Source:	**TSG SA WG4 Chairman**[1]
Title:	**TSG SA WG4 Status Report at TSG SA#25**
Document for:	**Information**
Agenda Item:	**7.4.1**

<u>Executive Summary</u>

Since TSG SA#24, TSG SA WG4 (SA4) has met once on 16-20 August, 2004 (SA4#32). In addition, a joint meeting of SA3 and SA4 on MBMS security took place on 23-24 August, 2004.

Release 6 work

MMS Enhancements: MMS formats and codecs:

Some enhancements have been agreed (e.g., extended support for synthetic audio, support for 128 kbps video) and CR on these is brought to TS 26.140 (Media Formats and Codecs). The same enhancements are included also to PSS (through CRs at SA#24 and SA#25) and this CR also keeps the services harmonised.

On audio codecs, SA#24 tasked SA4 to draft two CRs to TS 26.140, one for both codecs under consideration, i.e. Enhanced aacPlus and Extended AMR-WB; with identification of the scenarios for which each codec is recommended. These two CRs are now brought to SA for discussion and decision along with two sets of codec specifications, one for each codec. (A third ìjoint CRî having the same technical content as the two CRs combined - with only improvements in language and tables to combine the two separate CR texts/tables into more fluent specification language - is also brought to SA#25 for consideration; just in case both codecs are selected). The remaining audio codec work in SA4 consists of finalising the fixed-point C-codes and codec conformance issues for both floating- and fixed-point codec versions (e.g. test sequences). These are expected to be completed by SA#26. Further codec verification and characterisation testing will be carried out. TR on performance characterisation will also be prepared.

On video codecs, the adoption of ITU-T H.264 (MPEG-4 AVC) as a recommended codec (ìshould be supportedî) has been agreed by all other companies in SA4 except two. Due to sustained objections from two companies, proposed CRs on adoption of H.264 to MMS (and also to PSS, PS Conversational applications and CS multimedia) could not be agreed at SA4#32.

PS Streaming (PSS) Rel-6:

Some new PSS features are brought to TS 26.234 (Protocols and Codecs). These include support for DRM (confidentiality and integrity protection), RTP retransmisson, RTP transport of timed text, support for 128 kbps video and two new Quality of Experience metrics. Updates to TS 26.244 (File Format) are brought for approval including fragmented files, server extensions for PSS rate adaptation and additional SDP attributes. TS 26.233 (General Description) is updated to cover the Rel-6 content.

A similar set of PSS audio codec CRs as for MMS is brought for SA#25 discussion and decision, since SA#24 asked SA4 to carry out similar identification of the scenarios also for the case of PSS, considering that the codec selections are related, and the candidate codecs are the same. Also, CRs to include the audio codecs into TS 26.244 (File Format) have been prepared.

On video codecs, CR for adoption of H.264 (AVC) could not be agreed due to two sustained objections.

Extended AMR-WB codec (AMR-WB+):

For the finalisation of AMR-WB+ codec specifications and presentation to SA, see the PSS and MMS audio codec work status above.

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

The work was completed at SA#24 with the exception of a TR on codec performance characterisation. The content of the TR will be based on the selection and verification testing carried out already earlier.

Media Codecs and Formats for IMS Messaging and Presence:

Draft TS 26.141 (Media formats and codecs) has been updated but is not yet mature enough to be brought for information to SA. The intended codecs are a subset of codecs defined for other services and are to be aligned especially with MMS codecs.

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

TS 26.346 (MBMS Protocols and Codecs) has been progressed and a draft version is presented for information. Complete specification of a scalable point-to-point repair was agreed at SA4#32, with inclusion of a request and response format based on HTTP. MBMS streaming part is also progressing: RTP has been adopted as transport protocol (without RTCP in uplink). Evaluation of forward error correction code (FEC) proposals (Reed-Solomon, LDPC, Raptor) is ongoing to reach an agreement at next SA4 meeting. On codec selection, the intention is to align MBMS with PSS/MMS codecs (when they become finally defined in Rel-6). The security aspects were discussed in a joint SA3-SA4 meeting on 23-24 August. Using SRTP for the protection of streaming data for MBMS was seen viable there. Finalisation of SA4 MBMS work is expected by SA#26. (The actual % of completion is, at present, estimated to be around 60%.)

Codec Enhancements for Packet Switched Conversational Multimedia Applications:

Support for 128 kbps video has been agreed into TS 26.235 (Default Codecs). CR on adoption of H.264 (AVC) could not be agreed due to two sustained objections.

3G-324M Improvements:

Inclusion of AMR-WB as an optional codec has been agreed and a CR to TS 26.111 (Modifications to H.324) is brought for approval. CR on adoption of H.264 (AVC) could not be agreed in SA4 due to two sustained objections.

Maintenance of releases

On SA2 request (related to BARS WI), SA4 has agreed on a common preferred mode configuration for narrowband AMR on all 3GPP radio access technologies: 12.2, 7.4, 5.9, 4.75 kbit/s. Rel-6 CRs are presented to TSs 26.103 (Speech Codec List for GSM and UMTS) and 28.062 (TFO).

Failure of using one test case defined in TS 26.131 (Terminal acoustic characteristics for telephony; requirements) has been investigated and has been solved by limiting the level ranges of Sending Distortion test signal. Rel-6 CRs are presented to TSs 26.131 (Requirements) and 26.132 (Test Specification).

Correction CRs are presented for Rel-5 to TS 26.103 (Codec List) and for Rel-6 to TSs 26.101 (AMR Frame Structure), 26.102 (AMR Interface to Iu, Uu and Nb) and 26.103 (Speech Codec List for GSM and UMTS).

Release 6 work status

For most SA4 Rel-6 Work Items, the work is now completed or almost completed. In many WIs, there are still some (minor) issues remaining. For ìMBMS User Servicesí and ìMedia Codecs and Formats for IMS Messaging and Presenceí substantial work still remains to be done.

TSG-SA WG4 Status Report at TSG SA#25 - Table of Contents

1.   General issues

This document presents the status report of TSG SA WG4 (SA4) at TSG SA#25. Slides presentation of the report is given in Annex 1 of this report ìSP-040631 Annex 1 - Slides presentation.pptî (attached in the zip-file).

1.1 Officials

The SA4 officials are:

Chairman:	Kari J‰rvinen (Nokia, ETSI)
Vice Chairpersons:	Catherine Quinquis (Orange, ETSI) and FrÈdÈric Gabin (NEC Technologies, ETSI)
Secretary:	Paolo Usai (3GPP Support)

SWG Chairmen:

PSM (Packet Switched Multimedia)	(open) - Interim Chairman: Igor Curcio (Nokia, ATIS)
SQ (Speech Quality)	Paolo Usai (ETSI)

Ad-hoc group Chairmen:

Audio Codec Ad-Hoc	Imre Varga (Siemens, ETSI)
Video Codec Ad-Hoc	Nikolaus F‰rber (Fraunhofer Gesellschaft, ETSI)

There are no changes in the above except that Igor Curcio acted as Interim Chairman of PSM SWG during SA4#32. (The previous PSM SWG chairman stepped down after SA4#31.)

1.2 Meetings

Since TSG SA#24, SA4 has held one plenary meeting (SA4#32 in August). In addition, a joint meeting with SA3 on MBMS security has taken place.

A need for having an extra meeting of PSM SWG still before next SA4 meeting has been raised. The need was noted in PSM SWG during SA4#32, but was not addressed on SA4-level at SA4#32. Therefore, the proposal of having the meeting is raised at SA#25.

Meetings held (since SA#24):

SA4#32	16 - 20 August, 2004	Host: The European Friends of 3GPP; Venue: Prague, Czech Republic
Joint meeting of SA3 and SA4 on MBMS security	23-24 August, 2004	Host: ETSI; Venue: Sophia Antipolis, France

Calendar of future meetings:

PSM SWG ad-hoc (tbc)	11-13 October, 2004	Host: Vodafone; Venue: in England
SA4#33	22 - 26 November, 2004	Host: The European Friends of 3GPP; Venue: Helsinki, Finland
SA4#34	21-25 February, 2005	Host and venue tbd
SA4#35	9-13 May, 2005	Host and venue tbd
SA4#36	5-9 September, 2005	Host and venue tbd
SA4#37	14-18 November, 2005	Host and venue tbd

During SA4#32, all SA4 SWGs and ad-hoc groups met. A joint evening session on MBMS was organised with co-located RAN2 meeting. Table 1 gives overall statistics from SA4#32 (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#29	167	53	18	8
SA4#30	215	74	27	9
SA4#31	168	57	26	7
SA4#32	**235**	**64**	**17**	**9**

Table 1: Statistics from SA4#32 (and from some past SA4 meetings for comparison)

1.3 Input documents from SA4 to TSG SA#25

Table 2 gives a complete list of input documents from SA4 to TSG SA#25.

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TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 1.0.0 (Release 6) is presented for information. For audio codecs, a number of documents on the two candidate codecs, Enhanced aacPlus and Extended AMR-WB, are presented for discussion and decision. These include a set of new TSs for both candidate codecs and CRs on codec definition for MMS and PSS. Several other CRs are presented for approval. These contain output from SA4 Rel-6 WIs as well as bring some corrections to Rel-5 and Rel-6. Also, a LS response to OMA POC WG on Speech codec for PoC is Ccíd to SA for information.

Tdoc	Title	Source	Agenda Item	Document for
SP-040631	TSG S4 Status Report at TSG SA#25	SA WG4 Chairman	7.4.1	Information
SP-040632	3GPP TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-040633	3GPP TS 26.401 "Enhanced aacPlus General Audio Codec; General description" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040634	3GPP TS 26.402 "Enhanced aacPlus General Audio Codec; Additional Decoder Tools" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040635	3GPP TS 26.403 "Enhanced aacPlus General Audio Codec; Encoder specification; Advanced Audio Coding (AAC) part" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040636	3GPP TS 26.404 "Enhanced aacPlus General Audio Codec; Encoder specification; Spectral Band Replication (SBR) part " Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040637	3GPP TS 26.405 "Enhanced aacPlus General Audio Codec; Encoder Specification; Parametric Stereo part" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040638	3GPP TS 26.410 "Enhanced aacPlus General Audio Codec; Floating-point ANSI-C code" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040639	3GPP TS 26.290 "Extended Adaptive Multi-Rate - Wideband codec; Transcoding functions" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040640	3GPP TS 26.304 "Extended Adaptive Multi-Rate - Wideband codec; Floating-point ANSI-C code" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040641	CRs TS 26.140 on Introduction of Extended AMR-WB and / or Enhanced aacPlus into MMS service (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040642	CRs TS 26.234 on Introduction of Enhanced aacPlus and / or Extended AMR-WB into PSS service (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040643	CRs TS 26.244 on Storage of AMR-WB+ and / or Enhanced aacPlus audio in 3GP files (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040644	CRs TS 26.101 on Generic Frame Structure for GSM-EFR SID and Error Corrections (Release 6)	SA WG4	7.4.3	Approval
SP-040645	CR TS 26.102 on Mapping of GSM_EFR SID on Nb Interface (Release 6)	SA WG4	7.4.3	Approval
SP-040646	CRs TS 26.103 on Harmonisation of AMR Configurations & several Corrections (Releases 5 and 6)	SA WG4	7.4.3	Approval
SP-040647	CR TS 28.062 on Harmonisation of AMR Configurations (Release 6)	SA WG4	7.4.3	Approval
SP-040648	CR TS 26.111 on 3G-324M Improvements: addition of optional AMR-WB support (Release 6)	SA WG4	7.4.3	Approval
SP-040649	CRs TS 26.131 & TS 26.132 on Change of sending distortion requirement & test case (Release 6)	SA WG4	7.4.3	Approval
SP-040650	CR TS 26.140 on Update of MMS codecs and formats with Release 6 functionality (Release 6)	SA WG4	7.4.3	Approval
SP-040651	CR TS 26.233 on Addition of Release 6 functionality (Release 6)	SA WG4	7.4.3	Approval
SP-040652	CR TS 26.234 on Additional Release-6 updates to PSS Protocols and codecs (Release 6)	SA WG4	7.4.3	Approval
SP-040653	CRs TS 26.235 on Support for 128 kbps video in the PS conversational services & editorial corrections (Release 6)	SA WG4	7.4.3	Approval
SP-040654	CR TS 26.244 on Additional Release 6 update to 3GP file format (Release 6)	SA WG4	7.4.3	Approval
SP-040494	LS reply about speech codec for PoC	SA WG4	7.4.1	Information

Table 2: List of input documents from SA4 to TSG SA#25

2. Release 6 Work Items

2.1 Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications

The work was completed at SA4#24 by the approval of TR 26.935 "Packet switched conversational multimedia applications; Default codecs; Performance characterization".

Table 3 lists the (already completed) 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 SA#23. Version 2.0.0 approved at SA#24 in Tdoc SP-040342.	**COMPLETED AT SA#24**

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

2.2 MMS Enhancements: MMS formats and codecs

2.2.1 MMS enhancements

Some enhancements have been agreed (extended support for synthetic audio, support for 128 kbps video, clarifications and updates to a number of references) and CR on these is brought to TS 26.140 (Media Formats and Codecs) in Tdoc SP-040650. The same enhancements are included also to PSS (through CRs at SA#24 and SA#25) and this CR keeps the services harmonised in Rel-6.

Adoption of SVG Tiny 1.2 (Scalable Vector Graphics) for use in MMS and PSS still remains being considered in SA4. SA4#32 requested from W3C some additional features to be added into the new SVG Tiny 1.2 making it better fitted for intended 3GPP use. Decision on inclusion of SVG Tiny 1.2 into MMS and PSS was therefore postponed until SA4#33 (November) to be brought from there as a late Rel-6 addition at SA#26.

Consideration of new enhanced audio and video codecs for MMS is described in detail in the following sections.

Table 4 lists the output for this WI.

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, T2	Rel-6 updates brought to SA#25 in CRs. These include a set of alternative audio codec CRs. (No consensus was reached on adoption of H.264 due to two sustained objections.)	**SA#25** (Note: SVG Tiny 1.2 expected to be still included at SA#26)

Table 4: Status list of output TSs/TRs/CRs for MMS Rel-6

2.2.2 Audio codecs

SA#24 tasked SA4 to draft two change requests to TS 26.140, one for both codecs under consideration i.e. for Enhanced aacPlus and Extended AMR-WB; with identification of the scenarios for which a codec is recommended. (Guidance to SA4 was given at SA#24 in Tdoc SP-040481.) These two CRs are now brought to SA discussion and decision along with two sets of codec specifications, one for each codec. It is up to SA#25 to decide whether to approve both, only one or none of the change requests.

