selection (and related documents)**
  - **Reply to TSG-SA on signalling of codecs**

Content

- General issues
- Review of SA4 work progress for Release 6
- Maintenance of releases
- Miscellaneous
- Documents for information
- Documents for approval

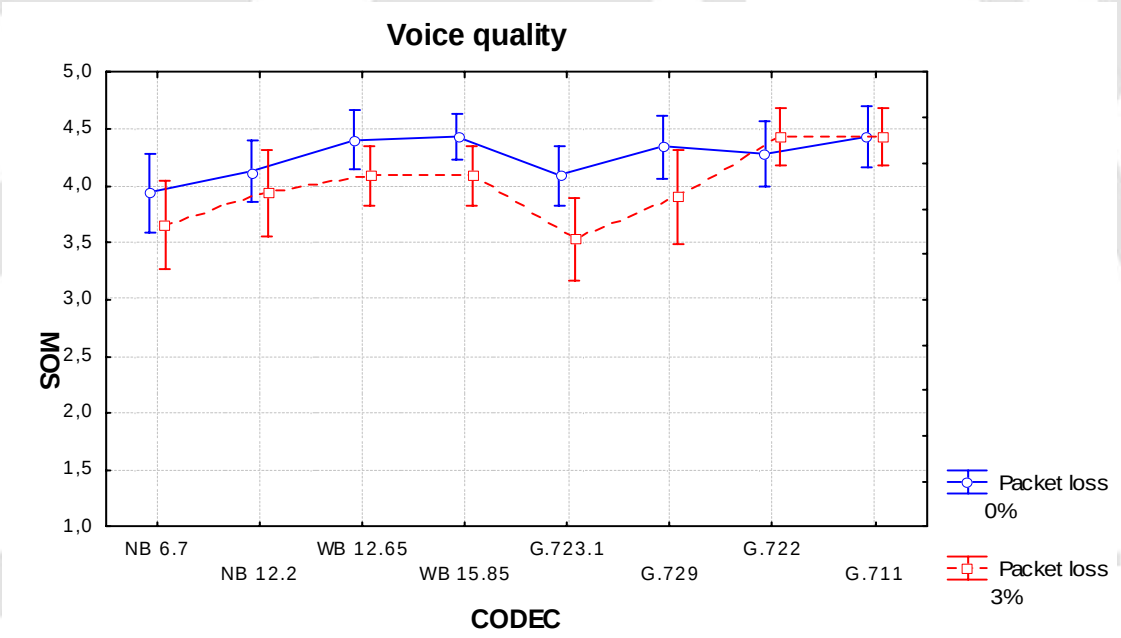
Release 6 WIs

- **Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications**
- **Packet Switched Streaming (PSS) Rel-6**
- **Extended AMR-WB codec ("AMR-WB+") Targeted for PS Streaming and Messaging Services**
- **MMS Enhancements: MMS codecs and formats**
- **Speech Recognition and Speech Enabled Services: Codec Work to Support Speech Recognition Framework for Automated Voice Services**
- **Media Codecs and Formats for IMS Messaging and Presence**
- **MBMS User Services: Definition of MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS)**

Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications

- **Phase 2 testing (comparison of quality offered by various speech codecs) completed; host and subjective testing report presented for approval in Tdoc SP-040068.**
  - AMR-NB (modes 6.7 and 12.2 kbit/s), AMR-WB (modes 12.65 and 15.85 kbit/s), ITU-T G.723.1 (mode 6.4 kbit/s), ITU-T G.729 (mode 8 kbit/s), ITU-T G.722 (mode 64 kbit/s) and ITU-T G.711 (64 kbit/s)
  - Transmission error conditions covered IP packet loss of 0% and 3%
  - Two languages (French and Arabic)
  - France Telecom R&D acted as host and listening laboratory

- **Example of results: Mean Opinion Scores obtained with the Voice Quality criterion (in French)**



Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications

- **Phase 1 testing (AMR-NB and AMR-WB codecs) performed earlier by TSG-SA#22.**
- **Global analysis of Phase 1 and 2 results by Dynastat for approval in Tdoc SP-040069.**
- **Draft TR 26.935 (v.1.0.0) on the performance characterisation is presented for information in Tdoc SP-040063.**
- **TR 26.935 gives information of the performance of PS conversational multimedia applications under various operating and transmission conditions (e.g., considering radio transmission errors, IP packet losses, end-to-end delays, and several types of background noise):**
  - Results confirm that the default speech codecs (AMR-NB and AMR-WB) operate well for PS conversational multimedia applications over various operating conditions. The results also indicate that users have clear preference to AMR-WB over AMR-NB.
  - Final conclusions based on the test results are still under discussion and will be completed in the version to be brought for approval (expected at TSG-SA#24). (Discussion ongoing on SA4 email reflector.)
  - The performance results may be used e.g. as guidance for network planning and to appropriately adjusting radio network parameters.
- **Specifications:**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TR 26.935	Performance characterization of default codecs for PS conversational multimedia applications	SA4	-	Version 1.0.0 presented for information at TSG-SA#23.	TSG-SA#24 (June 2004)

Packet Switched Streaming (PSS) Rel-6: General

- **TSs 26.244 "3GPP file format (3GP)" finalised and is brought for approval in Tdoc SP-040065. (Draft version presented for information at TSG-SA#22.)**
- **Consideration of new codecs: selection process ongoing for new PSS/MMS audio and video codecs. (Related WIs: MMS Enhancements and Extended AMR-WB)**
- **Other work progressed, e.g:**
  - Optional quality metrics (for servers to receive information from the handset to provide the service providers means to evaluate the end user experience - Quality of Experience)
  - Mobile DLS (Downloadable Sounds) and Mobile XMF (eXtensible Music Format) standards by the MIDI Manufacturers Association (MMA) and the Association of the Musical Electronics Industry (AMEI) agreed as optional content formats for synthetic audio media type
  - Rel-6 CR to TR 26.937 bringing simulation results on rate adaptation is brought for approval
  - ITU-T (SG 9) informed SA4#30 that they intend to refer to the 3GPP Timed text specification (TS 26.245). 3GPP2 (TSG-C) has already earlier explained the same to SA4 from their part.
- **Communication with OMA on DRM protection for streaming has continued.**
  - SA4 is currently working on the final specification text for the use of DRM into TS 26.244 (File Format) and TS 26.234 (Protocols and Codecs). LS sent to OMA giving information of the work progress in these DRM-related SA4 TSs.

