Technical Specification Group Services and System Aspects Meeting #27, Tokyo, Japan, 14-17 March, 2005

TSGS#27(05)0081

Source: **TSG SA WG4 Chairman**[1]

Title: **TSG SA WG4 Status Report at TSG SA#27**

Document for: **Information**

Agenda Item: **7.4.1**

Executive Summary

Since TSG SA#26, TSG SA WG4 (SA4) has met once on 21st-25th February, 2005 (SA4#34). In addition, several subgroup meetings have taken place outside the SA4 meeting week (most as conference calls).

Remaining release 6 work

Audio codecs (Enhanced aacPlus and Extended AMR-WB)

The remaining issues (conformance, fixed-point codec versions and performance characterisation) have been progressed. The fixed-point codec TSs 26.273 and 26.411 are brought for approval, and the conformance TSs 26.274 and 26.406 for information. SA4 also requests approval of Phase 1 test plan of the audio codec performance characterisation (error-free conditions across various bit-rates). Phase 2 test plan (GPRS/EGPRS and UTRAN error conditions) is presented for information. Furthermore, SA4#34 agreed to create a new TS 26.412 to contain a pointer to reference 3GPP file format software (maintained by MPEG as part of overall file format software). Draft of this new TS is brought for information to SA#27. SA4 asks more time for completion of the remaining specifications: two conformance TSs, the file format TS and the performance characterisation TR; all to be still included into Rel-6 after SA#27. (Completion of the TSs is expected by SA#28 and the TR by SA#30.)

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

TS 26.346 on MBMS Protocols and Codecs is presented for approval. Agreement on MBMS video codecs has been reached with H.264 defined as recommended codec. Also, the possibility to use H.263 is noted (with further information to be given in TR 26.946 on MBMS User Service guidelines). Decision on audio codecs from SA#26 has also been included in the TS. Some open issues still remain in the TS (foremost selection of FEC code(s) and definition of the status of some codecs i.e. “shall vs. should be supported”). On FEC selection, no consensus could be reached in SA4 and a report is brought for information to SA#27. TR 26.946 on MBMS User Service Guidelines still remains to be completed, and SA4 asks more time for completion of this TR. (Completion foreseen by SA#28.)

Release 7 work

Video Codec Performance Requirements

The structure of video codec specifications, mandatoriness of requirements, simulation conditions to be covered, objective metrics for error prone channels and the overall standardization methodology have been discussed. No working methodology or detailed goals for the work were yet agreed at SA4#34 and companies were asked to consider the proposals and respond by next meeting. Based on these proposals and responses, working methodology definition will be finalized at the next SA4 meeting.

Proposed new Work Items

Three new Release 7 WIs are presented for approval: 1) Performance Characterization of VoIMS over HSDPA/EUL channels, 2) Dynamic and interactive multimedia scenes, and 3) Combining CS and IMS Services Stage 3.

Maintenance of releases

CRs have been agreed to TSs 26.140 (Rel-6), 26.141 (Rel-6), 26.234 (Rel-5 and Rel-6), 26.235 (Rel-6), 26.236 (Rel-5 and Rel-6), 26.244 (Rel-6), 26.290 (Rel-6), 26.304 (Rel-6), 26.401 (Rel-6), 26.405 (Rel-6) and 26.410 (Rel-6).

Release 6 work status

SA4 Rel-6 work is now completed except: 1) some audio codec TSs (two conformance TSs, TS on 3GPP file format reference software and TR on performance characterisation), and 2) TR on MBMS User Service Guidelines. The TS on MBMS Protocols and Codecs is stable and complete enough for SA#27 approval, but some outstanding issues remain (FEC code and status of some codec definitions). The remaining audio codec work impacts also the work completion for the services using the new audio codecs: PSS, MMS, MBMS User Services, IMS Messaging and Presence.

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1. General issues

This document presents the status report of TSG SA WG4 (SA4) at TSG SA#27. Slides presentation of the report is given in Annex B "SP-050081 Annex B - Slides presentation.ppt" (attached in the zip-file of this report).