SA4 felt that in the case both codecs would be selected at SA#25, some improvements could be made in the text and tables to combine the two CRs into more fluent specification language. Therefore, SA4 prepared also a third CR having the same technical content as the two CRs combined with just improvements in language and tables. This combined CR-version is also presented for SA#25 consideration.

The three CRs to TS 26.140 are contained in Tdoc SP-040641. The new audio codecs are included in the CRs as recommended codecs (ìshould be supportedî). Consequently, the status of the recommended audio codec in Rel-5 (MPEG-4 AAC LC) has been reduced from ìshould be supportedî to ìmay be supportedî, since the new audio codecs outperform it (and it does not meet the performance requirements set in SA4 for Rel-6 audio codecs).

The two sets of finalised new codec specifications are brought for discussion and decision in Tdocs SP-040633 until SP-040638 for the Enhanced aacPlus and in Tdocs SP-040639 and SP-040640 for the Extended AMR-WB. Draft versions of the specifications were presented for information at SA#24. The codec specifications include the floating-point ANSI C-codes for the two codecs. The floating-point C-codes will be made available as part of the specifications upon approval of the specifications at SA#25. (See a complete list of the new audio codec specifications in Table 5.) For inclusion of the codecs into 3GPP File Format, also two CRs to TS 26.244 have been prepared; a separate CR for both codecs is presented for discussion and decision in Tdoc SP-040643.

The two sets of new codec TSs and CRs to TS 26.244 are linked to the definition of the codecs to PSS and MMS services. The new codec TSs and CRs to TS 26.244 are to be approved conditionally to the approval of the codec to be used in 3GPP. For Enhanced aacPlus, the set of codec TSs and the CR to TS 26.244 are asked to be approved only in case the codec is defined for use in MMS or PSS (through the CRs to TS 26.140). For Extended AMR-WB, developed under itís own 3GPP Work Item, it is left for SA discretion if the specifications and the CR to TS 26.244 are seen useful to be approved by TSG SA as extension to 3GPP AMR-WB codec even in the case Extended AMR-WB would not be selected for use in PSS or MMS.

The critical verification work (e.g., verification of bit-exactness, verification of complexity, verification of the format of the C-code and review of specifications) has been completed in SA4 and the remaining issues have been solved. The reason for a failure in few cases (3 out of 188) in the bit-exactness of Enhanced aacPlus (reported at SA#24) was found to be a bugfix introduced in the decoder after testing. It has been since then verified that bit-exactness to the tested codec is obtained when the bugfix is not present in the code thus making the code fulfilling the bit-exactness requirement. The bugfix has been reviewed and agreed at SA4#32 to be included into the C-code of the Enhanced aacPlus codec and into the proposed codec specifications.

After the SA#25 decision on the audio codecs, the remaining audio codec work in SA4 consists of finalising the fixed-point C-code(s) and codec conformance issues for both floating- and fixed-point codec versions (e.g. preparation of test sequences). These can be expected to be completed by SA#26. Other remaining audio codec work consists of completing the remaining verification and characterisation tests. These include e.g. detailed checking of the C-codes for any remaining bugs, detailed complexity analysis, measurement of frequency response, checking for special input voices and background noises and verification of the fixed-point codec versions. More organisations volunteering for the remaining verification tasks would be welcome in order to complete the work in time. A TR on audio codecs performance characterisation will be prepared to give information of the codec performance (based on selection, verification and complementing characterisation tests). Initial test plan for the characterisation is under development in SA4. Funding for the characterisation tests exists from the codec proponents (collected during the selection phase).

Table 5 lists the new specifications for audio codecs (and the related CR to File Format TS).

Deliverable	Title	Prime resp. WG	2nd resp WG	Comment/Status	TSG-SA approval target*
TS 26.401	Enhanced aacPlus General Audio Codec; General Description	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.402	Enhanced aacPlus General Audio Codec; Additional Decoder Tools	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.403	Enhanced aacPlus General Audio Codec; Encoder Specification Advanced Audio Coding (AAC) part	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.404	Enhanced aacPlus General Audio Codec; Enhanced aacPlus encoder Spectral Band Replication (SBR) part	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.405	Enhanced aacPlus General Audio Codec; Encoder Specification Parametric Stereo part	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.410	Enhanced aacPlus General Audio Codec; Floating-point ANSI-C code	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.411	Enhanced aacPlus General Audio Codec; Fixed-point ANSI-C code	SA4		Contained in TS 26.410 presented for information at SA#24. Now extracted into itís own specification.	**ONGOING; FORESEEN TO BE COMPLETED AT SA#26**
TS 26.290	Extended AMR Wideband codec; Transcoding functions	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.304	ANSI-C code for the Floating-point; Extended AMR Wideband codec	SA4		Presented for information at SA#24 and for approval at SA#25.	**SA#25**
TS 26.273	ANSI-C code for the Fixed-point; Extended AMR Wideband codec	SA4		Presented for information at SA#24.	**ONGOING; FORESEEN TO BE COMPLETED AT SA#26**
CRs to 26.244	Transparent end-to-end PSS; File Format	SA4		Inclusion of Extended AMR Wideband and / or Enhanced aacPlus audio in 3GP file format	**SA#25**
TS 26.xyz	3GPP audio codecs; Conformance	SA4		To be prepared when codec specifications approved (i.e. codec frozen)	**ONGOING; FORESEEN TO BE COMPLETED AT SA#26**
TR 26.xyz	Performance characterization of audio codecs	SA4		To be prepared. Characterisation test plan drafting ongoing in SA4.	**ONGOING; COMPLETION DATE TBD**

*) Note: These are presented for discussion and decision at SA#25. See Section 2.2.2 for details.

Table 5: List of specific output TSs/TRs/CRs for audio codecs.

2.2.3 Video codecs

2.2.3.1. The codec selection process

The video codec selection for Rel-6 was initiated at SA4#28 (September 2003). Two video codec proponents declared their intention to submit a candidate by the declaration deadline (October 3rd). The two declared candidates were: 1) ITU-T H.264 (MPEG-4 AVC) proposed by Nokia and 2) WMV9 proposed by Microsoft. The required codec qualification material (demonstrating compliance to the qualification criteria in terms of quality and complexity) was provided to SA4#29 only for the MPEG-4 AVC codec. The other candidate was withdrawn. Based on the submission material the remaining candidate H.264 (AVC) was agreed at SA4#29 to meet all the qualification criteria set for Rel-6 video codec (with regard to coding efficiency, resource computation and error resilience).

In the following meetings from SA4#30 until SA4#32 additional data were presented illustrating the performance of H.264 (AVC) compared to Rel-5 video codec H.263 and further detailing the improvement obtained by adoption of H.264 (AVC). (H.263 profile 0 level 10 is defined for Rel-5 PSS, MMS and PS conversational applications as ìshall be supportedî codec for the video media type and some other H.263 levels/profiles as ìshould be supportedî.) Among the data presented were the formal verification test results of AVC from MPEG/ITU-T and complementing new test results from companies. Based on all the evidence H.264 (AVC) was agreed by SA4 as providing significant performance gain over Rel-5 video codecs. (Test results show that e.g. when compared to MPEG-4 Visual SP, AVC Baseline Profile achieved a coding efficiency improvement of 2 times or greater in 14 out of 18 statistically conclusive cases. Test results presented in SA4 also covered typical packet loss conditions where H.264 (AVC) was shown to be at least as robust as the video codecs in Rel-5.)

AVC profiles (subset of algorithmic features) and levels (a set of limits mainly on memory and computation performance parameters) were specified for MMS (and to several other services: PSS, PS Conversational applications and 3G-324M CS multimedia terminal). A draft specification text was continuously revised to accommodate all required system aspects. H.264 (AVC) was considered as a recommended codec (ìshould be supportedî) instead of mandated (ìshall be supportedî) due to 3GPP already having a default codec in Rel-5 (H.263) which status was preferred to be kept for Rel-6 and also due to complexity of H.264 (AVC) seen still challenging for low/mid price-range terminals.

At SA4#31, there were still some requests for further testing of codec behaviour under error conditions. Also, two companies expressed concerns on that H.264 (AVC) codec efficiency was not proven, complexity of the encoder was still an issue, and the improvement in terms of quality was not fully quantified (and also questioned that an earlier agreement on AVC specification text was ìmay be supportedî rather than ìshould be supportedî). Except for these few companies, the adoption of AVC as a recommended codec was agreed as a working assumption within SA4 at SA4#31, with some remaining issues in video buffering parameters still to be defined.

2.2.3.2 Outcome of discussions at SA4#32

At SA4#32, the discussion on the adoption of H.264 (AVC) continued trying to resolve the remaining issues. The issues of further codec testing and video buffering were resolved. New complementing test results were presented for 3GPP bearers, and further testing was agreed to be best addressed during a (post-selection) characterisation testing phase. Some signalling issues were noted needing still to be checked for conversational use especially for 3G-324M, but this was seen to be done after the codec selection at SA4#33 through additional CRs. (The decoder capability signalling for Arbitrary Slice Ordering/Flexible Macroblock Ordering coding tool should be enabled for 3G-324M, and the use of signalling should be clarified also for PS conversational applications.) A set of CRs on adoption of H.264 (AVC) to MMS (and to PSS, PS Conversational applications and 3G-324M CS multimedia terminal) as a recommended codec, i.e. ìshould be supportedî, were debated and finalised.

Two companies stated their objection for the proposed CRs (Siemens and ì3î). The objections were explained to be based on the fact that the encoder is not fully specified in H.264 (AVC) since only the decoding process, bit-stream syntax, bit-stream semantics and constraints on bit-streams are specified. Two specific concerns were stated by the objecting companies: 1) The computational complexity for encoder is not specified (in terms of WMOPS/PROM/RAM) and it is not clear how much complexity is required to achieve the reported performance gain. 2) The quality of the encoding process is seen not guaranteed (like for any video codec) and therefore not granting guaranteed QoS in Rel-6. (The first point was further clarified to be not valid for PSS where only the decoder is used in the terminal.)

As a response to these concerns it was noted that video and speech coding traditionally use different approaches in specification. While the former only specifies the decoder, speech codecs are fully specified including a bit-exact encoder. Both approaches have advantages and disadvantages and both approaches have shown to be effective in history. As for any other video codec in 3GPP (like H.263 specified for Rel-5), H.264 does not specify the encoder in detail, it was asked how H.263 can then have been defined for use in previous 3GPP releases if this traditional video codec specification style is not sufficient. This was responded by the objecting companies that improvement should be sought for the new releases. On the complexity of the encoder, results for encoding in terms of encoding times per pictures were explained having been presented earlier in SA4. However, the objecting companies did not feel that these were sufficient to alleviate their concerns on complexity.

During the discussion, concerns were raised by "3" regarding the Licensing terms of MPEG-LA with respect to the Usage Base. "3" highlighted that the Usage Base Licensing imposed by MPEG-LA is not in line with the ETSI IPR Rules and Procedures and requested SA4 Chairman to bring their concern to the attention of SA Plenary.

Due to the two sustained objections, no CRs on adoption of H.264 (AVC) could be agreed at SA4#32.

Tdoc S4-040590 ìRevised Technical Report on Video Codec Selectionî (approved by SA4#32) is attached into this report as Annex 2. It provides some further information on the video codec discussions in SA4.

2.3 Packet Switched Streaming Rel-6

2.3.1 New PSS features

TS 26.234 (PSS; Protocols and Codecs) is updated for Rel-6 through CRs. A CR on ìaddition of Release 6 functionalityî was approved at SA#24 bringing most Rel-6 updates and completing restructuring of this specification (some functionalities moved into their own Rel-6 specifications). At SA#25, the remaining Rel-6 enhancements are brought for approval in Tdoc SP-040652. They are as follows:

- DRM support (confidentiality and integrity protection) is included. (OMA DRM version 2 is supported through two extensions: the first extension is an RTP payload format that enables confidentiality protection of individual RTP payloads used in a streaming session, the second extension defines the necessary key management and protocol support for the optional integrity protection of RTP payloads using SRTP between streaming server and client.)
- RTP retransmission is included (to improve robustness for lost packets received within the receiver buffering time)
- RTP transport of timed text is included enabling streaming of timed text in Rel-6 (only downloading was possible in earlier releases)
- PSS UAProf vocabulary and MIME type references are updated
- Support for 128 kbps video is included (new H.263 level defined in ITU-T)
- Client buffer feedback mechanism is updated (for the rate adaptation mechanism)
- Two new Quality of Experience metrics are added. (QoE metrics are used for servers to receive information from the handset in order to provide the service providers means to evaluate the end user experience.)
- Editorial changes

TS 26.244 (PSS; File Format) is updated for Rel-6 with a CR in Tdoc SP-040654 including the following changes :

- Fragmented files are allowed (reducing initial buffering durations and memory consumption during local playback)
- Server extensions for PSS rate adaptation are included (reflecting introduction of rate adaptation for PSS)
- Reference to MIME type for 3GP files are included
- References are updated
- Additional SDP attributes (reflecting updates by PSS) are included

A CR is brought also to TS 26.233 (PSS; General Description) in Tdoc SP-040651 on the PSS Rel-6 updates. This covers both the updates agreed at SA#24 and the ones brought now for approval at SA#25.

Table 6 lists the output specification for this WI.

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	Updated at SA#25 based on the content of PSS Rel-6.	**SA#25**
CRs to TS 26.234	Transparent end-to-end PSS; Protocols and codecs	SA4	SA2	CR presented for approval at SA#24 bringing most Rel-6 updates. Remaining updates brought to SA#25 in CRs. These include a set of alternative audio codec CRs. (No consensus was reached on adoption of H.264 due to two sustained objections.)	**SA#25**
TS 26.244	Transparent end-to-end PSS; File Format	SA4	SA2	Version 1.0.0 presented for information at SA#22. Version 2.0.0 approved at SA#23. Further update CRs brought at SA#25.	**SA#25**
TS 26.245	Transparent end-to-end PSS; Timed Text Format	SA4	SA2	Version 2.0.0 approved at SA#24.	**COMPLETED AT SA#24**
TS 26.246	Transparent end-to-end PSS; SMIL Language Profile	SA4	SA2	Version 1.0.0 presented for information at SA#22. Version 2.0.0 approved at SA#24.	**COMPLETED AT SA#24**
CRs to TR 26.937	Transparent end-to-end PSS; RTP Usage Model	SA4		Updated based on the content of PSS Rel-6. CR agreed at SA#23.	**COMPLETED AT SA#24**
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 6: Status list of output TSs/TRs/CRs for Packet Switched Streaming Rel-6

The consideration of new enhanced audio and video codecs for PSS into TS 26.234 is described in detail below.