PSS Rel-6: Specifications

- **Status of specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.233	Transparent end-to-end PSS; General description	SA4	SA2	To be updated based on the content of PSS Rel-6.	TSG-SA#25 (September 2004)
CRs to TS 26.234	Transparent end-to-end PSS; Protocol and codecs	SA4	SA2	SA4 internal working draft (v.0.4.0) of the CR(s) exists in SA4.	TSG-SA#25 (September 2004)
TS 26.244	Transparent end-to-end PSS; File Format	SA4	SA2	Version 1.0.0 presented for information at TSG-SA#22. Version 2.0.0 presented for approval at TSG-SA#23.	TSG-SA#23 (March 2004)
TS 26.245	Transparent end-to-end PSS; Timed Text Format	SA4	SA2	SA4 internal working draft (v.0.1.7) exists in SA4.	TSG-SA#25 (September 2004)
TS 26.246	Transparent end-to-end PSS; SMIL Language Profile	SA4	SA2	Version 1.0.0 presented for information at TSG-SA#22.	TSG-SA#25 (September 2004)
CRs to TR 26.937	Transparent end-to-end PSS; RTP Usage Model	SA4		To be updated based on the content of PSS Rel-6.	TSG-SA#25 (September 2004)
CRs to TS 22.233	Stage 1	SA1		Under SA1 responsibility.	
Possible new TS	Stage2 (non-transparent aspects)	SA2		To be produced by SA2, if needed.	

PSS/MMS Video Codecs

- **Working assumption to adopt ITU-T H.264 (MPEG AVC) as an optional video decoder in Rel-6 (PSS, MMS, PS conversational). It will not be adopted as a default codec, i.e., "shall be supported" will not be used in the specification text.**
- **Working assumptions now agreed also on AVC/H.264 profiles (subset of algorithmic features) and levels (a set of limits mainly on memory and computation performance parameters) for adoption to 3GPP services.**
- **The results of formal MPEG subjective verification tests reviewed: verify that AVC/H.264 provides a significant improvement over the earlier MPEG video codec standards.**
- **At SA4#30 some concerns still expressed, and further testing requested. Companies with concerns about current working assumption should provide input documents to next meeting for further debate.**
- **Related issue: TSG-SA#22 tasked SA4 to investigate whether signalling capabilities would be needed to allow the setting-up of connections with other Codecs than the chosen "Default" Video Codec. As a response, SA4 clarifies the extensibility, signalling and usage of codecs in Tdoc SP-040062.**

PSS/MMS Audio Codecs: General

- **PSS/MMS audio codec and Extended AMR-WB codec selection tests have been completed.**
- **The related laboratory reports are brought for approval in Tdocs SP-040070 (subjective testing), SP-040071 (host and selection of items) and SP-040072 (global analysis of results).**
- **The results of audio codec selection at SA4#30 are brought for information in Tdoc SP-040073 "Audio codec selection: Report from SA4 to SA#23 on PSS/MMS audio codec selection".**
- **The codec candidates:**

  Three candidate codecs for the low bit-rate range (< 32 kbit/s):
  - **Codec 1: MPEG4 HE-AAC codec (aacPlus)**
  - **Codec 2: AMR-WB+ candidate codec**
  - **Codec 3: Enhanced aacPlus (CT codec)**

  Two candidate codecs for the high bit-rate range:
  - **Codec 1: MPEG4 HE-AAC codec (aacPlus)**
  - **Codec 2: Enhanced aacPlus (CT codec)**

- **Reference codecs: AAC and AMR-WB in the low bit-rate range; AAC and RealAudio (for informative purposes) in the high bit-rate range**

PSS/MMS Audio Codecs: Selection tests

- **The selection tests consisted of two main sets of experiments, one covering the low bit-rate range and the other the high bit-rate range. (Detailed Test Plans presented for information at TSG-SA#21.)**
- **In the low bit-rate range, experiments were divided further into two main blocks, "Block A" (Intrinsic quality comparison of candidate codecs) and "Block B" (Quality comparison under stressed operating conditions)**
  - A1: 14 kbps, mono, use case A (PSS)
  - A2: 18 kbps, stereo, use case A (PSS)
  - A3: 24 kbps, mono, use case A (PSS)
  - A4: 24 kbps, stereo, use case A (PSS)
  - B1: 14 kbps, mono, use case B (MMS), 16 kHz input and output sampling rate
  - B2: 18 kbps, stereo, use case B (MMS)
  - B3: 14 kbps, mono, use case A (PSS), 3% random frame error rate (FER)
  - B4: 24 kbps, stereo, use case A (PSS), 3% random FER
- **In the high bit-rate range, the following experiments were conducted**
  - 1: 32 kbps, stereo, use case A (PSS) and use case B (MMS)
  - 2: 48 kbps, stereo, use case A (PSS) and use case B (MMS)
  - 3-1: 32 kbps, stereo, use case A (PSS) with 1% random FER
  - 3-2: 32 kbps, stereo, use case A (PSS) with 3% random FER