1.1 Officials

The SA4 officials are:

Chairman:	Kari Järvinen (Nokia, ETSI)	
Vice Chairpersons:	Catherine Quinquis (Orange, ETSI) and Frédéric Gabin (NEC Technologies, ETSI)	
Secretary:	Paolo Usai (3GPP Support)	
SWG Chairmen:		
	PSM (Packet Switched Multimedia)	(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 Färber (Fraunhofer Gesellschaft, ETSI)

Igor Curcio was able to act still at SA4#34 as Interim Chairman of PSM SWG. Nikolaus Färber was not able to attend SA4#34 and Thomas Stockhammer (Siemens, ETSI) kindly chaired the video codec ad-hoc group sessions during SA4#34.

Since the audio codec work is now close to completion and the performance characterisation work can be taken over by SQ SWG, this was the last physical meeting of the audio codec ad-hoc group. SA4 thanks the audio codec ad-hoc group Chairman, Imre Varga, and the audio codec ad-hoc group for the good work done!

1.2 Meetings

Since SA#26, SA4 has held one plenary meeting (SA4#34 on February 21st –25th). In addition, the following subgroup meetings have taken place: 1) audio codec ad-hoc conference call on December 17th 2004, 2) two video codec ad-hoc conference calls on January 28th and February 3rd 2005 (on requirements for mandatory video codecs for MBMS Rel-6), 3) a joint meeting of SA4 audio codec ad-hoc group and SQ SWG on 7th-8th February 2005, and 4) audio codec ad-hoc conference call on March 9th 2005 (with SA4 decision power given by SA4#34 to approve the audio codec fixed-point C-code TSs, based on verification test results).

The next SA4 meeting will be held in May 2005. Before that a meeting of SA4 PSM SWG will be held on 6th–7th April (with SA4#34 given rights to send out LSs on MBMS).

Meetings held (since SA#26):

Audio codec ad-hoc	December 17, 2004	[teleconference call]
Video codec ad-hoc	January 28 and February 3, 2005	[teleconference calls]
Audio codec ad-hoc and SQ SWG	February 7-8, 2005	Host: Siemens; Venue: Munich, Germany
SA4#34	February 21 - 25, 2005	Host: The European Friends of 3GPP; Venue: Lisbon, Portugal
Audio codec ad-hoc	March 9, 2005	[teleconference call]

Calendar of future meetings:

PSM SWG	April 6-7, 2005	Host and venue tbd
SA4#35	May 9-13, 2005	Host: Qualcomm; Venue: San Diego, USA
SA4#36	September 5-9, 2005	Host and venue tbd
SA4#37	November 14-18, 2005	Host and venue tbd

During SA4#34, all SA4 SWGs and ad-hoc groups met. Table 1 gives overall statistics from SA4#34 (including also statistics from some previous SA4 meetings for comparison).

Table 1: Statistics from SA4#34 (and from some past 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
SA4#33	265	55	32	14
SA4#34	**254**	**52**	**22**	**12**

1.3 Input documents from SA4 to TSG SA#27

Table 2 gives a complete list of input documents from SA4 to TSG SA#27. These contain 3 Rel-6 TSs for approval and 3 for information. Three Rel-7 WIs are presented for approval. Also, a number of Rel-5 and Rel-6 CRs are presented for approval. Two release 6 submission templates (on remaining specifications for audio codecs and for MBMS user services) are also presented for approval. Phase 1 test plan for performance characterisation of audio codecs is presented for approval, and a report on FEC code selection for MBMS User Services for information. A LS to OMA BCAST on the status of OMA Mobile Broadcast Services is Cc'd to TSG SA for information.