2.3.2 Audio Codecs

A similar set of audio codec CRs is brought for SA consideration for PSS (as for MMS) in Tdoc SP-040642. A similar set of PSS CRs was not explicitly requested in the guidance document from SA#24. However, since SA#24 asked SA4 to carry out similar identification of the scenarios for the case of PSS as done for the MMS CRs, and since the audio codec selections are related (with the same candidate codecs), SA4 is bringing a similar set also for PSS to the consideration of SA#25.

What has happened earlier with regard to audio codecs for PSS is that the SA4 intention to recommend two codecs for PSS (as no consistent ranking of the codecs was possible) was communicated to SA#23 in March. SA4#31 (in May) then agreed on recommending both candidate codecs for PSS (ìone or both should be supportedî). However, SA4 could not yet finalise the codec specifications in time for approval at SA#24 and also some issues in critical verification were not completed yet (e.g., bit-exactness verification). The new audio codec specifications were therefore presented only for information at SA#24, and no approval of PSS codec selection was yet requested or took place. Now, after the guidance from SA#24, SA4 brings a similar set of audio codec CRs for PSS as for MMS so that they can be jointly discussed and decided by SA#25.

2.3.3 Video codecs

On video codecs, CR for adoption of ITU-T H.264 (MPEG-4 AVC) could not be agreed in SA4 due to two sustained objections (see details under Section 2.2.3 above).

2.4 Extended AMR-WB codec (AMR-WB+)

The work in this WI is related to ongoing audio codec selection work for PSS and MMS since the AMR-WB+ codec is considered as one candidate for PSS and MMS audio codec and the testing of all codec candidates has been carried out as combined testing. For the finalisation of AMR-WB+ codec specifications and presentation to SA, see the PSS and MMS audio codec work status in Sections 2.2.2 (MMS) and 2.3.2 (PSS) above.

SA4#32 concluded that the AMR-WB+ codec developed within the AMR-WB+ work item meets the essential goals of that work item. AMR-WB+ provides extension modes to the AMR-WB speech codec which meet the AMR-WB+ performance requirements and the design constraints.

The codec can also be operated in configurations beyond the scope of the AMR-WB+ work item that do not strictly comply with the design constraint set for a maximum bit rate (24 kbps), as it may be configured to operate at rates up to 48 kbps, which increases the worst case computational complexity figures by about 40% as presented in the table below. Memory consumption is not affected at all.

Design constraint complexity figures for AMR-WB+ work item	Complexity figures when operated at 24 kbps	Complexity figures when operated at 48 kbps
Encoder (for stereo): 4 x AMR-WB codec (145.56 wMOPS)	Encoder (for stereo): 62.0 wMOPS	Encoder (for stereo) 86.3 wMOPS
Decoder (for stereo): 4 x AMR-WB decoder (36.76 wMOPS)	Decoder (for stereo) 15.5 wMOPS	Decoder (for stereo) 22.04 wMOPS

Therefore, essential design constraints related to codec implementation, such as computational complexity and memory limits, are though always met.[2]

SA4 sees that the work item can be concluded after approval of the specifications defining AMR-WB+. (See Table 5 on the status of AMR-WB+ specifications.)

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

The work has been completed with the exception of TR on codec performance characterisation. The content of the TR will be based on the selection and verification testing carried out already earlier. 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 CR presented for information at SA#23. CR approved at SA#24.	**COMPLETED AT SA#24**
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	A document containing draft CR presented for information at SA#23. CR approved at SA#24.	**COMPLETED AT SA#24**
TS 26.243	Software documentation for fixed-point DSR Extended Advanced Front-end	SA4		Version 1.0.0 was presented for information at SA#23. Version 2.0.0 approved at SA#24.	**COMPLETED AT SA#24**
TR 26.xyz	Performance characterization of SES codecs	SA4		To be prepared based on selection and verification tests.	**ONGOING; COMPLETION DATE TBD**

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 ìskeletonî working draft of TS 26.141 (IMS Messaging and Presence; Media Formats and Codecs) was prepared at SA4#28 (September 2003). At SA4#32 the working draft was updated. However, it is not yet seen mature for presentation to SA for information and further consideration in SA4 is needed. The intended codecs are a subset of codecs defined for other services and are to be aligned especially with MMS codecs.

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[2] Complexity estimates for both candidate codecs were presented at SA#23 in Tdoc SP-040073.

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	Drafting ongoing.	**ONGOING; COMPLETION DATE TBD**

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)

TS 26.346 (MBMS Protocols and Codecs) has been progressed and a draft version is presented for information in Tdoc SP-040632. Complete specification of a scalable point-to-point repair has now been agreed (this includes a scalable solution, an HTTP request definition and an HTTP response definition). MBMS streaming part is also progressing: RTP has been adopted there as transport protocol (without RTCP in uplink).

Evaluation of forward error correction code (FEC) proposals is ongoing to reach an agreement at next SA4 meeting. The proposals under study include Reed-Solomon, LDPC (Linear Density Parity Codes) and Raptor codes. No algorithm selection has been done yet.

On codec selection, the intention is to align MBMS with PSS/MMS codecs (when they become finally defined in Rel-6 ñ expected at SA#25). Like stated at SA#24 in the guidance to SA4 on audio codecs, it is expected that the codecs to be used for MBMS would be the codecs already used for other applications or a subset. Also, discussion with GERAN and RAN WGs is continuing on RAB simulations impacting the FEC and codec selection.

The security aspects still need to be completed with SA3. A joint SA3-SA4 meeting on MBMS Security was organised on 23-24 August (after SA4#32). The SA3 and SA4 MBMS specifications (TSs 26.346 and 33.246) and related documents were reviewed in the meeting. Some issues needing alignment were noted. Recent LSs were covered and questions raised in them answered. The SA4 delegates clarified that SRTP is used for the integrity protection for PSS and is optional to implement at the UE. Using SRTP with MIKEY (working assumption in TS 33.246) for the protection of streaming data for MBMS was seen viable by the joint meeting, but was still left subject to e-mail approval on the SA3 e-mail list.

A joint evening session on MBMS was organised during SA4#32 with co-located RAN2-meeting. The agenda consisted of knowledge sharing of MBMS work in both groups, MBMS simulation matters and other joint issues. The knowledge sharing mainly covered the SA4 defined point-to-point-repair functionality and discussion on SDU-sizes. The joint session also provided a good forum to discuss LSs and clarity/progress the issues raised in them (e.g., SA4 questions on MBMS simulation parameters needed for selection of FEC).

The main remaining MBMS issues in SA4 after SA#32 are 1) codec definition, 2) FEC selection and 3) security issues (with SA3). Also some parts of the TS text still need work (especially the protocols and procedures overview, MBMS user service architecture and procedures, and streaming delivery method). TR on user service guidelines is also planned to be prepared.

Due to the remaining work, the MBMS issues are planned be progressed in PSM SWG ad-hoc meeting in October already before SA4#33 (November). Finalisation of SA4 MBMS work is expected by SA#26.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TS 26.346	MBMS Protocols and Codecs	SA4	SA2, SA3	Draft version under development. FEC and other methods for reliable transport under study. Draft TR v1.0.0 presented for information at SA#25.	**ONGOING; TO BE COMPLETED AT SA#26**
TS 22.246	MBMS user services; Stage 1	SA1			(Approved at SA#22)
TR 26.946	Multimedia Broadcast/Multicast Service (MBMS) user service guidelines	SA4		Draft version under development.	**ONGOING; TO BE COMPLETED AT SA#26**

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)

2.8 Codec Enhancements for Packet Switched Conversational Multimedia Applications

CRs to TS 26.235 (Protocols and Codecs) on support for 128 kbps video and on language improvements are brought for approval in Tdoc SP-040653. A proposed CR on adoption of ITU-T H.264 (MPEG-4 AVC) could not be agreed in SA4#32 due to two sustained objections (see details in Section 2.2.3); further debate is expected.

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	No consensus reached on adoption of H.264 (AVC) due to two sustained objections	**SA#25**
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2		**(no changes currently foreseen)**

Table 10: Status list of output TSs/TRs/CRs for Codec Enhancements for Packet Switched Conversational Multimedia Applications

2.9 3G-324M (CS Multimedia Telephony Service Terminal) Improvements

AMR-WB codec was agreed to be included as an optional codec. CR on this to TS 26.111 is brought for approval in Tdoc SP-040648. A proposed CR on adoption of ITU-T H.264 (MPEG-4 AVC) could not be agreed in SA4 due to two sustained objections (see details in Section 2.2.3); further debate is expected.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TS 26.111	Codec for CS Multimedia Telephony Service; Modifications to H.324	SA4		No consensus reached on adoption of H.264 (AVC) due to two sustained objections	**SA#25**
TR 26.911	Codec for CS Multimedia Telephony Service; Terminal Implementorís Guide	SA4		No consensus reached on adoption of H.264 (AVC) due to two sustained objections	**(no changes foreseen unless AVC adopted)**

Table 11: Status list of output TSs/TRs/CRs for 3G-324M Improvements

2.10 Other work (Rel-6 CRs other than corrections)

2.10.1 Harmonisation of AMR configurations

On SA2 request, related to SA2 BARS WI, SA4 took the task (at SA4#30) to co-ordinate selecting a single preferred narrrowband AMR configuration for CS speech telephony, i.e., one common configuration for the AMR Codec Types that can be used on all channels in GERAN and UTRAN. The harmonisation of AMR configurations for CS speech is seen as a valuable enhancement for systems supporting TFO/TrFO. At SA4#31, the choice of codec modes and factors impacting the choice were debated but no agreement on a single preferred set was reached.

SA4#32 continued the discussions and reached an agreement of the following mode set: 12.2, 7.4, 5.9 and 4.75 kbit/s. The main issue was on whether to include 7.4 or 6.4 into the set. No strong views were expressed on either side and the decision was finally made based on preferences. The chosen configuration is especially recommended for use in GERAN-UTRAN combined networks for transcoding free operation (via TFO and/or TrFO). The relevant WGs have been informed on the agreement via LS. CRs were agreed to TS 28.062 (TFO) and TS 26.103 (Speech Codec List for GSM and UMTS) and are brought for approval in Tdocs SP-040646 and SP-040647.

2.10.2 Sending Distortion

GCF UTRA Agreement Group (GCF U-AG) reported to SA4#25 that the sending distortion test case defined in TS 26.132 (Speech and video telephony terminal acoustic test specification) cannot be passed with terminals using active noise suppressor. SA4 has been investigating the issue and has found a solution by limiting the level ranges of Sending Distortion test signal. CRs on this are presented to TSs 26.131 (Requirements) and 26.132 (Test Specification) in Tdoc SP-040649.

3. Summary of Rel-6 work status

For most SA4 Rel-6 Work Items, the work is now completed or almost completed. However, there are two WIs for which substantial work remains to be carried out after SA#25:

- MBMS User Services

- Media Codecs and Formats for IMS Messaging and Presence

The MBMS User Services work is expected to be completed by SA#26; draft of the output TS is presented for information at SA#25. The completion date for Media Codecs and Formats for IMS Messaging and Presence depends on contributions and remains rather uncertain (SA#26 at the very earliest).

Besides these two WIs, the SA4 Rel-6 work is either completed or almost completed (with some small remaining parts to be still completed by SA#26). The remaining parts to be completed after SA#25 are:

a) Two TRs on codec characterisation (SES and audio codecs). Completion dates for both will most likely be after SA#26, but as informative TRs these are not release-critical.

b) For the new audio codecs for PSS and MMS, the floating-point codec is part of the set of specifications brought for approval at SA#25. The fixed-point codec versions/specifications and conformance issues (for fixed- and floating-point codecs e.g. test sequences) are being progressed and are foreseen to be completed by SA#26. Also, some (non-critical) verification tests for the codecs are still continuing. (Furthermore, the codec selection is still pending for SA#25 decision on the audio codec CRs from SA4.)

c) Adoption of SVG Tiny 1.2 (Scalable Vector Graphics) for use in MMS and PSS remains being considered. SA4#32 requested from W3C some additional features to be added making it better suitable for 3GPP use. Decision on inclusion of SVG Tiny 1.2 was therefore postponed until SA4#33 (November) to be brought from there as a late Rel-6 addition at SA#26.

d) In the consideration of new video codecs, H.264 (AVC) could not be agreed as a recommended codec at SA4#32 due to two objections. Further debate is expected. The current status of adopting H.264 has an impact to several WIs where consideration of new codecs is part of the work (PSS Rel-6, MMS Formats and Codecs, Codec Enhancements for PS Conversational Multimedia Applications, 3G-324M Improvements). The technical work is basically done (except any issues raised in the two objections and some complementing checking of signalling).

Estimated completion percentages for SA4 WIs are shown in Table 12 (based on input from SA4 officials).