PSS/MMS Audio Codecs: Tasks and the involved laboratories

- **Eight listening laboratories: T-Systems, NTT-AT, France Telecom R&D, Dynastat, Nokia, Ericsson, Coding Technologies, and Fraunhofer Institute. Each test condition was tested twice by two different laboratories.**
- **T-Systems and Audio Research Laboratories acted as host laboratories (to process the test material). Each processing was done twice in the two different laboratories to cross check the processing.**
- **Audio material used for the low bit-rate test was classified according to four content types: Speech, Speech over Music, Speech between Music, and Music. Audio material used for high bit-rate test consisted of several music categories: e.g. pop, classic, single instruments, a capella vocals.**
- **A call was first sent out for test material according to the (above) pre-defined audio signal categories. Then, an independent selection entity (France Telecom) chose the material to be used in the selection tests. (The material was not made public before tests started to avoid the codecs being "tuned" to the particular sound samples used in tests.)**
  - The result of material selection was 12 files:
    - 56 -> 7 music items (2 classical, 2 pop, 2 single instruments and 1 vocal)
    - 49 -> 5 speech items (2 speech over music, 2 speech with background noise and 1 speech)
  - 4 other files were selected to be used as training items
  - Length 5 seconds for speech items and 10 seconds for the others; sampling frequency 48 KHz.
- **Global analysis of the results by Audio Research Laboratories.**
- **Testing process funded by codec proponents (with total funding of 487.5 kEuro).**

PSS/MMS Audio Codecs: Codec selection

- **The codec selection in SA4 is based both on quality performance results (as given in the global analysis in Tdoc SP-040072) and also on analysing the codec algorithms (based on technical descriptions provided by the codec proponents).**
- **Key documents agreed before selection along the process: Test Plans, Performance Requirements (for audio quality), Design Constraints (e.g. limits for complexity) and Selection Rules.**
- **Selection Rules (approved at TSG-SA#22 in Tdoc SP-030675):**
  - **Rule 1**: candidates must fulfill the Design Constraints (e.g. implementation complexity)
  - **Rule 2**: candidates must meet the Performance Requirements
  - **Rule 3:** gives a set of Figures of Merit to be used to analyse and compare codecs
- **Basic performance requirements (error free case):**

Criteria	Performance requirement for low bit-rate range	Performance requirement for high bit-rate range
Audio quality	No worse than the better of AMR-WB and MPEG-4 AAC LC at the same bitrate in any test case based on the average performance over music, mixed content and speech, and better in at least one test case. Test cases covered shall be 14kbit/s mono, 18kbit/s stereo, 24kbit/s mono and 24kbit/s stereo	Better than AAC in all test cases. Test cases are 24kbit/s mono, 24kbit/s stereo, 32kbit/s stereo and 48kbit/s stereo.

- **Encoder complexity limits are more stringent for MMS than for PSS (in design constraints)**

Note: Performance Requirements, Design Constraints, and Selection Rules are attached into Tdoc SP-040073.

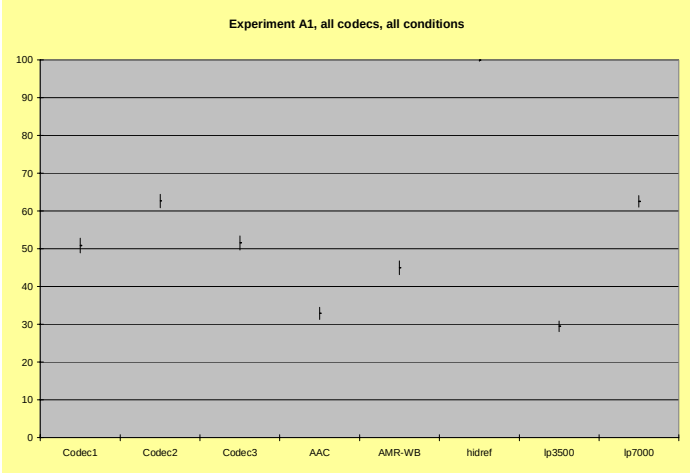
PSS/MMS Audio Codecs: Low bit-rate range

- **aacPlus did not meet all the PSS/MMS performance requirements due to failure at experiment A2 (18 kbps, stereo, use case PSS) where quality lower than for AMR-WB was demonstrated. AacPlus was therefore eliminated from further consideration (complying with the agreed Selection Rules).**
- **AMR-WB+ and Enhanced aacPlus met all the performance requirements.**
- **All candidates met the codec design constraints.**
- **No consistent ranking of the remaining two candidates (AMR-WB+ and Enhanced aacPlus) was possible. However, the following conclusions were agreed based on the figures of merit:**
  - At 14 kbps AMR-WB+ performs better than enhanced aacPlus
  - At 24 kbps enhanced aacPlus performs better than AMR-WB+
  - At 18 kbps the ranking of the performance of AMR-WB+, compared to enhanced aacPlus, depends on the application and/or content-type:
    - enhanced aacPlus performs better than AMR-WB+ in use case B (MMS)
    - AMR-WB+ performs better than enhanced aacPlus in use case A (PSS)
  - enhanced aacPlus is strong in music and speech over music content at 18 and 24 kbps
  - AMR-WB+ is strong in speech and speech between music content at 14, 18, and 24 kbps
  - enhanced aacPlus performs worse than the reference for speech and speech-between-music content at rates 14 and 18 kbps

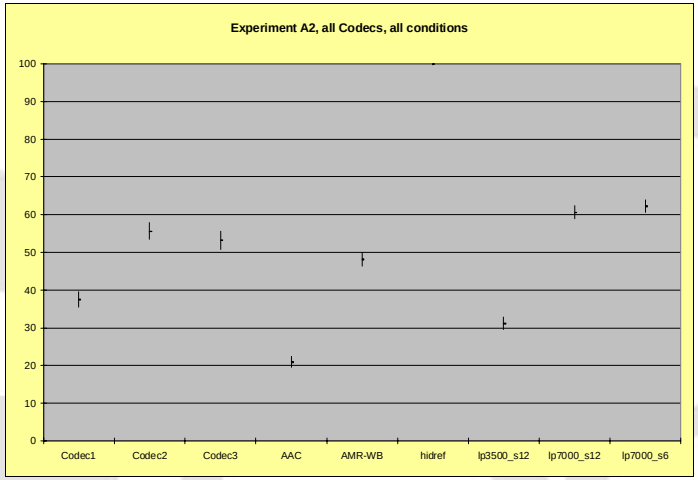
PSS/MMS Audio Codecs: High bit-rate range