Table 2: List of input documents from SA4 to TSG SA#27

Tdoc	Title	Source	Agenda Item	Document for
SP-050081	TSG S4 Status Report at TSG-SA#27	SA WG4 Chairman	7.4.1	Information
SP-050082	3GPP TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Approval
SP-050083	3GPP TS 26.273: "ANSI-C code for the Fixed-point Extended AMR Wideband codec" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Approval
SP-050146	3GPP TS 26.411: "Enhanced aacPlus General Audio Codec; Fixed-point ANSI-C code" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Approval
SP-050085	3GPP TS 26.406: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Conformance testing" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-050086	3GPP TS 26.274 "Audio codec processing functions, Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Conformance testing" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-050087	3GPP TS 26.412 "Source code for 3GP file format" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-050088	Report of FEC selection for MBMS	SA WG4	7.4.3	Information
SP-050089	New Work Item Description on Performance Characterization of VoIMS over HSDPA/EUL channels (Release 7)	SA WG4	7.4.3	Approval
SP-050090	New WID for dynamic and interactive multimedia scenes (Release 7)	SA WG4	7.4.3	Approval
SP-050091	New WID for Stage 3 Specification of Combining CS and IMS services (Release 7)	SA WG4	7.4.3	Approval
SP-050092	CR TS 26.140 on Introduction of PIM and DRM (Release 6)	SA WG4	7.4.3	Approval
SP-050093	CRs TS 26.234 on Corrections to Extended PSS Protocols and codecs (Releases 5 and 6)	SA WG4	7.4.3	Approval
SP-050094	CR TS 26.244 on Extended presentations in 3GP files for MBMS (Release 6)	SA WG4	7.4.3	Approval
SP-050095	CRs TS 26.401 & TS 26.405 & TS 26.410 on Corrections to Enhanced aacPlus codec specifications (Release 6)	SA WG4	7.4.3	Approval
SP-050096	CRs TS 26.290 & TS 26.304 on Corrections to Extended AMR-WB+ codec specifications (Release 6)	SA WG4	7.4.3	Approval
SP-050097	CR TS 26.235 on Correction of inconsistency regarding the maximum number of speech frames per RTP packets for PoC (Release 6)	SA WG4	7.4.3	Approval
SP-050098	CR TS 26.141 on Editorial correction on missing IMS	SA WG4	7.4.3	Approval

	Presence UA text (Release 6)			
SP-050099	CRs TS 26.235 & TS 26.236 on Introduction of AMR SDP parameters and correction of reference (Releases 5 and 6)	SA WG4	7.4.3	Approval
SP-050100	Release 6 Submission Template for WI: MBMS User Services	SA WG4	7.4.3	Approval
SP-050101	Release 6 Submission Template for audio codecs and related services	SA WG4	7.4.3	Approval
SP-050102	Reply to Liaison Statement on Status of OMA Mobile Broadcast Services	SA WG4	7.4.1	Information
SP-050132	PSS-MMS-MBMS Audio Codec Characterization Test Plan	SA WG4	7.4.3	Approval

2. Maintenance of Releases

CRs have been agreed to TSs 26.140 (Rel-6), 26.141 (Rel-6), 26.234 (Rel-5 and Rel-6), 26.235 (Rel-6), 26.236 (Rel-5 and Rel-6), 26.244 (Rel-6), 26.290 (Rel-6), 26.304 (Rel-6), 26.401 (Rel-6), 26.405 (Rel-6) and 26.410 (Rel-6). The CRs are found in Tdocs SP-050092 until SP-050099.

3. Remaining release 6 Work

Rel-6 work progress is described below. The Rel-6 status for each specification (new specifications and CRs) is explained in detail in Annex A.

3.1 Audio codecs (Enhanced aacPlus and Extended AMR-WB)

The remaining audio codec work after TSG SA#26 was:

1) Fixed-point reference C-code versions and related TSs
2) Conformance requirements (e.g. test sequences) and relevant TS(s)
3) Characterisation testing and performance characterisation TR

Since TSG SA#26, all these remaining issues have been progressed. The fixed-point TSs have now been finalised and are presented for approval in Tdocs SP-050083 and SP-050146. The conformance TSs have been progressed and are presented for information in Tdocs SP-050085 and SP-050086. Phase 1 test plan for the characterisation has been completed and is presented for approval as part of Tdoc SP-050132.

CRs have been agreed to both codecs (Enhanced aacPlus and Extended AMR-WB) and these are brought for approval in Tdocs SP-050095 and SP-050096. These bring bug-corrections to the floating-point reference C-codes and the high-level descriptions of the codecs.

The definition of the 3GPP file format is derived from the ISO Base Media File Format, as published by ISO/IEC in 14496-12. The reference software for the file format is also therefore maintained by ISO/IEC. In recent SA4 meetings it has became clear that users of 3GPP specifications are having difficulty in finding reference code for the 3GPP file format. (E.g., the Enhanced aacPlus source code and the Extended AMR-WB (AMR-WB+) source code both rely on the file-format for their file input/output.) SA4#34 therefore agreed to create a new specification TS 26.412 “Source code for 3GP file format” to contain a pointer to the reference 3GPP file format '3GP' software. Since the file format source code is reference software in MPEG, copyright cannot easily be assigned to 3GPP partners. However, it does assist users if there is a visible specification which documents how to access the source code. This also provides a single ‘indirection point’ for other 3GPP specifications (e.g. Enhanced aacPlus or AMR-WB+) that wish to refer to it. In the future it may be possible to provide a copy of the source also within the TS. Now the TS includes a compiled library with headers for use on Windows. Draft of the new TS is brought for information to TSG SA#27 in Tdoc SP-050087. (The TS can be used also by other media and it is not specific for audio.)