Work Item	Completion-% at SA#25	Remaining issues (after SA#25)
Performance characterisation of default codecs for PS conv. multimedia application:	100	None

MMS formats and codecs	90	1) some complementing audio codec work
		  - fixed point C-code TS
		  - conformance issues (e.g. test sequences) and TS
		  - rest of verification (not critical for codec selection)
		  - characterisation testing and TR
		2) consideration of AVC
		3) adoption of SVG Tiny 1.2

PSS Rel-6	90	Same as for MMS (see above)
AMR-WB extension for high audio quality	95	Some complementing audio codec work (see list under MMS above)
Codec Work to Support Speech Recognition Framework for Automated Voice Services	95	TR on performance characterisation
Media Codecs and Formats for IMS Messaging and Presence	20	Preparation of TS 26.141.
Definition of MBMS user services; media codecs, formats and transport/application protocols using MBMS	60	Finalisation of TS 26.346 (MBMS Protocols and Codecs). Draft TS is presented for information at SA#25. Main remaining issues are FEC selection and definition of codecs. Finalisation of TR 26.946 (Multimedia Broadcast/Multicast Service (MBMS) user service guidelines)

	Codec Enhancements for Packet Switched Conversational Multimedia Applications	80	Consideration of AVC
	3G-324M Improvements	80	Consideration of AVC

Table 12: Completion of SA4 WIs at SA#25

4. Maintenance of Releases

4.1 Output CRs from SA4 Rel-6 WIs

4.1.1 Audio codec CRs

Audio codec CRs for MMS TS 26.140 (Media formats and codecs) and for PSS TS 26.234 (Protocols and codecs) in Tdocs SP-040641 and SP-040642:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.140	004	2	Rel-6	Introduction of Extended AMR-WB into MMS service	C	5.2.0	S4	TSG-SA WG4#32	S4-040585
26.140	005	2	Rel-6	Introduction of Enhanced aacPlus into MMS service	C	5.2.0	S4	TSG-SA WG4#32	S4-040586
26.140	006	2	Rel-6	Introduction of Extended AMR-WB and Enhanced aacPlus into MMS service	C	5.2.0	S4	TSG-SA WG4#32	S4-040587

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.234	072	1	Rel-6	Introduction of Enhanced aacPlus into PSS service	C	6.0.0	S4	TSG-SA WG4#32	S4-040579
26.234	073	1	Rel-6	Introduction of Extended AMR-WB into PSS service	C	6.0.0	S4	TSG-SA WG4#32	S4-040580
26.234	074	1	Rel-6	Introduction of Extended AMR-WB and Enhanced aacPlus into PSS service	C	6.0.0	S4	TSG-SA WG4#32	S4-040581

Related CRs to introduce the audio codecs into TS 26.244 (3GPP file format) in Tdoc SP-040643:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.244	002	1	Rel-6	Storage of AMR-WB+ audio in 3GP files	B	6.0.0	S4	TSG-SA WG4#32	S4-040505
26.244	005	1	Rel-6	Storage of Enhanced aacPlus audio in 3GP files	B	6.0.0	S4	TSG-SA WG4#32	S4-040597

4.1.2 Other CRs as output from SA4 Rel-6 work

Output of WI ìMMS Enhancements: MMS formats and codecsî: CR to TS 26.140 (MMS; Media formats and codecs) in Tdoc SP-040650:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.140	007	1	Rel-6	Update of MMS codecs and formats with Release 6 functionality	B	5.2.0	S4	TSG-SA WG4#32	S4-040591

Output of WI ìPS Streaming (PSS) Rel-6î: CRs to TSs 26.233 (PSS; General Description), 26.234 (PSS; Protocols and codecs) and 26.244 (PSS; File Format) in Tdocs SP-040651, SP-040652 and SP-040654):

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.233	005	1	Rel-6	Addition of Release 6 functionality	B	5.0.0	S4	TSG-SA WG4#32	S4-040550

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.234	070	1	Rel-6	Additional Release-6 updates to PSS Protocols and codecs	B	6.0.0	S4	TSG-SA WG4#32	S4-040506

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.244	003		Rel-6	Additional Release 6 update to 3GP file format	B	6.0.0	S4	TSG-SA WG4#32	S4-040507

Output of WI ìCodec Enhancements for Packet Switched Conversational Multimedia Applicationsî: CRs to TS 26.235 (Default Codecs) in Tdoc SP-040653:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.235	007	1	Rel-6	Language improvement and alignment	D	6.1.0	S4	TSG-SA WG4#32	S4-040536
26.235	009		Rel-6	Support for 128 kbps video in the packet-switched conversational services	B	6.1.0	S4	TSG-SA WG4#32	S4-040566

Output of WI ì3G-324M Improvementsî: CR to TS 26.111 (Modifications to H.324) in Tdoc SP-040648:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.111	011	1	Rel-6	3G-324M Improvements: addition of optional AMR-WB support	B	5.1.0	S4	TSG-SA WG4#32	S4-040568

4.2 Others

CRs to TS 26.101 (AMR Frame Structure) in Tdoc SP-040644:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.101	009	2	Rel-6	Generic Frame Structure for GSM-EFR SID	F	5.0.0	S4	TSG-SA WG4#32	S4-040570
26.101	010	1	Rel-6	Error Corrections	F	5.0.0	S4	TSG-SA WG4#32	S4-040571

CR to TS 26.102 (AMR Interface to Iu, Uu and Nb) in Tdoc SP-040645:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.102	016	1	Rel-6	Mapping of GSM_EFR SID on Nb Interface	F	5.2.0	S4	TSG-SA WG4#32	S4-040400

CRs to TS 26.103 (Speech Codec List for GSM and UMTS) in Tdoc SP-040646:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.103	023	2	Rel-6	Harmonisation of AMR Configurations	C	5.4.0	S4	TSG-SA WG4#32	S4-040595
26.103	024	2	Rel-5	Codec Identifier (CoID) for the telephone-event	F	5.4.0	S4	TSG-SA WG4#32	S4-040552
26.103	025	1	Rel-6	Error Fixes	F	5.4.0	S4	TSG-SA WG4#32	S4-040573
26.103	028	1	Rel-5	Correction of Size and Reference of MuMe Codec	F	5.4.0	S4	TSG-SA WG4#32	S4-040572
26.103	029	1	Rel-6	Correction of Size and Reference of MuMe Codec	A	5.4.0	S4	TSG-SA WG4#32	S4-040553

CR to TS 28.062 (TFO) in Tdoc SP-040647:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
28.062	041	2	Rel-6	Harmonisation of AMR Configurations	C	5.4.0	S4	TSG-SA WG4#32	S4-040594

CRs to TSs 26.131 (Terminal acoustic characteristics for telephony; Requirements) and 26.132 (Test Specification) in Tdoc SP-040649:

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.131	022		Rel-6	Change of sending distortion requirement	C	5.2.0	S4	TSG-SA WG4#32	S4-040556
26.132	028		Rel-6	Change of sending distortion test case	C	5.4.0	S4	TSG-SA WG4#32	S4-040557

5. Communication with other WGs/TSGs/groups

Table 13 gives a complete list of the LSs sent out (to other 3GPP WGs/TSGs and 3GPP external groups) from SA4#32

Tdoc no.	Title	Intended for	Copy to
TD S4-040498	Reply LS on S4-030781 GZip Extensions	W3C SVG Working Group	
TD S4-040569	LS on Changes on the Sending Distortion Audio Test Case	GCF U-AG, GERAN WG3	
TD S4-040544	LS on Audio Codec Enhancement for MMS	TSG T WG2	
TD S4-040596	LS on Outcome of AMR Harmonization	TSG GERAN, TSG RAN WG2, TSG T WG1, TSG CN WG4, TSG CN WG3	TSG SA WG2, GERAN WG1, GERAN WG2, GERAN WG3
TD S4-040593	Liaison Statement on the finalization of DRM protection for PSS	OMA BAC DL+DRM	
TD S4-040551	Reply to Liaison Statement from 3GPP2 on alignment of 3GPP2 C.S0050 and 3GPP TS 26.244, TS26.245 and TS26.246	3GPP2 TSG-C	
TD S4-040554	LS reply about speech codec for PoC	OMA POC WG	TSG SA
TD S4-040555	Reply Liaison Statement on Mobile Broadcast Services to 3GPP and 3GPP2	OMA BAC	TSG SA WG1, TSG SA WG2, 3GPP2 TSG-C, 3GPP2 TSG X
TD S4-040546	Reply LS on Adoption of SVG Tiny 1.2	W3C SVG Working Group	

Table 13: SA4 LSs sent out since TSG SA#24

The main issues in the LSs are:

- Two LSs were sent to W3C SVG Working Group giving feedback on Scalable Vector Graphics Tiny 1.2 (currently being standardised in W3C). SA4 is requesting some features being added making it better suited for 3GPP use (in PSS and MMS).
- Failure of Sending Distortion test reported earlier by GCF UTRA Agreement Group has been investigated and solved by limiting the level ranges of Sending Distortion test signal. LS was sent to GCF UTRA on the found solution. GERAN WG3 was also informed on the change to be taken into consideration for 3G UE type approval (Release 6 onwards).
- T2 was informed on the progress for audio codec selection for Rel-6 MMS.
- The relevant WGs were informed on the agreed common preferred configuration for narrowband AMR for all 3GPP radio access technologies.
- LS was sent to OMA BAC DL+DRM informing them about the progress on TS 26.234 and 26.244. TS 26.234 now contains the necessary extensions for DRM protection of PSS. It includes all details on signalling encrypted media as well as the transport format (RTP payload wrapper payload format). Key management is handled by using OMA DRM 2.0. It also includes the mechanism for integrity protection and key handling based on SRTP. TS 26.244 includes support for carrying encrypted and protected media, as well as support for streaming servers to apply integrity protection using SRTP.
- LSs have been exchanged with 3GPP2 TSG-C on specifications for streaming, file formats, and SMIL language profile (e.g. on updates for Rel-6). Both groups intend to keep each other informed on developments for these specifications
- SA4 responded to OMA POC WG that SA4 presently has no mandate to modify or create specifications with respect to PoC, but that SA4 is very interested to take the responsibility to work on PoC codec definition as soon as SA4 has been given the mandate. (See Section 6 below for details.)

6. Miscellaneous

- PoC codecs: SA4#32 received a LS from OMA POC WG (sent to TSG-SA WG4, 3GPP2 TSG-C; CC: 3GPP TSG-SA, 3GPP TSG-SA WG2, 3GPP2 TSG-S) asking if 3GPP and 3GPP2 were willing to create or modify existing specifications to specify speech codec usage for PoC (by December 2004). SA4 responded (Cc: TSG-SA) in Tdoc SP-040494 to be willing to take the task, but is unsure if it presently has mandate to modify or create specifications with respect to PoC. It was also unclear to SA4#32 what is the status of PoC Stage 1 work. If these will become clarified, SA4 could address the PoC codecs at the next SA4 meeting (November) still before the deadline of the OMA request.

7. Documents presented for information

The following draft TS is presented for information:

Tdoc	Title	Source	Agenda Item	Document for
SP-040632	3GPP TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information

8. Approval/Decision requested

8.1 CRs and new TSs for audio codecs (for PSS and MMS); for discussion and decision

CRs on codec selection for MMS and PSS:

Tdoc	Title	Source	Agenda Item	Document for
SP-040641	CRs TS 26.140 on Introduction of Extended AMR-WB and / or Enhanced aacPlus into MMS service (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040642	CRs TS 26.234 on Introduction of Enhanced aacPlus and / or Extended AMR-WB into PSS service (Release 6)	SA WG4	7.4.3	Discussion / Decision

New audio codec TSs for Enhanced aacPlus:

Tdoc	Title	Source	Agenda Item	Document for
SP-040633	3GPP TS 26.401 "Enhanced aacPlus General Audio Codec; General description" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040634	3GPP TS 26.402 "Enhanced aacPlus General Audio Codec; Additional Decoder Tools" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040635	3GPP TS 26.403 "Enhanced aacPlus General Audio Codec; Encoder specification; Advanced Audio Coding (AAC) part" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040636	3GPP TS 26.404 "Enhanced aacPlus General Audio Codec; Encoder specification; Spectral Band Replication (SBR) part " Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040637	3GPP TS 26.405 "Enhanced aacPlus General Audio Codec; Encoder Specification; Parametric Stereo part" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040638	3GPP TS 26.410 "Enhanced aacPlus General Audio Codec; Floating-point ANSI-C code" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision

New audio codec TSs for Extended AMR-WB:

Tdoc	Title	Source	Agenda Item	Document for
SP-040639	3GPP TS 26.290 "Extended Adaptive Multi-Rate - Wideband codec; Transcoding functions" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision
SP-040640	3GPP TS 26.304 "Extended Adaptive Multi-Rate - Wideband codec; Floating-point ANSI-C code" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Discussion / Decision

CRs to include the new audio codecs into 3GPP file format:

Tdoc	Title	Source	Agenda Item	Document for
SP-040643	CRs TS 26.244 on Storage of AMR-WB+ and / or Enhanced aacPlus audio in 3GP files (Release 6)	SA WG4	7.4.3	Discussion / Decision

8.2 Other CRs as output from SA4 Rel-6 work; for approval

Output of WI ìMMS Enhancements: MMS formats and codecsî: CRs to TSs 26.140 (MMS; Media formats and codecs) in Tdoc SP-040650:

Tdoc	Title	Source	Agenda Item	Document for
SP-040650	CR TS 26.140 on Update of MMS codecs and formats with Release 6 functionality (Release 6)	SA WG4	7.4.3	Approval

Output of WI ìPS Streaming (PSS) Rel-6î: CRs to TSs 26.233 (PSS; General Description), 26.234 (PSS; Protocols and codecs) and 26.244 (PSS; File Format) in Tdocs SP-040651, SP-040652 and SP-040654):

Tdoc	Title	Source	Agenda Item	Document for
SP-040651	CR TS 26.233 on Addition of Release 6 functionality (Release 6)	SA WG4	7.4.3	Approval
SP-040652	CR TS 26.234 on Additional Release-6 updates to PSS Protocols and codecs (Release 6)	SA WG4	7.4.3	Approval
SP-040654	CR TS 26.244 on Additional Release 6 update to 3GP file format (Release 6)	SA WG4	7.4.3	Approval

Output of WI ìCodec Enhancements for Packet Switched Conversational Multimedia Applicationsî: CRs to TSs 26.235 (Default Codecs) in Tdoc SP-040653:

Tdoc	Title	Source	Agenda Item	Document for
SP-040653	CRs TS 26.235 on Support for 128 kbps video in the PS conversational services & editorial corrections (Release 6)	SA WG4	7.4.3	Approval

Output of WI ì3G-324M Improvementsî: CR to TS 26.111 (Modifications to H.324) in Tdoc SP-040648:

Tdoc	Title	Source	Agenda Item	Document for
SP-040648	CR TS 26.111 on 3G-324M Improvements: addition of optional AMR-WB support (Release 6)	SA WG4	7.4.3	Approval