- **Both high bit-rate candidates (aacPlus and Enhanced aacPlus) met the performance requirements. Enhanced aacPlus was found to have the best performance of these two.**
- **Both candidates were found to meet all the codec design constraints.**
- **Based on the figures of merit, the Enhanced aacPlus was ranked better than aacPlus.**

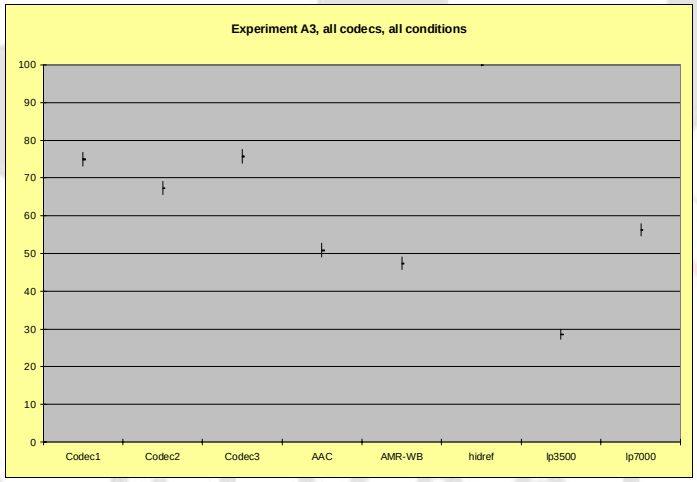
PSS/MMS Audio Codecs: Extracts from low bit-rate results



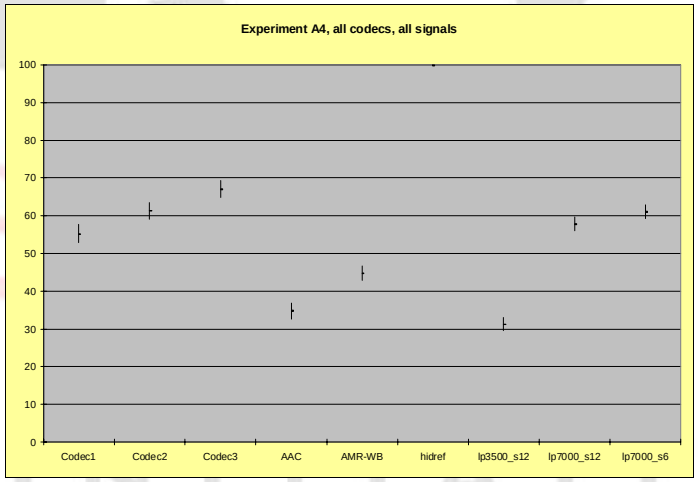
A1: 14 kbps, mono, use case A (PSS)



A2: 18 kbps, stereo, use case A (PSS)

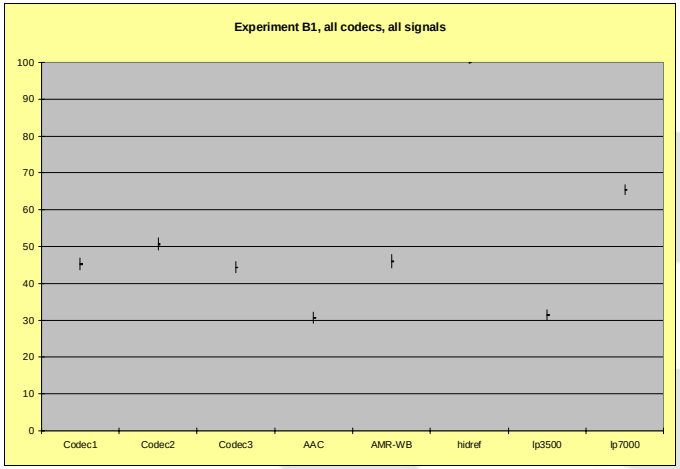


A3: 24 kbps, mono, use case A (PSS)

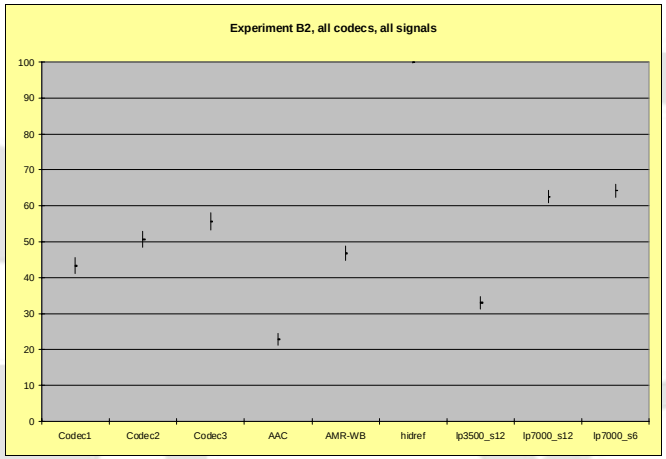


A4: 24 kbps, stereo, use case A (PSS)

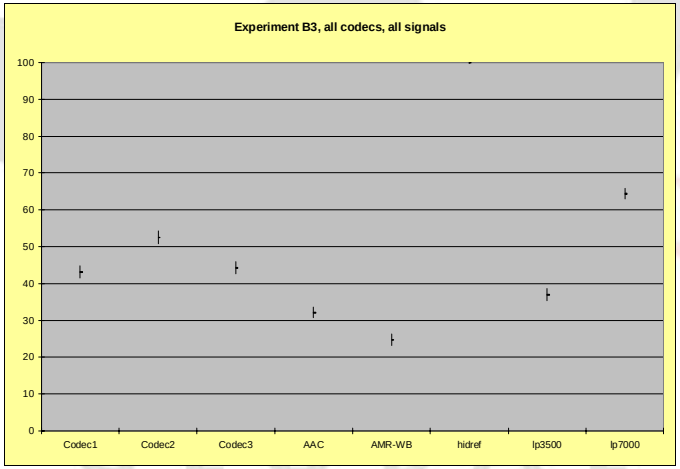
PSS/MMS Audio Codecs: Extracts from low bit-rate results (continued)