SA4 asks more time for completion of the remaining audio codec specifications. (See Release 6 Submission Template for audio codecs and related services in Tdoc SP-050101.) All the remaining audio codec TSs are expected to be presented for approval at TSG SA#28 and the TR on performance characterisation by TSG SA#30. The work for Enhanced aacPlus codec is done under “PSS Rel-6” WI and for Extended AMR-WB under “Extended AMR-WB codec” WI. Note that the remaining audio codec work impacts also the work completion for the services using the new audio codecs: PSS, MMS, MBMS User Services, IMS Messaging and Presence.

3.1.1 Fixed-point codec versions of the audio codecs

The fixed-point C-code versions of the codecs have been finalised by the codec proponents and they have been tested in SA4 by volunteering organisations. (The fixed-point codec or the floating-point codec may be used depending on if the implementation platform is better suited for a floating-point or a fixed-point implementation.)

Three aspects of the fixed-point C-codes were tested:

1) Verification of subjective quality of fixed-point code vs. floating-point code (MUSHRA tests) by France Telecom and Siemens: The test results show no statistically significant difference between the performance of the floating-point and fixed-point codecs. The verification of subjective quality was approved for both codecs.

2) Verification of the format of the C-code and correct implementation of complexity counters by ST Microelectronics: Verification shows that the source codes for both codecs can serve as the reference codes in the respective specifications. (For Enhanced aacPlus, two alternative C-code implementations will be included: a) source code fully based (but not necessarily optimised) for ETSI basic operators, and b) source code that allows a fast and efficient port for a DSP, where the 16x31 multiplication from the reference source code maps easily on the DSP intrinsic functions. Information of computational complexity for both versions was included into an informative annex of the TS.) The verification of the format of the C-code and correct implementation of complexity counters was approved for both codecs.

3) Verification of implementation complexity using large number of input samples, cross-checked by codec proponents (Coding Technologies, Ericsson, Nokia and VoiceAge): Complexity verification results were presented and were confirmed by the cross-cheking. The verification of implementation complexity was approved for both codecs.

These three verification items were completed only after SA4#34 and therefore a specific Audio Codec teleconference was organized on March 9th, 2005, to examine the verification results. Decision power was conferred by SA4#34 to the Audio Codec teleconference to approve the fixed-point C-code specifications, and eventually to modify also the specification text agreed at SA4#34 (if needed). All the verification tests showed good performance (as explained above). The verification results were approved and the fixed-point C-code TSs were agreed to be presented for approval at TSG SA#27. These are found in Tdocs SP-050083 and SP-050146.

The verification results will be included in the TR on audio codec performance characterization. Some complementing verification and characterisation items (non-critical for TS approval) for the floating- and fixed-point codec versions have not yet been taken by any organisation and volunteers for these are needed.

3.1.2 Codec conformance

Conformance testing is used to verify that implementations of Enhanced aacPlus and Extended AMR-WB match the relevant specifications. The conformance TSs define the allowed deviation with respect to the reference C-codes included in the respective TSs. Conformance is defined both for the floating-point and fixed-point codecs. Digital test sequences to check conformance for bit-exact implementations are included in the conformance TSs.

Draft versions of conformance TSs are presented for information in Tdoc SP-050085 (for Enhanced aacPlus) and in Tdoc SP-050086 (for Extended AMR-WB). These TSs are expected to be finalised by TSG SA#28. The codec conformance is very similar for both codecs with differences mainly in the objective measures tailored to test specific parts of each codec.

The general framework for conformance is (with some minor deviation for each codec):

- Fixed-point encoder and decoder conformance can be met by showing either bit-exactness to the fixed-point reference C-code or by meeting a set of objective performance requirements. (The bit-exact approach should be preferred over applying objective measures if it can be achieved without undue penalty on computational complexity.)
- Floating-point encoder and decoder conformance can be met by utilizing (compiling) the reference floating-point source code in specifications as such or by meeting a set of objective performance requirements. For encoder, this is only recommended unless it is used in terminal equipment (MMS use case).