8.3 Other CRs; for approval

Tdoc	Title	Source	Agenda Item	Document for
SP-040644	CRs TS 26.101 on Generic Frame Structure for GSM-EFR SID and Error Corrections (Release 6)	SA WG4	7.4.3	Approval
SP-040645	CR TS 26.102 on Mapping of GSM_EFR SID on Nb Interface (Release 6)	SA WG4	7.4.3	Approval
SP-040646	CRs TS 26.103 on Harmonisation of AMR Configurations & several Corrections (Releases 5 and 6)	SA WG4	7.4.3	Approval
SP-040647	CR TS 28.062 on Harmonisation of AMR Configurations (Release 6)	SA WG4	7.4.3	Approval
SP-040649	CRs TS 26.131 & TS 26.132 on Change of sending distortion requirement & test case (Release 6)	SA WG4	7.4.3	Approval

List of Annexes:

Annex 1:   ìSP-040631 Annex 1 - Slides presentation.pptî

Annex 2:   ìSP-040631 Annex 2 - S4-040590 Revised Technical Report on Video Codec Selection in Rel-6.docî (approved by SA4#32)

TSG-SA WG4 (SA4) - CODEC Status Report at TSG-SA#25

Kari Järvinen
TSG-SA WG4 Chairman

☞ *SA4 status report in Tdoc SP-040631*

☞ *These slides are attached in Annex 1 (of Tdoc SP-040631)*

Content

- **General issues**

- **Review of SA4 work progress for Release 6**

- **Maintenance of releases**

- **Communication with other groups**

- **Summary of Rel-6 work status**

- **Documents for information**

- **Documents for decision/approval**

General: SA4 officials

- **Chairman:**   **Kari J%rvinen (Nokia, ETSI)**

- **Vice Chairpersons:**   **Catherine Quinquis (Orange, ETSI) and FrÈdÈric Gabin (NEC Technologies, ETSI)**

- **Secretary:**   **Paolo Usai (3GPP Support)**

- **Sub Working Groups / Ad-Hoc groups:**
  - ñ **Speech Quality (SQ) SWG**   **Paolo Usai (ETSI)**
  - ñ **PS Multimedia (PSM) SWG**   **(open) - Interim Chairman: Igor Curcio (Nokia, ATIS)**
  - ñ **Audio Codec Ad-Hoc group**   **Imre Varga (Siemens, ETSI)**
  - ñ **Video Codec Ad-Hoc group**   **Nikolaus F%rber (Fraunhofer Gesellschaft, ETSI)**

There are no changes except that Igor Curcio acted as Interim PSM SWG Chairman during SA4#32.

General: SA4 meetings

- **Meetings held**
  - ñ **SA4#32** **16 - 20 August, 2004 Host: The European Friends of 3GPP; Venue: Prague, Czech Republic**
  - ñ **Joint meeting of SA3 and SA4 on MBMS security 23-24 August, 2004 Host: ETSI; Venue: Sophia Antipolis, France**

- **Future meetings**
  - ñ **PSM SWG ad-hoc meeting (tbc)* 11-13 October, 2004 Host: Vodafone; Venue: in England**
  - ñ **SA4#33 22 - 26 November, 2004 Host: The European Friends of 3GPP; Venue: Helsinki, Finland**
  - ñ **SA4#34 21-25 February, 2005 Host and venue tbd**
  - ñ **SA4#35 9-13 May, 2005 Host and venue tbd**
  - ñ **SA4#36 5-9 September, 2005 Host and venue tbd**
  - ñ **SA4#37 14-18 November, 2005 Host and venue tbd**

*) A need for extra ad-hoc meeting of PSM SWG (still before next SA4 meeting) was noted in PSM SWG during SA4#32, but was not formally addressed on SA4-level at SA4#32. Therefore, the proposal of having the meeting is raised at SA#25.

- **Meeting statistics**

Meeting	Number of (new) input documents	Number of participants	Number of incoming LSs	Number of outgoing LSs/communications
SA4#29	167	53	18	8
SA4#30	215	74	27	9
SA4#31	168	57	26	7
SA4#32	**235**	**64**	**17**	**9**

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General: Input documents

- **For information:**
    - ñ **SP-040631: TSG S4 Status Report at TSG SA#25; Source: SA4 Chairman**
    - ñ **SP-040632: 3GPP TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 1.0.0 (Release 6); Source: SA4**
    - ñ **SP-040494: LS reply about speech codec for PoC; Source: SA4**

- **For discusion/decision:**
    - ñ **SP-040633 - SP-040638: New audio codec TSs for Enhanced aacPlus; Source: SA4**
    - ñ **SP-040639 - SP-040640: New audio codec TSs for Extended AMR-WB; Source: SA4**
    - ñ **SP-040641: CRs TS 26.140 on Introduction of Extended AMR-WB and / or Enhanced aacPlus into MMS service (Release 6); Source: SA4**
    - ñ **SP-040642: CRs TS 26.234 on Introduction of Enhanced aacPlus and / or Extended AMR-WB into PSS service (Release 6); Source: SA4**
    - ñ **SP-040643: CRs TS 26.244 on Storage of AMR-WB+ and / or Enhanced aacPlus audio in 3GP files (Release 6); Source: SA4**

- **For approval**
    - ñ **SP-040644 - SP-040654: CRs to TSs 26.101 (Rel-6), 26.102 (Rel-6), 26.103 (Rel-5, Rel-6), 26.111 (Rel-6), 26.131 (Rel-6), 26.132 (Rel-6), 26.140 (Rel-6), 26.233 (Rel-6), 26.234 (Rel-6), 26.235 (Rel-6) and 28.062 (Rel-6).**

Content

- **General issues**

- **Review of SA4 work progress for Release 6**

- **Maintenance of releases**

- **Communication with other groups**

- **Summary of Rel-6 work status**

- **Documents for information**

- **Documents for decision/approval**

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Release 6 WIs

- **Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications   100% COMPLETED AT SA#24**

- **Packet Switched Streaming (PSS) Rel-6**

- **MMS Enhancements: MMS codecs and formats**

- **Extended AMR-WB Codec (AMR-WB+) Targeted for PS Streaming and Messaging Services**

- **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)**

- **Codec Enhancements for Packet Switched Conversational Multimedia Applications**

- **3G-324M Improvements (CS Multimedia Telephony Service Terminal)**

Audio codecs for MMS and PSS (1/3)

- **SA#24 tasked SA4 (in Tdoc SP-040481) to draft two CRs to MMS TS 26.140 (Media Formats and Codecs), one for both codecs under consideration, i.e. Enhanced aacPlus and Extended AMR-WB; with identification of the scenarios for which each codec is recommended.**

  - ñ These are brought to SA for discussion and decision along with two sets of finalised codec TSs, one for each codec. It is up to SA#25 to decide whether to approve both, only one or none of the CRs.

  - ñ In addition, a third ìjoint CRî having same technical content as the two CRs combined - with just improvements in language and tables to combine two separate CR texts/tables into more fluent specification language - is also brought to SA#25 for consideration

- **A similar set of audio codec CRs is brought to SA consideration also for PSS**

  - ñ No explicit request given in the guidance. However, since SA#24 asked SA4 to carry out similar identification of the scenarios also for the case of PSS, and since the audio codec selections are related (with the same candidate codecs), SA4 is bringing also a similar set for PSS so that they can be jointly discussed and decided by SA#25.

- **Two sets of codec TS are presented for discussion and decision. (Also, for inclusion of the codecs into 3GPP File Format, two CRs to TS 26.244 have been prepared.)**

  - ñ The TSs include the floating-point C-codes. Finalising the fixed-point C-code(s) and codec conformance issues for both floating- and fixed-point codec versions (e.g. preparation of test sequences) and related TSs is ongoing and can be expected to be completed by SA#26.

Audio codecs for MMS and PSS (2/3)

- **The critical verification work (e.g. verification of bit-exactness, verification of complexity, verification of the format of the C-code) has been completed and the remaining issues have been solved**
  - ñ The remaining verification (e.g. detailed checking of the C-codes for any remaining bugs, detailed complexity analysis, measurement of frequency response, verification of the fixed-point codec versions) is expected to be completed by SA#26. Volunteering organisations for some tasks are still missing.

- **Also, a TR on audio codecs performance characterisation (based on selection, verification and complementing characterisation tests) will be prepared**
  - ñ Initial test plan under development in SA4. TR to be finalised after testing, likely early 2005 (tbd).

- **Audio codecs for MBMS to be addressed later**
  - ñ SA4 intention is to align MBMS codecs with PSS and MMS codecs (when finally defined in Rel-6 ñ foreseen at SA#25). It is expected that the codecs to be used for MBMS would be the codecs already used for other applications or a subset (like stated at SA#24 in the audio codec guidance to SA4).
  - ñ Note that the overall SA4 MBMS User Services work is still ongoing in SA4 (to be completed by SA#26); e.g. discussion on RAB simulations/parameters ongoing with relevant WGs.

Audio codecs for MMS and PSS (3/3)

- **Completed audio codec specifications**
  - ñ   **TS 26.401: Enhanced aacPlus General Audio Codec; General Description**
  - ñ   **TS 26.402: Enhanced aacPlus General Audio Codec; Additional Decoder Tools**
  - ñ   **TS 26.403: Enhanced aacPlus General Audio Codec; Encoder Specification Advanced Audio Coding (AAC) part**
  - ñ   **TS 26.404: Enhanced aacPlus General Audio Codec; Enhanced aacPlus encoder Spectral Band Replication (SBR) part**
  - ñ   **TS 26.405: Enhanced aacPlus General Audio Codec; Encoder Specification Parametric Stereo part**
  - ñ   **TS 26.410: Enhanced aacPlus General Audio Codec; Floating-point ANSI-C code**
  - ñ   **TS 26.290: Extended AMR Wideband codec; Transcoding functions**
  - ñ   **TS 26.304: ANSI-C code for the Floating-point; Extended AMR Wideband codec**
  - ñ   **CRs to 26.244 (Transparent end-to-end PSS; File Format) on Inclusion of Extended AMR Wideband and / or Enhanced aacPlus audio in 3GP file format**

- **Specifications to be completed after SA#25**
  - ñ   **TS 26.411: Enhanced aacPlus General Audio Codec; fixed-point ANSI-C code (by SA#26)**
  - ñ   **TS 26.273: ANSI-C code for the Fixed-point; Extended AMR Wideband codec (by SA#26)**
  - ñ   **TS 26.xyz: 3GPP audio codecs; Conformance (by SA#26)**
  - ñ   **TR 26.xyz: Performance characterization of audio codec (early 2005, tbd)**

Video codecs for PSS, MMS, PC conversational and CS multimedia (1/4)

- **Selection initiated at SA4#28 (Sept 2003) with two proponents intending to submit a candidate: 1) ITU-T H.264 (MPEG-4 AVC) proposed by Nokia and 2) WMV9 proposed by Microsoft.**

- **H.264 (AVC) was agreed at SA4#29 to meet all Rel-6 video codec candidate qualification criteria (with regard to coding efficiency, resource computation and error resilience). WMV9 was withdrawn.**

- **From SA4#30 until SA4#32 additional data were presented illustrating the performance improvements of H.264 (AVC) compared to Rel-5 video codec H.263**
  - ñ Formal verification test results of H.264 (AVC) from MPEG/ITU-T
  - ñ Complementing test results from companies (e.g. on 3GPP bearers)

- **H.264 (AVC) is agreed by SA4 as providing significant performance gain over Rel-5 video codecs as demonstrated in test results presented in SA4**
  - ñ When compared to MPEG-4 Visual SP, AVC Baseline Profile achieves a coding efficiency improvement of 2 times or greater in 14 out of 18 statistically conclusive cases.
  - ñ In packet loss conditions shown to be at least as robust as the video codecs in Rel-5.

- **A draft specification text continuously updated to accommodate all system aspects**
  - ñ The configuration (levels and profiles) of H.264 (AVC) were specified for each service
  - ñ Considered as a recommended codec (ìshould be supportedî) instead of mandated (ìshall be supportedî) due to already having a default codec in Rel-5 (which status was preferred to be kept for Rel-6) and also due to complexity of AVC seen still challenging for low/mid price-range terminals.

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Video codecs for PSS, MMS, PC conversational and CS multimedia (2/4)

- **At SA4#31:**
  - ñ **Two companies still expressed concerns on adoption of H.264 (AVC)**
    - ï Stating that codec efficiency not proven, complexity of the encoder still an issue, and improvement in terms of quality not fully quantified (and also felt that an earlier agreement on specification text was ìmay be supportedî rather than ìshould be supportedî).
  - ñ **Also, some requests for further testing under error conditions**
  - ñ **Except for these few companies, the adoption of H.264 (AVC) as a recommended (ì should be supportedî) codec was agreed as a working assumption within SA4**
  - ñ **Some issues in video buffering parameters remained to be defined**

- **At SA4#32:**
  - ñ **Work continued trying to resolve the remaining concerns/requests**
  - ñ **The video burffering issues were finalised and the issue of further testing resolved**
    - ï New complementing test results presented for 3GPP bearers. Further testing was agreed to be best addressed during a post-selection characterisation testing phase.
  - ñ **CRs prepared on adoption of H.264 (AVC) to 1) MMS, 2) PSS, 3) PS Conversational applications and 4) 3G-324M (CS multimedia terminal) as a recommended codec**
    - ï Some signalling issues noted to be checked for conversational use, but can be done after codec selection. (Decoder capability signalling for Arbitrary Slice Ordering/Flexible Macroblock Ordering coding tool to be enabled for 3G-324M, and the use of signalling to be clarified for PS Conv.)
  - ñ **Two companies sustained their objection against the proposed CRs (Siemens and ì 3î)**

Video codecs for PSS, MMS, PC conversational and CS multimedia (3/4)

- **The two objections were explained to be based on the fact that the encoder is not fully specified for H.264 (AVC) - since only the decoding process, bit-stream syntax, bit-stream semantics and constraints on bit-streams are specified.**

- **Two specific issues on the objections:**

  1. **The computational complexity for an encoder is not specified (in terms of WMOPS/PROM/RAM) and it is not clear how much complexity is required to achieve the reported performance gain.**

  2. **The quality of the encoding process is seen not guaranteed (like for any video codec) and therefore not granting guaranteed QoS.**

  The first point was further clarified not to be valid for PSS (where only the decoder is used in the terminal).

  Also, ì mayî instead of ì shouldî as basis for discussion was raised, but with no support from others.

- **During the discussion, concerns were raised by ì 3î regarding the Licensing terms of MPEG-LA with respect to the Usage Base.**

  - ñ   ì3î highlighted that the Usage Base Licensing imposed by MPEG-LA, is not in line with the ETSI IPR Rules and Procedures and requested SA4 Chairman to bring their concern to the attention of SA Plenary.