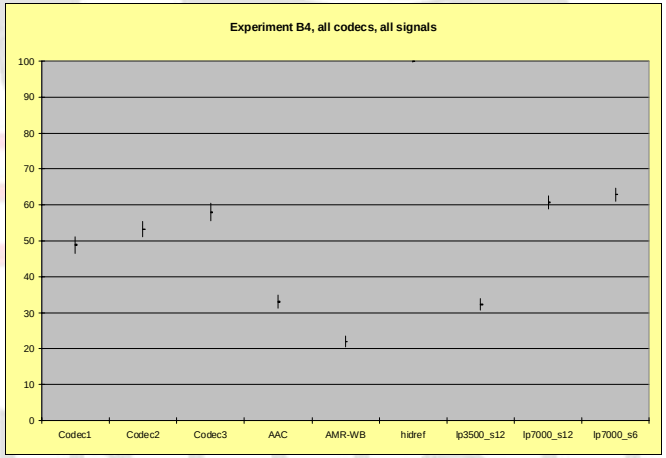
B1: 14 kbps, mono, use case B (MMS), 16 kHz input and output sampling rate



B2: 18 kbps, stereo, use case B (MMS)

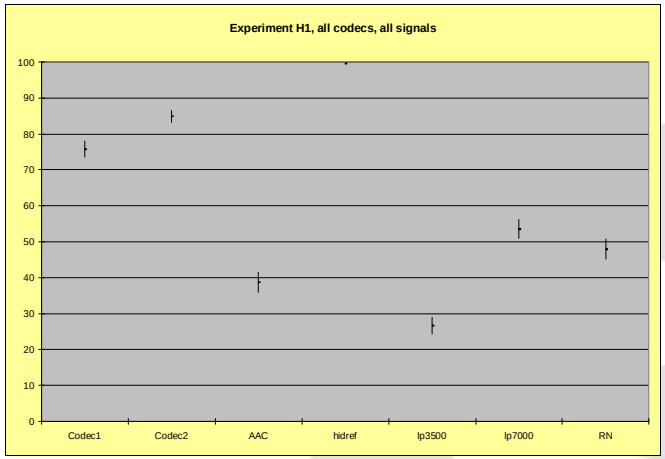


B3: 14 kbps, mono, use case A (PSS), 3% random frame error rate (FER)

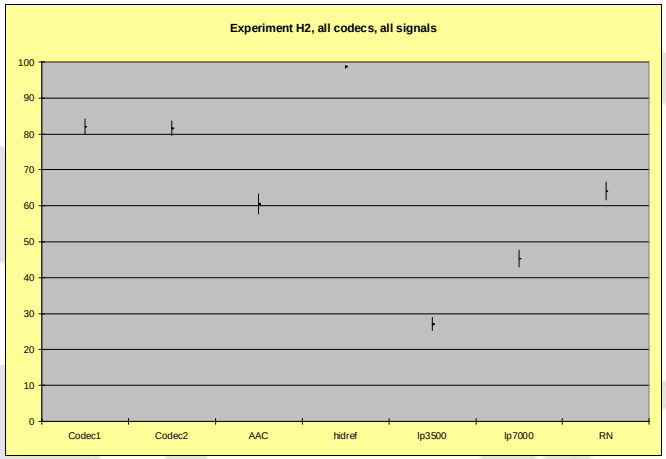


B4: 24 kbps, stereo, use case A (PSS), 3% random FER

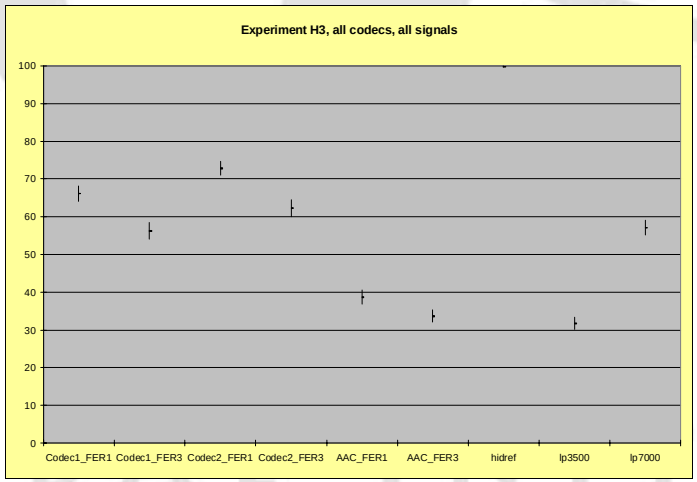
PSS/MMS Audio Codecs: Extracts from high bit-rate results



32 kbps, stereo, use case A and B (PSS and MMS)



48 kbps, stereo, use case A and B (PSS and MMS)



32 kbps, stereo, use case A (PSS) with 1% and 3% random FER

PSS/MMS Audio Codecs: Selection of PSS/MMS audio codec(s) for low and high bit-rate ranges

- **After discussion on the respective merits of the candidate codecs and after collecting views of companies, SA4 agreed that for PSS both Enhanced aacPlus and AMR-WB+ should be recommended (i.e. "should be supported" for the audio media type).**
- **Both codecs were recognised to have merits depending on the bit-rate and content type – like the analysis shows (Slide 18).**
- **Guidelines for the usage of the two codecs (their optimal operating ranges and information on the characteristics) would be provided in specifications, e.g., in informative annex to TS 26.234 and in a separate audio codec characterisation TR.**
- **A detailed report from SA4 on the codec selection with outcome draft text for PSS (into TS 26.234) is presented for information in Tdoc SP-040073. (The draft text to PSS TS 26.234 is also presented in Tdoc SP-040074 for information.)**
- **At TSG-SA#23, SA4 brings the status of the codec selection discussion for information, with request to endorse the SA4 aim to recommend two audio codecs ("should be supported") instead of defining default codec(s) ("shall be supported").**