The draft specifications also allow conformance testing alternatively by using subjective tests, in which performance not worse than that of the reference codec must be achieved. For Enhanced aacPlus this is allowed only for encoder, while for AMR-WB+ also for decoder.

3.1.3 Performance characterisation

Test plan for audio codec characterisation has been progressed and a draft version of the overall Test Plan is presented in Tdoc SP-050132.

The characterisation testing is divided into two phases:

- Phase 1: Characterization of the codecs across various bit rates
  - Experiment 1: Mono signal with bit rates of 10 kbit/s, 16 kbit/s and 20 kbit/s; no transmission errors
  - Experiment 2: Stereo signal with bit-rates of 14 kbit/s, 21 kbit/s, 28 kbit/s; no transmission errors
- Phase 2: Characterization of the codecs across error conditions
  - Experiment 1: GPRS/EGPRS error conditions
  - Experiment 2: UTRAN error conditions

The allocation of test laboratories and the associated funding was agreed already at SA4#33. Dynastat, NTT-AT, Nokia, France Telecom R&D, T-Systems, Ericsson, Coding Technologies and Fraunhofer IIS will act as Listening Laboratories (LL); Dynastat will also act as Global Analysis Laboratory (GAL) to combine and analyse the results. Each listening test experiment will be compensated by 9 kEuros and the global analysis by 13.5 kEuros. The funding for characterisation (85.5 kEuro) is available from the overall funding collected earlier from the audio codec proponents. The processing and cross-checking tasks will be carried out on voluntary basis by host laboratories (HL): Ericsson, Nokia, and Coding Technologies.

Phase 1 testing is scheduled to be carried out between TSG SA#27 and TSG SA#28, and the Phase 1 results are planned to be presented for information at TSG SA#28. Table 3 shows the detailed schedule for the characterisation tests (all dates in 2005).

At TSG SA#27, SA4 asks approval of Phase 1 part of the overall Test Plan.

Table 3: Schedule of audio codec characterisation tests (Phase 1 and Phase 2)

Schedule of tasks for the Phase 1 Experiments	
Mar.16	Codec proponents deliver executables to Host Lab's
Mar.16	Selection of test items (subset of items used in the Selection Test)
Mar.16-Apr.4	Host Labs perform HL/Cross-check functions
Apr.4	HL's delivers processed materials to LL's
Apr.4-Apr.25	Mushra Listening tests (LL's)
Apr.25	LL's deliver raw voting data to GAL
Apr.25-May 6	GAL and draft TR preparation
May 9-May 13	Phase 1 results and draft TR presented at SA4#35
Schedule of tasks for the Phase 2 Experiments	
May 30	Error patterns delivered to HL
May 30-Jun.27	Host Labs perform HL/Cross-check functions
Jun.27	HL's deliver processed materials to LL's
Jun.27-Aug.1	Mushra Listening tests (LL's)
Aug.1	LL's deliver raw voting data to GAL
Aug.1–Sep.2	GAL and final TR preparation
Sep.5-9	Phase 2 results and final TR presented at SA4#36

Phase 2 contains characterisation of the codec performance under realistic channel conditions for MBMS streaming services both using GPRS/EGPRS and UTRAN radio access. SA4 would need support to obtain suitable channel error patterns and also guidance on how to setup realistic simulation chains. A LS was sent to TSG RAN and TSG GERAN from SA4#33 (November 2004) to make the relevant groups and also 3GPP member companies immediately aware of this SA4 request. Response was received from RAN at SA4#34 suggesting collaboration between SA4 and the relevant RAN WGs. SA4#34 suggests to TSG RAN that a joint meeting between SA4 and relevant RAN WGs could take place during the RAN MBMS workshop on April 4-6, 2005 to discuss suitable channel error patterns and realistic simulation chains. For the error patterns, such aspects as RoHC, FEC and RTP-packetization would need to be considered.

At SA4#34, one company kindly volunteered to provide error patterns for GPRS/EGPRS tests (Phase 2, Experiment 1) by SA4#35 (May). Also, error patterns for UTRAN (Phase 2, Experiment 2) were proposed at SA4#34. (This UTRAN error pattern proposal was sent to TSG RAN and TSG GERAN for feedback, attached in the above mentioned LS.)