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Video codecs for PSS, MMS, PC conversational and CS multimedia (4/4)

- **As a response to these concerns it was noted that**
    - ñ   Video and speech coding traditionally use different approaches in specification. While the former only specifies the decoder, speech codecs are fully specified including a bit-exact encoder. Both approaches have advantages and disadvantages and both approaches have shown to be effective in history.
    - ñ   As for any other video codec in 3GPP (like H.263 specified for Rel-5), H.264 does not specify the encoder in detail, it was asked how H.263 can then have been defined for previous 3GPP releases if this traditional video codec specification style is not sufficient.

- **This was responded by the objecting companies that improvement should be sought for the new releases**

- **On the complexity of the encoder, results for encoding in terms of encoding times per pictures were explained having been presented earlier in SA4, but the objecting companies did not feel that these were sufficient to alleviate their concerns on complexity.**

- **Due to the two sustained objections, no CRs on adoption of H.264 (AVC) could be agreed at SA4#32**

MMS Enhancements: MMS media formats and codecs

- **Rel-6 enhancements (extended support for synthetic audio, support for 128 kbps video, clarifications and updates to a number of references) brought to TS 26.140 (MMS; Media Formats and Codecs) through a CR**
  - ñ Included also to PSS (through CRs at SA#24 and SA#25) and this CR also keeps the services harmonised in Rel-6

- **CRs on audio codecs brought for decision. A proposed CR on adoption of H.264 (AVC) video codec could not be agreed at SA4#32.**

- **Adoption of SVG Tiny 1.2 (Scalable Vector Graphics) for use in MMS and PSS still remains being considered in SA4**
  - ñ SA4#32 requested from W3C some additional features to be added into the new SVG Tiny 1.2 making it better fitted for intended 3GPP use. Decision on inclusion of SVG Tiny 1.2 into MMS and PSS is therefore postponed until SA4#33 (November) to be brought from there as a late Rel-6 addition to SA#26.

- **Status of 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, T2	Rel-6 updates brought to SA#25 in CRs. These include a set of alternative audio codec CRs. (No consensus was reached on adoption of H.264 due to two sustained objections.)	**SA#25** (Note: SVG Tiny 1.2 expected to be still included at SA#26)

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Packet Switched Streaming (PSS) Rel-6 (1/2)

- **TS 26.234 (PSS; Protocols and Codecs) is updated to contain new Rel-6 features**
  - ñ   DRM support included: confidentiality and integrity protection. (OMA DRM version 2 is supported through two extension: the first extension is an RTP payload format that enables confidentiality protection of individual RTP payloads used in a streaming session, the second extension defines the necessary key management and protocol support for the optional integrity protection of RTP payloads using SRTP between streaming server and client.)
  - ñ   RTP retransmission included (to improve robustness for lost packets received within the receiver buffering time)
  - ñ   RTP transport of timed text included enabling streaming of timed text in Rel-6 (only downloading was possible in earlier releases)
  - ñ   PSS UAProf vocabulary and MIME type references updated
  - ñ   Support for 128 kbps video included (new H.263 level defined in ITU-T)
  - ñ   Client buffer feedback mechanism updated (for the rate adaptation mechanism)
  - ñ   Two new Quality of Experience metrics added. (QoE metrics are used for servers to receive information from the handset to provide the service providers means to evaluate the end user experience.)

- **TS 26.244 (PSS; File Format) is also updated to cover the Rel-6 content**
  - ñ   Fragmented files allowed (reducing initial buffering durations and memory consumption during local playback)
  - ñ   Server extensions for PSS rate adaptation included (reflecting introduction of rate adaptation for PSS)
  - ñ   Reference to MIME type for 3GP files included
  - ñ   References updated
  - ñ   Additional SDP attributes (reflecting updates by PSS) included

- **TS 26.233 (PSS; General Description) also updated**

- **Also, CRs on audio codecs brought for decision. A proposed CR on adoption of H.264 (AVC) video codec could not be agreed at SA4#32.**

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Packet Switched Streaming (PSS) Rel-6 (2/2)

- **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	Updated at SA#25 based on the content of PSS Rel-6.	**SA#25**
CRs to TS 26.234	Transparent end-to-end PSS; Protocols and codecs	SA4	SA2	CR presented for approval at SA#24 bringing most Rel-6 updates. Remaining updates brought to SA#25 in CRs. These include a set of alternative audio codec CRs. (No consensus was reached on adoption of H.264 due to two sustained objections.)	**SA#25**
TS 26.244	Transparent end-to-end PSS; File Format	SA4	SA2	Version 1.0.0 presented for information at SA#22. Version 2.0.0 approved at SA#23. Further update CRs brought at SA#25.	**SA#25**
TS 26.245	Transparent end-to-end PSS; Timed Text Format	SA4	SA2	Version 2.0.0 approved at SA#24.	**COMPLETED AT SA#24**
TS 26.246	Transparent end-to-end PSS; SMIL Language Profile	SA4	SA2	Version 1.0.0 presented for information at SA#22. Version 2.0.0 approved at SA#24.	**COMPLETED AT SA#24**
CRs to TR 26.937	Transparent end-to-end PSS; RTP Usage Model	SA4		Updated based on the content of PSS Rel-6. CR agreed at SA#23.	**COMPLETED AT SA#24**
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.	-

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Extended AMR-WB codec (AMR-WB+) Targeted for PS Streaming and Messaging Services

- **The work is related to ongoing SA4 audio codec selection work for PSS and MMS (as the AMR-WB+ codec is considered as one candidate)**

- **AMR-WB+ provides extension modes to the AMR-WB speech codec which meet the AMR-WB+ performance requirements and the design constraints.**
  - ñ AMR-WB+ codec can also be operated in configurations that do not strictly comply with the design constraint set for a maximum bit rate (24 kbps), as it may be configured to operate at rates up to 48 kbps.
  - ñ This increases the worst case computational complexity figures by about 40%. Memory consumption is not affected at all. Therefore, essential design constraints related to codec implementation, such as computational complexity and memory limits, are though always met.
  - ñ Hence, SA4 sees that the work item can be concluded after approval of the specifications defining AMR-WB+.

- **SA4#32 left it for SA discretion in the overall audio codec selection discussion at SA#25, if AMR-WB+ TSs (developed under own WI as extensions to AMR-WB) would be approved even in the case the codec is not specified for use in PSS or MMS.**

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

- **Work completed with the exception of TR on codec performance characterisation. (The content of the TR will be based on the selection and verification testing carried out already earlier.)**

- **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 CR presented for information at SA#23. CR approved at SA#24.	**COMPLETED AT SA#24**
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	A document containing draft CR presented for information at SA#23. CR approved at SA#24.	**COMPLETED AT SA#24**
TS 26.243	Software documentation for fixed-point DSR Extended Advanced Front-end	SA4		Version 1.0.0 was presented for information at SA#23. Version 2.0.0 approved at SA#24.	**COMPLETED AT SA#24**
TR 26.xyz	Performance characterization of SES codecs	SA4		To be prepared based on selection and verification tests.	**ONGOING; COMPLETION DATE TBD**

Media Codecs and Formats for IMS Messaging and Presence

- **A first ì skeletonî working draft of TS 26.141 (IMS Messaging and Presence; Media Formats and Codecs) was prepared at SA4#28 (September 2003).**

- **At SA4#32 the working draft was updated. However, not yet mature for presentation to SA for information.**

- **The intended codecs are a subset of codecs defined for other services and are to be aligned especially with MMS codecs.**

- **Status of 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	Drafting ongoing.	**ONGOING; COMPLETION DATE TBD**

MBMS User Services (1/2)

- **TS 26.346 (MBMS Protocols and Codecs) progressed; draft version presented for information**
    - ñ Complete specification of a scalable point-to-point repair agreed (includes a scalable solution, an HTTP request definition and an HTTP response definition)
    - ñ MBMS streaming part also progressing: RTP adopted as transport protocol (without RTCP in uplink)

- **Evaluation of forward error correction code (FEC) proposals ongoing to reach an agreement at next SA4 meeting**
    - ñ The proposals under study include Reed-Solomon, LDPC (Linear Density Parity Codes) and Raptor codes. No algorithm selection has been done yet.

- **On codec selection, the intention is to align MBMS with PSS/MMS codecs (when they become finally defined in Rel-6 ñ expected at SA#25)**
    - ñ Like stated at SA#24 in the guidance to SA4 on audio codecs, it is expected that the codecs to be used for MBMS would be the codecs already used for other applications or a subset.
    - ñ Also, discussion with GERAN and RAN WGs is continuing on RAB simulations impacting the FEC and codec selection.

- **The security aspects to be completed with SA3**
    - ñ A joint SA3-SA4 meeting on MBMS Security was organised on 23-24 August (after SA4#32).
    - ñ Using SRTP for the protection of streaming data for MBMS seen viable by the joint meeting (subject to e-mail approval on the SA3 e-mail list).

MBMS User Services (2/2)

- **A joint evening session on MBMS was organised during SA4#32 with co-located RAN2-meeting**
    - ñ Knowledge sharing of MBMS work in both WGs (e.g. point-to-point repair functionality and SDU-sizes), MBMS simulation matters (SA4 questions on simulation parameters for selection of FEC) and other issues.

- **The main remaining MBMS issues: 1) codec definition, 2) FEC selection and 3) security issues (with SA3). Also some parts of the specification text still need work.**

- **Also, TR 26.946 (MBMS user service guidelines) will be prepared. (SA4 draft version under development.)**

- **Due to the remaining work, MBMS is planned to be progressed in an ad-hoc PSM SWG meeting in October. Finalisation of SA4 MBMS work is expected by SA#26.**

- **Status of 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	Draft version under development. FEC and other methods for reliable transport under study. Draft TR v1.0.0 presented for information at SA#25.	**ONGOING; TO BE COMPLETED AT SA#26**
TS 22.246	MBMS user services; Stage 1	SA1			(Approved at SA#22)
TR 26.946	Multimedia Broadcast/Multicast Service (MBMS) user service guidelines	SA4		Draft version under development.	**ONGOING; TO BE COMPLETED AT SA#26**

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Codec Enhancements for PS Conversational Multimedia Applications

- **CRs to TS 26.235 (Protocols and Codecs) on support for 128 kbps video and on language improvements are brought for approval.**

- **A proposed CR on adoption of H.264 (AVC) could not be agreed in SA4#32 due to two sustained objections; further debate is expected.**

- **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	No consensus reached on adoption of H.264 (AVC) due to two sustained objections	**SA#25**
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2		**(no changes currently foreseen)**

3G-324M Improvements

- **AMR-WB codec included as an optional codec. CR to TS 26.111 brought for approval.**

- **A proposed CR on adoption of H.264 (AVC) could not be agreed in SA4 due to two sustained objections; further debate is expected.**

- **Status of specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
TS 26.111	Codec for CS Multimedia Telephony Service; Modifications to H.324	SA4		No consensus reached on adoption of H.264 (AVC) due to two sustained objections	**SA#25**
TR 26.911	Codec for CS Multimedia Telephony Service; Terminal Implementorís Guide	SA4		No consensus reached on adoption of H.264 (AVC) due to two sustained objections	**(no changes foreseen unless AVC adopted)**

Other Release 6 work (CRs other than corrections)

- **Harmonisation of AMR configurations - a single preferred narrrowband AMR mode configuration for CS speech telephony agreed: 12.2, 7.4, 5.9 and 4.75 kbit/s**
    - ñ   A single preferred set of modes to be used on all channels in GERAN and UTRAN.
    - ñ   Especially recommended for use in GERAN-UTRAN combined networks for transcoding free operation (via TFO and/or TrFO).
    - ñ   The main issue was on whether to include 7.4 or 6.4 kbit/s into the set. No strong views were expressed on either side and the decision was finally made based on preferences.
    - ñ   CRs agreed to TS 28.062 (TFO) and TS 26.103 (Speech Codec List for GSM and UMTS)

- **Sending Distortion**
    - ñ   GCF UTRA Agreement Group (GCF U-AG) reported to SA4#25 that the sending distortion test case defined in TS 26.132 (Speech and video telephony terminal acoustic test specification) cannot be passed for terminals using active noise supressor.
    - ñ   SA4 has been investigating the issue and has found a solution by limiting the level ranges of Sending Distortion test signal. CRs on this are presented to TSs 26.131 (Requirements) and 26.132 (Test Specification).

Content

- **General issues**

- **Review of SA4 work progress for Release 6**

- **Maintenance of releases**

- **Communication with other groups**

- **Summary of Rel-6 work status**

- **Documents for information**

- **Documents for decision/approval**

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Maintenance of releases

- **CRs to TSs 26.101 (Rel-6), 26.102 (Rel-6), 26.103 (Rel-5, Rel-6), 26.111 (Rel-6), 26.131 (Rel-6), 26.132 (Rel-6), 26.140 (Rel-6), 26.233 (Rel-6), 26.234 (Rel-6), 26.235 (Rel-6) and 28.062 (TFO).**

- **These contain output from Rel-6 WIs, impact from other WGsí Rel-6 work, and corrections (to Rel-5 and Rel-6).**

- **The audio codec CRs are presented for discussion and decision; others for approval**

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Content

- **General issues**

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Communication with other WGs/TSGs/groups

Tdoc no.	Title	Intended for	Copy to
TD S4-040498	Reply LS on S4-030781 GZip Extensions	W3C SVG Working Group	
TD S4-040569	LS on Changes on the Sending Distortion Audio Test Case	GCF U-AG, GERAN WG3	
TD S4-040544	LS on Audio Codec Enhancement for MMS	TSG T WG2	
TD S4-040596	LS on Outcome of AMR Harmonization	TSG GERAN, TSG RAN WG2, TSG T WG1, TSG CN WG4, TSG CN WG3	TSG SA WG2, GERAN WG1, GERAN WG2, GERAN WG3
TD S4-040593	Liaison Statement on the finalization of DRM protection for PSS	OMA BAC DL+DRM	
TD S4-040551	Reply to Liaison Statement from 3GPP2 on alignment of 3GPP2 C.S0050 and 3GPP TS 26.244, TS26.245 and TS26.246	3GPP2 TSG-C	
TD S4-040554	LS reply about speech codec for PoC	OMA POC WG	TSG SA
TD S4-040555	Reply Liaison Statement on Mobile Broadcast Services to 3GPP and 3GPP2	OMA BAC	TSG SA WG1, TSG SA WG2, 3GPP2 TSG-C, 3GPP2 TSG X
TD S4-040546	Reply LS on Adoption of SVG Tiny 1.2	W3C SVG Working Group	

- **PoC codecs:** SA4#32 received a LS from OMA POC WG (sent LS to TSG-SA WG4, 3GPP2 TSG-C; CC: 3GPP TSG-SA, 3GPP TSG-SA WG2, 3GPP2 TSG-S) asking if 3GPP and 3GPP2 were willing to create or modify existing specifications to specify speech codec usage for PoC (by December 2004). SA4 responded (Cc: TSG-SA) in Tdoc SP-040494. to be willing to take the task, but is unsure if it presently has mandate to modify or create specifications with respect to PoC. It was also unclear to SA4#32 what is the status of PoC Stage 1 work. If these will become clarified, SA4 would like to address the PoC codecs at the next SA4 meeting (November) still before the deadline of the OMA request.