PSS/MMS Audio Codecs: Further work

- **Further work needed to finalise specification text for TS 26.234 (PSS) and agree on codec selection and specification text for TS 26.140 (MMS).**
- **As two codecs would only be recommended (instead of defining a default codec as originally targeted), SA4 acknowledged that the situation has changed. The format of the specification needs discussion at next SA4 meeting. Furthermore, the draft TS 26.234 text was requested to specify bit-rate ranges to be recommended (for AMR-WB+). This also needs discussion at SA4#31.**
- **The provision of deliverables from candidates (draft specifications, C-code for verification) was postponed until remaining specification matters are agreed (after SA4#31).**
- **Critical verification (verification of the bit-exactness of the codec to be included in specifications against the one used in testing, and verification of implementation complexity meeting design constraints) for two codecs could not be completed in time for TSG-SA#23.**
- **Because of all these remaining issues, SA4 did not yet bring the codec selection for approval to TSG-SA#23.**
- **Formal approval of codecs for PSS and MMS as well as new codec specifications and related CRs to the impacted service specifications (TSs 26.140 and 26.234) are expected to be finalised at SA4#31 and to be brought for approval at TSG-SA#24.**

PSS/MMS Audio Codecs: Specifications

- **Status of specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to 26-series AMR-WB TSs/TRs	(Relevant AMR-WB specifications of 26 –series)	SA4	-	To be prepared at SA4#31.	TSG-SA#24 (June 2004)
New audio codec TS(s)		SA4	-	Drafts to be delivered after SA4#31.	TSG-SA#24 (June 2004)
CRs to TSs 26.234 and 26.140	Transparent end-to-end PSS; Protocols and codecs, MMS; Media formats and codecs	SA4	SA2	To be prepared at SA4#31.	TSG-SA#24 (June 2004)

MMS Enhancements: MMS media formats and codecs

- **SA4 internal working draft of TS 26.140 (MMS; Media formats and codecs) updated to include the addition of optional support for timed text feature in order to synchronise the media types between PSS and MMS.**
- **Ongoing audio and video codec selections will impact also MMS**
- **Specifications:**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.140	MMS; Media formats and codecs	SA4	SA2	Working draft (v.0.2.0) of the CR(s) exists in SA4.	TSG-SA#25 (September 2004)

Codec Work to Support Speech Recognition Framework for Automated Voice Services (SES codecs)

- **Selection tests to compare performances of the two candidate codecs completed.**
- **The candidate codecs: 1) AMR/AMR-WB and 2) DSR Extended Advanced Front-End candidate codec (ETSI Standard 202 212)**
- **Two Automatic Speech Recognition (ASR) vendors, IBM and ScanSoft carried out the speech recognition testing (on voluntary basis) and provided the results by SA4#30. The vendors had a free choice over the recogniser back-end configuration.**
- **The recognition test experiments covered a range of tasks: connected digit recognition task, sub-word trained model recognition task and tone confusability task. (Detailed Test and Processing plan was presented for information at TSG-SA#21.)**
  - Testing was done in error-free channel as well as under packet loss situations. The channel error experiments covered average channel Block Error Rates (BLER) of 1% and 3%. (The testing covered Error Patterns for UTRAN and EGPRS/GPRS channels.)
  - In addition, performance at BLER of 10% and reconstruction quality were tested for informative purposes.
- **Key documents agreed before selection: Test and Processing Plan, Design Constraints and Recommendation Criteria.**
- **Both candidates meet the design constraints (concluded already at SA4#29)**

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Note: All the SA4 key SES documents are attached into Tdoc SP-040075.

SES Codecs: Speech recognition test results

- **Three comparison cases identified in the agreed Recommendation Criteria (Tdoc SP-030440 approved at TSG-SA#21):**
  - At low data rate at 8 kHz sampling rate (AMR 4.75 vs. DSR AFE with extension 5.6 kbit/s), DSR provided an average of 36% relative reduction in word error rate compared to AMR 4.75.
  - At high data rate 8 kHz sampling rate (AMR 12.2 vs. DSR AFE and extension 5.6 kbit/s), DSR provided an average of 24% relative reduction in word error rate compared to AMR 12.2.
  - At the high data rate at 16 kHz sampling rate (AMR 12.65 vs. DSR AFE and extension 5.6 kbit/s), DSR provided an average of 31% relative reduction in word error rate compared to AMR-WB 12.65.
- **Recommendation Criteria: DSR to be recommended for low data rate at 8 kHz sampling rate and for 16 kHz sampling rate, while for high data rate at 8 kHz sampling rate the result is in the "grey area".**
- **The recognition performance in terms of word error rates varied from 0.6 % to 13.8 % for DSR and from 0.8 % to 21.7 % for AMR/AMR-WB, depending on the database.**
- **After some debate, consensus was found to recommended the DSR codec in TS 26.235 for SES for all data-rates/sampling frequencies ("should be supported"). AMR or AMR-WB may be used for SES ("may be supported") but the substantial performance advantages of DSR are noted.**
- **For speech output back to the user in Speech Enabled Services it is recommended that AMR or AMR-WB is used giving speech quality consistent with voice communications.**
- **Three documents for information: 1) Report on SES codec selection in Tdoc SP-040075, 2) Draft TS in Tdoc SP-040064 and 3) Formulation into CRs for TSs 26.235 and 26.236 in Tdoc SP-040076.**

SES Codecs: Further work

- **The formal selection of the codecs, new codec TS and related CRs to the impacted service TSs 26.235 and 26.236 are expected for approval at TSG-SA#24.**
- **By then the critical verification can be completed (verification of bit-exactness of the codec to be included in specifications against the one used in testing, and verification of implementation complexity meeting design constraints).**
- **SES codec verification plan v 1.0 is presented for information in Tdoc SP-040077. Verification is expected to be completed by 26th March.**
- **Status of specifications:**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.235	PS Conversational Multimedia Applications; Default Codecs	SA4	SA2, T2	A document containing draft CRs presented for information at TSG-SA#23 in Tdoc SP-040076.	TSG-SA#24 (June 2004)
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	A documet containing draft CRs presented for information at TSG-SA#23 in Tdoc SP-040076.	TSG-SA#24 (June 2004)
TS 26.243	Software documentation for fixed-point DSR Extended Advanced Front-end	SA4		v. 1.0.0 is presented for information at TSG-SA#23	TSG-SA#24 (June 2004)