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

3.2.1 General

TS 26.346 “MBMS Protocols and Codecs” has been progressed and v 2.0.0 is presented for approval in Tdoc SP-050082. Version 1.5.0 was presented for information at TSG SA#26.

This TS 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. Only MBMS download and streaming delivery methods are specified. This specification however does not preclude the use of other delivery methods.

The work completed into TS 26.346 after TSG SA#26 includes the following:

- TSG SA#26 agreement on audio codecs included into the TS (both Enhanced aacPlus and Extended AMR-WB recommended with applications/use scenarios identified)
- Agreement on video codecs (H.264 recommended, the usability of H.263 noted)
- Definition of other codecs and media formats (codec status in terms of “shall” vs. “should” is still tbd)
- Definition of FEC (Forward Error Correction) buffering method
- SDP for download (FLUTE) session and for streaming (RTP) included
- Identification of end-of-transmission (end-of-files) for download delivery
- Encapsulation of metadata fragments in aggregated document
- MBMS service announcement compression with Gzip
- Extending file formats to container file format for multimedia presentations
- QoE (Quality of Experience) metrics for the reception reporting procedures
- Ptm repair for file repair procedure
- Guidelines for RTP packetization
- Use of new IETF RFC 3640 “RTP Payload Format for Transport of MPEG-4 Elementary Streams” (instead of IETF RFC 3016) for Enhanced aacPlus - pending evidence of the benefits to be shown at SA4#35
- Security aspects from SA3 updated (e.g., security description metadata, HTTP procedure to request keys or key-updates)
- Description of BM-SC Proxy aligned to SA2 view
- Several updates e.g. for Service Discovery / Announcement function, Security description, FEC mechanism for RTP
- Harmonisation of terminology, updates to figues (e.g. protocol stack overview), new references

TS 26.346 is mature for TSG SA#27 approval and stable enough. However, there are still some outstanding issues to be completed later:

- Decision of status ("shall" vs. "should") for some codecs (speech, synthetic audio, still images, bitmap graphics, vector graphics, text and timed text). Note that the media types and codecs themselves are defined already - and only the status of some codecs remains open. (The codecs are harmonised with the ones defined for PSS.)
- SA4#34 was not able to reach consensus on the FEC code selection (and on support requirements, i.e., “shall/should/may be supported”). Two FEC codes still remain under consideration (Reed-Solomon and Raptor). The FEC selection is a contentious issue. See Section 3.2.3 for details.
- Also, there are SA4 agreements on Service Announcement over interactive bearers (Tdoc S4-050142), MBMS Session identity definition (Tdoc S4-050103) and using 2 TMGIs for several access networks (Tdoc S4-050147), but the exact specification text for these is not yet ready. Also, RTP stream bundling, i.e., multiple RTP streams to be protected together for FEC purposes (Tdoc S4-050037) is agreed pending on confirmation from SA1, SA2, SA3 and RAN2. All these features/corrections are planned to be included later through CRs.

TR 26.946 “Multimedia Broadcast/Multicast Service (MBMS) user service guidelines” still remains to be prepared and SA4 asks more time for completion of this TR. (See Release 6 Submission Template for WI MBMS User Services in Tdoc SP-050100.)

3.2.2 Codecs

3.2.2.1 Audio codecs

The audio codec agreement from TSG SA#26 has been taken into account and is included in TS 26.346: no particular audio codec is made "mandatory", and both audio codecs under discussion (Enhanced aacPlus and AMR-WB+) are recommended - with table of applications/use scenarios included to help the operator/manufacturer decide which to use for their particular applications.

3.2.2.2 Video codecs

The following working assumption was agreed at SA4#33: H.264 (AVC) Baseline Profile Level 1b decoder is to be recommended ("should be supported") and H.263 Baseline profile Level 45 to be defined as "may be supported". However, a decoder can still be raised to become default ("shall be supported") at SA4#34 based on further consideration.

The video codecs and requirements for a codec to become mandatory were debated in two teleconferences before SA4#34 and still during SA4#34. However, a list of requirements agreeable to all SA4 could not be concluded. This requirements work nevertheless is seen useful as basis of the Rel-7 work on video codec performance requirements.

During SA4#34, several companies argued that since H.264 shows consistent performance gain over H.263 it should be chosen as the single default ("shall be supported") video codec for MBMS User Services. This however was not agreeable to several other companies. They felt that the evidence does not justify making H.264 default and requested SA4 to stay with the working assumption. Concerns were expressed with respect to, e.g. the performance in error-prone conditions (especially in MBMS environment), lack of clarity in simulations and some open issues.