Content

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Summary of Rel-6 status (1/2)

- **For most SA4 Rel-6 WIs, the work is now completed or almost completed. However, in many WIs, there are still some (minor) issues remaining.**

- **For ìMBMS User Servicesí and ìMedia Codecs and Formats for IMS Messaging and Presenceí substantial work still remains**
  - ñ **MBMS User Services:**
    - ï Draft of the output TS ìMBMS Protocols and Codecsî is presented for information at SA#25
    - ï TR 26.946 ìMBMS user service guidelinesî to be completed by SA#26
    - ï Work expected to be completed by SA#26
  - ñ **Media Codecs and Formats for IMS Messaging and Presence**
    - ï Work finalisation depends on contributions (SA#26 at the earliest)

- **In other WIs, the remaining issues are:**
  - ñ **Two TRs on codec characterisation (SES and audio codecs).** Completion dates for both will most likely be after SA#26, but as informative TRs these are not release-critical.
  - ñ **The fixed-point codec versions/specifications and conformance issues** are being progressed and can be foreseen to be completed by SA#26. Also, some (non-critical) verification tasks for the codecs are still continuing or are to be done. Progress in verification depends on companies volunteering for the tasks.
  - ñ **Decision on adoption of SVG Tiny 1.2** (Scalable Vector Graphics) for use in MMS and PSS postponed until SA4#33 (November) to be brought from there as a late Rel-6 addition at SA#26. (SA4#32 requested from W3C some additional features to be added.)
  - ñ **H.264 (AVC) video codec** could not be agreed as a recommended codec at SA4#32 due to two sustained objections. Further debate is expected. (Also, some signalling issues for conversational use are to be checked.)

Summary of Rel-6 status (2/2)

Work Item	Completion-% at SA#25	Remaining issues (after SA#25)
Performance characterisation of default codecs for PS conv. multimedia application:	100	None

MMS formats and codecs	90	1) some complementing audio codec work:
		   - fixed point C-code TS
		   - conformance issues (e.g. test sequences) and TS
		   - rest of verification (not critical for codec selection)
		   - characterisation testing and TR
		2) consideration of AVC
		3) adoption of SVG Tiny 1.2

PSS Rel-6	90	Same as for MMS (see above)
AMR-WB extension for high audio quality	95	Some complementing audio codec work (see list under MMS above)
Codec Work to Support Speech Recognition Framework for Automated Voice Services	95	TR on performance characterisation
Media Codecs and Formats for IMS Messaging and Presence	20	Preparation of TS 26.141.
Definition of MBMS user services; media codecs, formats and transport/application protocols using MBMS	60	Finalisation of TS 26.346 (MBMS Protocols and Codecs). Draft TS is presented for information at SA#25. Main remaining issues are FEC selection and definition of codecs. Finalisation of TR 26.946 (Multimedia Broadcast/Multicast Service (MBMS) user service guidelines)
Codec Enhancements for Packet Switched Conversational Multimedia Applications	80	Consideration of AVC
3G-324M Improvements	80	Consideration of AVC

Content

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Documents for information

Tdoc	Title	Source	Agenda Item	Document for
SP-040632	3GPP TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information

- **Defines a set of media codecs, formats and transport/application protocols to enable the deployment of MBMS user services over the MBMS bearer service within the 3GPP system.**

- **MBMS download and streaming delivery methods are specified.**

- **The TS contains:**
  1. MBMS system description (e.g. functional layers, user service entities and service architecture)
  2. Procedures and protocols overview (service announcements, service initiation/termination, protocols)
  3. Definition of delivery methods:
     - ï Download delivery based on IETF FLUTE
     - ï Streaming delivery based on RTP (without RTCP in uplink to avoid channel congestion); use of SRTP under study with SA3
     - ï Associated delivery procedures (download):
       - ñ Point-to-point file repair (repair lost or corrupted file fragments): a scalable solution to handle congestion and server overload, file repair requests and responses take place in a single TCP session using HTTP-protocol
       - ñ Delivery confirmation procedure (confirmation from UE of reception and succesful delivery of content)
  4. Codecs (t.b.d. ñ to be aligned to the PSS/MMS codecs)

- **The main remaining issues: 1) codec definition, 2) FEC selection and 3) security issues (with SA3). Also some other parts of the specification text still need work.**

Content

- **General issues**

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Documents for decision: audio codecs (1/2)

- SA#24 tasked SA4 (in Tdoc SP-040481) to draft two CRs, one for both codecs under consideration; with identification of the scenarios for which each codec is recommended.

- These are brought to SA for discussion and decision along with two sets of finalised codec TSs, one for each codec. It is up to SA#25 to decide whether to approve both, only one or none of the CRs.

- In addition, a third ìjoint CRî having same technical content as the two CRs combined - with only improvements in language and tables to combine two separate CR texts/tables into more fluent specification language - is also brought to SA#25 for consideration; just for the case that both codecs would be selected.

- The new audio codecs are included in the CRs as recommended codecs (ìshould be supportedî) and the status of the recommended audio codec in Rel-5 (MPEG-4 AAC LC) has been reduced from ìshould be supportedî to ìmay be supportedî since the new audio codecs outperform it (and it does not meet the performance requirements set for new Rel-6 audio codecs).

Documents for decision: audio codecs (2/2)

- **SP-040641 and SP-040642: Codec adoption CRs to TS 26.140 (MMS) and TS 26.234 (PSS)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.140	004	2	Rel-6	Introduction of Extended AMR-WB into MMS service	C	5.2.0	S4	TSG-SA WG4#32	S4-040585
26.140	005	2	Rel-6	Introduction of Enhanced aacPlus into MMS service	C	5.2.0	S4	TSG-SA WG4#32	S4-040586
26.140	006	2	Rel-6	Introduction of Extended AMR-WB and Enhanced aacPlus into MMS service	C	5.2.0	S4	TSG-SA WG4#32	S4-040587

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.234	072	1	Rel-6	Introduction of Enhanced aacPlus into PSS service	C	6.0.0	S4	TSG-SA WG4#32	S4-040579
26.234	073	1	Rel-6	Introduction of Extended AMR-WB into PSS service	C	6.0.0	S4	TSG-SA WG4#32	S4-040580
26.234	074	1	Rel-6	Introduction of Extended AMR-WB and Enhanced aacPlus into PSS service	C	6.0.0	S4	TSG-SA WG4#32	S4-040581

- **SP-040633 - SP-040638: New audio codec TSs for Enhanced aacPlus**
  - ñ TS 26.401: General Description
  - ñ TS 26.402: Additional Decoder Tools
  - ñ TS 26.403: Encoder Specification Advanced Audio Coding (AAC) part
  - ñ TS 26.404: Enhanced aacPlus encoder Spectral Band Replication (SBR) part
  - ñ TS 26.405: Encoder Specification Parametric Stereo part
  - ñ TS 26.410: Floating-point ANSI-C code

- **SP-040639 - SP-040640: New audio codec TSs for Extended AMR-WB**
  - ñ TS 26.290: Extended AMR Wideband codec; Transcoding functions
  - ñ TS 26.304: ANSI-C code for the Floating-point; Extended AMR Wideband codec

- **SP-040643: CRs to introduce codecs to TS 26.244 (File Format)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.244	002	1	Rel-6	Storage of AMR-WB+ audio in 3GP files	B	6.0.0	S4	TSG-SA WG4#32	S4-040505
26.244	005	1	Rel-6	Storage of Enhanced aacPlus audio in 3GP files	B	6.0.0	S4	TSG-SA WG4#32	S4-040597

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Documents for approval: from Rel-6 WIs (1/2)

- **Output of WI ì MMS Enhancements: MMS formats and codecsî : CR to TS 26.140 (MMS; Media formats and codecs) in Tdoc SP-040650:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.140	007	1	Rel-6	Update of MMS codecs and formats with Release 6 functionality	B	5.2.0	S4	TSG-SA WG4#32	S4-040591

- **Output of WI ì PS Streaming (PSS) Rel-6î : CRs to TSs 26.233 (PSS; General Description), 26.234 (PSS; Protocols and codecs) and 26.244 (PSS; File Format) in Tdocs SP-040651, SP-040652 and SP-040654):**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.233	005	1	Rel-6	Addition of Release 6 functionality	B	5.0.0	S4	TSG-SA WG4#32	S4-040550

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.234	070	1	Rel-6	Additional Release-6 updates to PSS Protocols and codecs	B	6.0.0	S4	TSG-SA WG4#32	S4-040506

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.244	003		Rel-6	Additional Release 6 update to 3GP file format	B	6.0.0	S4	TSG-SA WG4#32	S4-040507

Documents for approval: from Rel-6 WIs (2/2)

- **Output of WI ì Codec Enhancements for Packet Switched Conversational Multimedia Applicationsî : CRs to TS 26.235 (Default Codecs) in Tdoc SP-040653:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.235	007	1	Rel-6	Language improvement and alignment	D	6.1.0	S4	TSG-SA WG4#32	S4-040536
26.235	009		Rel-6	Support for 128 kbps video in the packet-switched conversational services	B	6.1.0	S4	TSG-SA WG4#32	S4-040566

- **Output of WI ì 3G-324M Improvementsî : CR to TS 26.111 (Modifications to H.324) in Tdoc SP-040648:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.111	011	1	Rel-6	3G-324M Improvements: addition of optional AMR-WB support	B	5.1.0	S4	TSG-SA WG4#32	S4-040568

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Documents for approval: other CRs (1/2)

- **CRs to TS 26.101 (AMR Frame Structure) in Tdoc SP-040644:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.101	009	2	Rel-6	Generic Frame Structure for GSM-EFR SID	F	5.0.0	S4	TSG-SA WG4#32	S4-040570
26.101	010	1	Rel-6	Error Corrections	F	5.0.0	S4	TSG-SA WG4#32	S4-040571

- **CR to TS 26.102 (AMR Interface to Iu, Uu and Nb) in Tdoc SP-040645:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.102	016	1	Rel-6	Mapping of GSM_EFR SID on Nb Interface	F	5.2.0	S4	TSG-SA WG4#32	S4-040400

- **CRs to TS 26.103 (Speech Codec List for GSM and UMTS) in Tdoc SP-040646:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.103	023	2	Rel-6	Harmonisation of AMR Configurations	C	5.4.0	S4	TSG-SA WG4#32	S4-040595
26.103	024	2	Rel-5	Codec Identifier (CoID) for the telephone-event	F	5.4.0	S4	TSG-SA WG4#32	S4-040552
26.103	025	1	Rel-6	Error Fixes	F	5.4.0	S4	TSG-SA WG4#32	S4-040573
26.103	028	1	Rel-5	Correction of Size and Reference of MuMe Codec	F	5.4.0	S4	TSG-SA WG4#32	S4-040572
26.103	029	1	Rel-6	Correction of Size and Reference of MuMe Codec	A	5.4.0	S4	TSG-SA WG4#32	S4-040553

Documents for approval: other CRs (2/2)

- **CR to TS 28.062 (TFO) in Tdoc SP-040647:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
28.062	041	2	Rel-6	Harmonisation of AMR Configurations	C	5.4.0	S4	TSG-SA WG4#32	S4-040594

- **CRs to TSs 26.131 (Terminal acoustic characteristics for telephony; Requirements) and 26.132 (Test Specification) in Tdoc SP-040649:**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.131	022		Rel-6	Change of sending distortion requirement	C	5.2.0	S4	TSG-SA WG4#32	S4-040556
26.132	028		Rel-6	Change of sending distortion test case	C	5.4.0	S4	TSG-SA WG4#32	S4-040557