- **SA2 has informed SA4 on the new TR 23.877 "Architectural Aspects of SES" where Section 4 contains ideas on how speech recognition might be improved. SA2 explained that it is for SA4 to determine which (if any) of these techniques are actually beneficial. There has been no input in SA4 on this. (Note that the current SA4 WID is defined to cover only PS.)**

Media Codecs and Formats for IMS Messaging and Presence

- **A "skeleton" working draft of TS 26.141 "IMS Messaging and Presence; Media formats and codecs" was prepared at SA4#28 (September 2003!).**
- **Since then there has been no contributions or progress for this WI.**
- **Specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TS 26.141	IMS Messaging and Presence; Media formats and codecs	SA4	SA2, CN1	First skeleton working draft prepared at SA4#28. No progress at SA4#29 and SAS4#30. Lack of input.	TSG-SA#25 (September 2004)

Definition of MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS)

- **Forward Error Correction (FEC) work continued**
  - In order to run application layer FEC simulation and comparison of proposed FEC solutions, SA4 would need bit and/or SDU error patterns for the MBMS radio bearer(s) and has therefore requested (in LS to GERAN1, GERAN2, RAN1, RAN2 and RAN3) information on simulation parameters and/or preparation of such error patterns reflecting realistic statistical distributions.
- **A working assumption agreed to use HTTP as the transport protocol for the point-to-point repair service.**
- **The SA4 TS 26.346 (MBMS Protocols and Codecs), is still at an early development stage. The foreseen content of the TS was clarified at SA4#30 by the WI rapporteur.**
- **Some concern expressed at SA4#30 on SA4 being able to cover all the issues within Rel-6 timeframe.**
  - Some companies supported to focus on download service in Rel-6, while some other companies disagreed and stated that both streaming and download should be included in Rel-6.
  - It was concluded that the work is contribution driven and if companies are interested to make certain features or services happen in Rel-6 they are invited to make contributions.
- **MBMS issues will be discussed in the PSM SWG ad-hoc meeting on 5-6 April.**

Definition of MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS)

- **Specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TS 26.346	MBMS Protocols and Codecs	SA4	SA2, SA3	First skeleton working draft prepared. FEC studies in progress in SA4.	TSG-SA#26 (December 2004); or earlier by focusing the content of TS 26.346
TS 22.246	MBMS user services; Stage 1	SA1			Approved at TSG-SA#22

Content

- **General issues**
- **Review of SA4 work progress for Release 6**
- **Maintenance of releases** 
- **Miscellaneous**
- **Documents for information**
- **Documents for approval**

Maintenance of releases

- **CR to TS 26.073 (Rel-5) "ANSI-C code for the AMR speech codec" (Tdoc SP-040078)**
- **Two CRs to TS 26.104 (Rel-5, Rel-6) "ANSI-C code for the floating-point AMR speech codec" (Tdoc SP-040079)**
- **CR to TR 26.937 (Rel-6) "PSS: RTP Usage Model" (Tdoc SP-040080)**

Content

- **General issues**
- **Review of SA4 work progress for Release 6**
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Miscellaneous

- **As TSG-SA#23, SA4 was tasked to investigate whether signalling capabilities would be needed to allow the setting-up of connections with other Codecs than the chosen "Default" Video Codec. SA4 agreed response to TSG-SA#23 is provided for information in Tdoc SP-040062.**

Communication with other WGs/TSGs/groups

Tdoc no.	Title	Intended for	Copy to
TD S4-040132	Reply LS on Multiple MBMS Issues	TSG RAN WG3	TSG SA WG2, TSG SA WG1, TSG RAN WG1, TSG RAN WG2, TSG RAN WG4, TSG GERAN WG1, TSG GERAN WG2
TD S4-040154	Reply LS on Harmonisation of AMR Configurations	TSG SA WG2, TSG GERAN WG1, TSG GERAN WG2, TSG RAN WG2, TSG CN WG4, TSG T WG1	
TD S4-040157	Reply to “LS on service announcement and UE joining procedure”	TSG SA WG3	TSG SA WG1, TSG SA WG2
TD S4-040123	Liaison Statement to MPEG on generalized container files	ISO/IEC SC29 WG11 (MPEG)	OMA BAC DLDRM
TD S4-040160	Reply LS on S4-030781 GZip Extensions	W3C SVG Working Group	
TD S4-040122	LS on Status of the PSS and 3GP file format specifications	OMA-BAC DL+DRM	
TD S4-040190	Reply to Reply LS on Optimisation of Voice over IMS	TSG RAN WG2, TSG SA WG2	TSG CN WG1, TSG RAN WG3
TD S4-030133	Reply LS on "LS on LS on HTTP based services and other procedures"	TSG SA WG3	TSG SA WG2, TSG CN WG1
TD S4-040130	LS on Request for simulation parameters and/or error patterns for MBMS	TSG GERAN1, TSG GERAN2, TSG RAN WG1, TSG RAN WG2, TSG RAN WG3	TSG SA WG2

Content

- General issues
- Review of SA4 work progress for Release 6
- Maintenance of releases
- Miscellaneous
- Documents for information 
- Documents for approval

Documents for information

Draft TR:

SP-040063	TR 26.935 "Packet switched conversational multimedia applications; Default codecs; Performance characterization" V1.0.0 (Release 6)	SA WG4	7.4.3	Information

Audio codec selection:

SP-040073	Audio codec selection: Report from SA4 to SA#23 on PSS/MMS audio codec selection	SA WG4	7.4.3	Information
SP-040074	Audio codec selection: Proposed text on audio media type into TS 26.234 Rel-6	SA WG4	7.4.3	Information

SES codec selection (including one draft TS):

SP-040064	TS 26.243 "Software documentation for fixed-point DSR Extended Advanced Front-end" V. 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-040075	SES codec selection: Report from TSG SA WG4 to SA#23 Plenary on SES codec selection	SA WG4	7.4.3	Information
SP-040076	SES codec selection: Proposed CRs from TSG SA4 to introduce SES to Release 6 specifications	SA WG4	7.4.3	Information
SP-040077	SES codec selection: SES verification plan v 1.0 (for information)	SA WG4	7.4.3	Information

Others:

SP-040062	Signaling of codecs (reply to SA#23)	SA WG4	7.4.1	Information

Content

- General issues
- Review of SA4 work progress for Release 6
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*Documents for approval: PS conversational default codec characterisation laboratory reports**

- **Tdoc SP-040068: 3G PS conversation tests Phase 2 : Report from FT R&D for Host Lab and Subjective Testing Lab functions**
- **Tdoc SP-040069: 3G PS conversation tests Phase 2 : Report from Dynastat on Global Analysis of Phase 1 & Phase 2 Conversation Test results**

*) Note: Approval of these reports means approval of the work and this is required for ETSI to pay the laboratories.

*Documents for approval: PSS/MMS Audio Codec testing laboratory reports**

- **Tdoc SP-040070: Audio codec selection tests: Reports from Subjective Testing Labs**

S4-040021	Listening laboratory report	France Telecom
S4-040023	Report on AMR-WB+ and PSS/MMS Low-Rate and High-Rate Audio Selection Tests	NTT-AT
S4-040035	PSS/MMS High Rate and AMR-WB+ and PSS/MMS Low Rate Audio Selection Test, Listening Laboratory Report	T-Systems
S4-040044	Listening laboratory report in the course of the 3GPP audio codec selection process	Coding Technologies
S4-040063	PSS/MMS selection tests - Nokia listening test lab report	Nokia
S4-040068	PSS/MMS audio codec selection - Test Lab report	Ericsson
S4-040101	Listening laboratory report in the course of the 3GPP audio codec selection process	Fraunhofer IIS
S4-040105	Dynastat Listening Laboratory Report for the 3GPP Audio Codec Selection	Dynastat

- **Tdoc SP-040071: Audio codec selection tests: Reports from "Host", "Mirror host" and "Selection of items" Laboratories**

S4-040022	Report on selection of items	France Telecom
S4-040026	Mirror Laboratory report on 3GPP Audio Experiment	ARL
S4-040036	PSS/MMS High Rate and AMR-WB+ and PSS/MMS Low Rate Audio Selection Test, Host Laboratory Report	T-Systems

*) Note: Approval of these reports means approval of the work and this is required for ETSI to pay the laboratories.

*Documents for approval: PSS/MMS Audio Codec laboratory reports**

- **Tdoc SP-040072: Audio codec selection tests: Reports from "Global Analysis" Laboratory**

S4-040172	Global Analysis Laboratory Report on 3GPP High-Rate Audio Codec Exercise	ARL
S4-040173	Global Analysis Laboratory Report on 3GPP Low-Rate Audio Codec Exercise	ARL

Note. The spreadsheets containing all raw data utilised for the Global Analysis Laboratory Report of 3GPP High-Rate and Low-Rate Audio Codec Exercises are available as attachments to the documents S4-040172 and S4-040173 at http://www.3gpp.org/ftp/tsg_sa/WG4_CODEC/TSGS4_30/Docs/

- **Also, endorsement of the SA4 aim to recommend two audio codecs ("should be supported") is requested (see Slide 23)**

*) Note: Approval of these reports means approval of the work and this is required for ETSI to pay the laboratories.

Documents for approval: specifications, WIDs

- **Tdoc SP-040065: 3GPP TS 26.244 Transparent end-to-end packet switched streaming service (PSS);"3GPP file format (3GP)" Version 2.0.0 (Release 6)**
  - New TS; in Rel-5. “File Format” was part of the content of TS 26.234.
  - 3GPP file format (3GP) is structurally based on the ISO media file format, but there are some constraints and additions.
  - Used by the PSS and MMS services, but is not restricted to be used with only these services.
  - Rel-6 defines several new file profiles for different usage scenarios, and gives possibility to include assets information (such as genre, location data, etc) and pre-decoder buffer related information structure (for video media tracks), and it also supports OMA DRM protected content.

- **Tdoc SP-040066: Work Item Description on Codec Enhancements for Packet Switched Conversational Multimedia Applications (Release 6)**
  - The objective is to consider enhanced codecs (and the related transport protocols) into TSs 26.235 and 26.236. Any changes in the set of codecs (and in the related transport protocols) should be well studied and justified as giving improved performance.

- **Tdoc SP-040067: Work Item Description on 3G-324M updates in Release 6**
  - The objective is to introduce a number of minor backwards-compatible changes to the CS multimedia telephony specifications (TS 26.111 and TR 26.911) that will improve the standard and are possible to incorporate in Release 6.

Documents for approval: CRs

- **Tdoc SP-040078: CR to TS 26.073 (Rel-5) "ANSI-C code for the AMR speech codec"**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.073	019		Rel-5	Correction of AMR DTX functionality	F	5.2.0	S4	TSG-SA WG4#30	S4-030752

- **Tdoc SP-040079: Two CRs to TS 26.104 (Rel-5, Rel-6) "ANSI-C code for the floating-point AMR speech codec"**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.104	031		Rel-5	Correction of floating point AMR DTX functionality	F	5.3.0	S4	TSG-SA WG4#30	S4-030753
26.104	032		Rel-6	Correction of floating point AMR DTX functionality	A	6.0.0	S4	TSG-SA WG4#30	S4-040158

- **Tdoc SP-040080: CR to TR 26.937 (Rel-6) "PSS: RTP Usage Model"**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.937	001	2	Rel-6	Rate Adaptation simulation results for PSS	D	5.0.0	S4	TSG-SA WG4#30	S4-040159

(end of presentation)