(end of presentation)
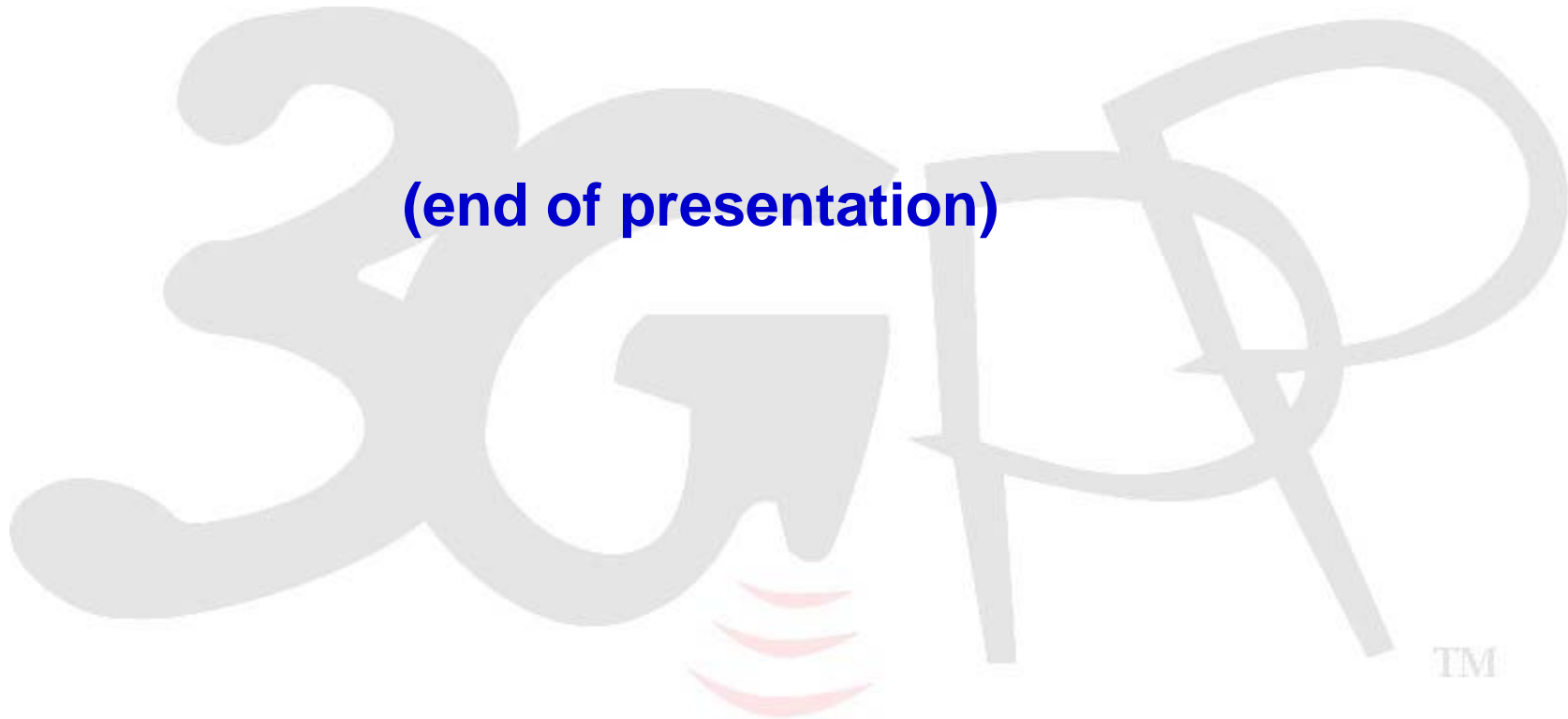
Source:	**Chairman**[1]
Title:	**Revised Technical Report on Video Codec Selection in Rel-6**
Document for:	**Approval**
Agenda Item:	**11.4**

1. Introduction

At SA4#32, the video codec selection and related system integration has been completed in time for Rel-6, and the resulting specification texts are available for approval at SA4. It is noted that concerns on the adoption of H.264/AVC and the request for further testing have been raised by individual companies at SA4#30 and thereafter. This document summarizes the current status of the video codec selection and highlights key results and decisions taken during the process.

This document only addresses MMS, PSS, PSC, and 3G-324M. Since work on video codecs for MBMS is ongoing, this service is not covered in this report.

2. Video Codec Selection Process Overview

The video codec selection for Rel-6 was initiated at SA4#28. Two proponents notified the intention to submit a candidate on Oct. 3 2003: 1) H.264/AVC [1] proposed by Nokia and 2) WMV9 proposed by Microsoft. The candidate qualification criteria were defined during the first ad-hoc meeting. One candidate was withdrawn before SA4#29 and H.264/AVC was agreed to meet the candidate qualification criteria at SA4#29. In the following meetings SA4#30 - SA4#32 additional data were presented illustrating the performance improvements of H.264/AVC compared to Rel-5 video codecs. Furthermore, the status (recommended) and configuration of H.264/AVC was specified for MMS, PSS, PSC, and 3G-324M and the specification text was continuously revised to accommodate all required system aspects. These specification texts were agreed by the video codec ad-hoc during SA4#32 and are available for approval at SA4.

3. Qualification

S4-030712 **Video Codec Candidate Qualification Criteria (AHVIC-018)** (Video Ad-Hoc) describes the candidate qualification criteria for the video codec selection process in 3GPP Rel-6. It includes criteria for coding efficiency, resource consumption and error resilience analysis.

Considering **coding efficiency** the qualification criteria required that a candidate must have the same or better Y-PSNR than the reference when encoded at a 50% higher bit rate. This criteria must be achieved for at least 3 out of 5 clips.

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The **resource consumption** must be measured on Armulator, emulating Arm925T, and must be reproducible with the delivered ARM decoder. For the measurements, the same bit streams as used for PSNR measurements have to be used. For complexity, processor cycles per second (averaged over the whole clip) and for memory code-size, static memory, dynamic memory had to be reported.

Considering **error resilience**, the proponent has to provide sufficient documentation that allows evaluating the error resilience against packet loss. In particular, the packetization and resynchronisation properties should be addressed. The description shall allow evaluating if the provided error resilience has similar properties as the reference.

The selected test material and reference codec (MPEG-4 Simple Profile) was provided by Fraunhofer-IIS and submitted on Nov. 10 in S4-030718 **Test Material and Reference Results for Video Codec Candidate Qualification Criteria** (Fraunhofer IIS).

S4-030739 **Response to Video Codec Qualification, MPEG-4 AVC** (Nokia) includes the PSNR results for AVC plus the remaining qualification material (decoder executable, decoder complexity and error resilience documentation). **During SA4#29 it was agreed that the qualification criteria are met for MPEG-4 AVC**.

S4-030855 **Revised Video Codec Submission Material** describes the material that is required to complete the standardization process as approved at SA4#32. Considering the requirements ìResults from objective testsî and ìDocumentation of resource consumption for encoder and decoderî **it was agreed during SA4#29 that the results which are already presented by Nokia are sufficient.**

4. Performance

In addition to the response for qualification criteria for H.264/AVC (S4-040739), several other documents and results have been provided to further illustrate the performance gain over other existing video codecs.

S4-030871 **Report of The Formal Verification Test on AVC** (Liason from SC 29/WG 11) provides extensive subjective test results from MPEG comparing H.264/AVC with other MPEG codecs. The MD-Baseline test uses appropriate frame sizes and bit-rates for 3G services and concludes: ì **When compared to MPEG-4 Visual SP, AVC Baseline Profile achieved a coding efficiency improvement of 2 times or greater in 14 out of 18 statistically conclusive casesî** .

S4-040048 **Grounds for Nokiaís AVC Proposal** (Nokia) provides the reasoning for Nokiaís AVC proposal together with extensive set of justification material. Among other things, there are results for encoding complexity presenting also the quality PSNR drop (about 0.5 dB) caused by low-complexity encoding compared to rate-distortion optimized encoding. It is estimated that 15-Hz QCIF encoding can be achieved with a 200-MHz general-purpose processor (such as ARM) and 15-Hz sub-QCIF encoding with a 100-MHz processor.

S4-040494 **Performance Characterization of H.263, H263+ and H.264 on 3GPP bearers** (France Telecom, Qualcomm, Siemens) shows that H.264 is at least as robust as other codecs under typical packet loss conditions.

SA-040533 **Video Simulations for MBMS Streaming ñ First Results** (Nokia) shows that for the tested sequence (foreman) an average performance gain of more than 2 dB between H.263 and H.264 under error-free as well as error-prone conditions can be achieved. It also shows that 32 kbps H.264/AVC performs equal to 64 kbps H.263 in error-free as well as error-prone conditions.

S4-040332 **Complexity and Coding Efficiency of H.264 / MPEG4 AVC and H.263 Baseline** (Siemens & Qualcomm) includes PSNR-plots comparing H.264 and H.263. The analysis of simulation test results shows that the coding efficiency lies in the range of 1.4 -1.7.

5. Status and Configuration of H.264/AVC

During SA4#30 (Feb. 23-27, Malaga) the discussion on status (mandatory vs. optional) and configuration (profile, level, additional constraints, etc.) for individual services (MMS, PSS, PSC, 3G-324M) was started. In addition, the relevant issues for system integration (packetization format, file format) were addressed.

Consensus was found that H.264/AVC is a recommended codec for MMS, PSS, PSC and 3G-324M. It was felt that requiring H.264/AVC is not appropriate because of three reasons: 1) 3GPP already has a required codec. 2) complexity is still a problem for low/mid-range terminals. 3) Concerns about non-technical aspects related to licensing.

The main decisions on the H.264/AVC configuration are summarized as follows (for details see specification texts listed below): For all services, the **Baseline Profile** is proposed. For MMS, PSS, and PSC **level 1b** (128 kbps) is required while for 3G-324M **level 1** (64 kbps). For MMS and PSS only the intersection with the Main Profile is required (**constraint_set1_flag=1**).

For system aspects, the main focus was on the **3GP file format and RTP packetization**. For those services that use RTP (PSS and PSC) the RTP payload format for AVC is proposed [2]. For PSC only the single NAL unit and non-interleaved packetization mode may be used. For PSS also the interleaved packetization mode may be used. For storage in 3GP files, the AVC file format is adopted [3]. Other system aspects that were considered are the interworking of HRD and de-interleaving buffers (S4-040424) and the interworking between interleaving and rate adaptation (S4-040510).

At SA4#32 the Video Codec Ad-Hoc group has completed the technical aspects of codec selection and system integration and has produced the following change requests:

> S4-040563 **CR 26.244 004 Storage of H.264 (AVC) video in 3GP files**
>
> S4-040564 **CR 26.234 075 Introduction of the H.264 (AVC) video codec into the PSS service**
>
> S4-040565 **CR 26.235 008 Introduction of the H.264 video codec into packet-switched conversational services**
>
> S4-040548 **CR 26.140 008 Update of MMS codecs and formats with H.264 (Rel-6)**
>
> S4-040379 **CR 26.111 010 rev2 3G-324M Improvements ñ video and general parts**
>
> S4-040534 **CR 26.911 014 rev2 3G-324M Improvements ñ video and general parts**

6. Concerns and Comments

At SA4#30 and thereafter, some companies have raised concerns about the adoption of H.264/AVC as a new video codec for Rel-6. Since these concerns could not be removed they are repeated here together with some comments.

Complexity and encoder specification: Concerns have been raised about the fact that the encoder is not fully specified in H.264/AVC since only the decoding process, bit-stream syntax, bit-stream semantics and constraints on bit-streams are specified.. Related to this issue is the concern that the computational complexity for an encoder is not specified either. Hence, it is not clear how much complexity is required to achieve the reported performance gain. Furthermore, the quality of the encoding process is not guaranteed (like for any video codec). Ensuring the quality of the encoding process is felt an important aspect in 3GPP compliant implementations.

As a response to this concern it is noted that video and speech coding traditionally use different approaches in specification. While the former only specifies the decoder, speech codecs are fully specified including a bit-exact encoder. Both approaches have advantages and disadvantages and

both approaches have shown to be effective in history. As for any other video codec in 3GPP, H.264/AVC does not specify the encoder.

From a procedural point of view, SA4 has already agreed that H.264/AVC meets the complexity requirements by approving that it meets the qualification criteria (S4-030712) and that all the requested submission material (S4-030855) is provided. This is stated in the video codec ad-hoc group meeting report (S4-030859), approved by SA4 in SA4#29.

During the video codec ad-hoc session at SA4#32, no company but Siemens had remaining concerns about encoding complexity.

Further test results: Concerns have been raised that not enough test results have been provided for typical 3G channel conditions, e.g., using higher intra rates and smaller slices. This data would help to configure H.264/AVC for existing services.

During SA4#32 two documents have been presented that do provide such data (S4-040494 and S4-040533). Both contribution show that H.264 is at least as robust as other codecs under typical packet loss conditions. In S4-040533, an average performance gain of 2 dB between H.263 and H.264 under error-free as well as error-prone conditions is demonstrated.

It was propsed that further testing may be addressed more appropriately in a *Characterization Phase* after the selection. I.e., the group felt that sufficient proof is provided for the adoption of H.264 (see S4-030739) but recognized that there is an interest for several companies to get a better understanding of the performance on typical 3G channels. The first step to specify common test conditions was performed by Nokia, France Telecom, and Qualcomm during SA4#32.

During the video codec ad-hoc session at SA4#32, no company but Siemens stated that they would make the adoption of H.264/AVC dependent on additional test results.

ì mayî vs. ì shouldî : Concerns have been raised about the wording that should be used to declare a codec as ìoptionalî in specification texts. Siemens noted that according to TR 21.801 Annex E, the term ìshouldî describes a ìrecommendationî and not ìoptionalî.

During the second video codec ad-hoc meeting (Lund, October 28-30, 2003) this issue was already discussed. According to Siemens, the wording to describe the current working assumption (ìoptional H.264î) is not correct in the proposal. The word ìmayî must be used instead of ìshouldî. ìshouldî does not describe the decision at SA4#30. The chairman noted that the exact wording has not been decided at SA4#30. Instead, only the word ìoptionalî is used. After a short discussion on the correct wording (ìmayî vs. ìshouldî) all delegates (Ericsson, Nokia, Panasonic, NEC, Qualcomm, Toshiba, ST, Philips, Siemens) were asked on their opinion. All but Siemens expressed that ìshouldî was their interpretation of ìoptionalî and should be used in the specification text.

During SA4#32 plenary, Ericsson noted that the term ìmayî describes a permission not an option. Furthermore, 3 noted that it fully supports the concerns raised by Siemens.

7. Conclusions

The Video Codec Ad-Hoc group has completed the technical aspects of codec selection and system integration and has produced specification text for adoption by SA4. Considering the significant performance gain that H.264/AVC offers over any Rel-5 video codec it is recommended to approve the provided change requests. For this decision, SA4 is asked to carefully weigh the demonstrated advantages against the above mentioned concerns.

8. Meeting Reports

The following is a list of meeting reports from the video codec ad-hoc group:

S4-030715 **Draft Meeting report AHVIC#1 (AHVIC-022)**

S4-030859 **Meeting Report on Video Codec Ad-Hoc during SA4#29**

S4-040129 **Draft Meeting Report on Video Codec Ad-Hoc during SA4#30**

S4-040225 **Draft Meeting Report on Video Codec Ad-Hoc #2**

S4-040349 **Revised Meeting Report on Video Codec Ad-Hoc during SA4#31**

S4-040495 **Draft Meeting Report on Video Codec Ad-Hoc during SA4#32**

References

[1]   ITU-T Recommendation H.264 (2003): "Advanced video coding for generic audiovisual services" | ISO/IEC 14496-10:2003: "Information technology ñ Coding of audio-visual objects ñ Part 10: Advanced Video Coding".

[2]   IETF Internet Draft: "RTP payload Format for H.264 Video", Wenger S. et al, http://www.ietf.org/internet-drafts/draft-ietf-avt-rtp-h264-10.txt, July 2004.

[3]   ISO/IEC 14496-15: "Information technology ñ Coding of audio-visual objects ñ Part 15: Advanced Video Coding (AVC) file format".