A way forward was found with a slight modification of the working assumption from SA4#33: H.264 (AVC) Baseline Profile Level 1b decoder is recommended for MBMS User Services, and (only) a sentence is included on H.263 explaining that H.263 profile 0 level 45 decoder may be used for MBMS User Services since (according to TS 26.234) it shall be supported for PSS. The details of use of H.263 in MBMS User Services will be explained in TR 26.946 "MBMS User Service Guidelines".

3.2.2.3 Other codecs

For the other media types and codecs (besides audio and video, i.e., speech, synthetic audio, still images, bitmap graphics, vector graphics, text and timed text), the same codecs as for PSS have been chosen. However the status of the codecs remains still open (default vs. recommended, i.e., "shall be supported" vs. "should be supported"). Speech, audio, video and timed text media decoders are defined relevant for both MBMS Download and Streaming delivery. Other media decoders (still images, bitmap graphics, vector graphics, text) are only relevant for MBMS Download delivery.

3.2.3 FEC method

The forward error correction code (FEC) mechanism is used at the application layer to allow MBMS receivers to recover lost SDUs. Altogether five FEC-proposals were presented in October 2004. At the SA4#33 meeting, they were reduced into the following three:

- Reed-Solomon codes
- LDPC (Low Density Parity Check) Copper codes
- Raptor codes

At SA4#34 these three proposals were further discussed and debated based on simulation results and other information/evidence on the algorithms. In the interest of progressing for consensus for Rel-6 the LDPC Copper codes proposal was withdrawn, leaving Reed-Solomon and Raptor as the two remaining contenders. However, SA4 could not reach consensus between these two at SA4#34.

A report on FEC code selection for MBMS is presented for information in Tdoc SP-050088. This document gives the motivation and background for FEC development, reviews the selection process in SA4 (request for information, simulation guidelines etc.) and highlights the main aspects of both remaining proposals (with respect to computational complexity, memory consumption, flexibility, latency etc.). The document contains some provisional figures on the candidate algorithms. These were agreed to be confirmed or updated by SA#27 (possibly on grounds of further individual contributions to SA#27).

Based on the analysis of the two FEC code algorithms, Digital Fountain, Ericsson, Vodafone, Telecom Italia S.p.A., T-Mobile and Siemens asked Raptor to be defined as the single mandatory FEC code, and the same position was expressed by Bamboo (position expressed during the PSM SWG meeting – company not present in the final SA4 plenary session). Nokia requested Reed-Solomon to be defined as the single mandatory FEC code, as well as did Toshiba (position expressed during the PSM SWG meeting – company not present in the final SA4 plenary session). Vidiator and "3" requested Reed-Solomon to be defined as the

single mandatory FEC code and Raptor as optional. NTT DoCoMo supported Reed-Solomon, but without statement on mandatoriness. Alcatel supported one mandatory FEC code and no optional FEC code to be defined (position expressed during the PSM SWG meeting – company not present in the final SA4 plenary session). Apple further suggested one or two non-mandatory FEC codes and justified for this position. Both Raptor and Reed-Solomon codes were strongly supported by several companies and no consensus was reached at SA4#34, as explained in the report on FEC code selection for MBMS.

3.3 Summary of Rel-6 specification status

Rel-6 work in SA4 is now completed except the remaining audio codec TSs/TR and the TR on MBMS User Service guidelines:

1) TS 26.406 "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Conformance testing" – Status: presented for information at SA#27, expected for approval at SA#28
2) TS 26.274 "Audio codec processing functions, Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Conformance testing" - Status: presented for information at SA#27, expected for approval at SA#28
3) TR 26.9xy "Performance characterization of audio codecs" - Status: pending on testing; Phase 1 test plan presented for approval at SA#27 and test results expected for information at SA#28, complete TR with Phase 2 results expected for approval at SA#30
4) TS 26.412 "Source code for 3GP file format" - Status: presented for information at SA#27, expected for approval at SA#28
5) TR 26.946 "Multimedia Broadcast/Multicast Service (MBMS) user service guidelines - Status: expected for approval at SA#28 (depends on the extent of the content)

The remaining audio codec specifications (1 and 2 in the above list) on conformance and (3) on characterisation rely on the completion of the codecs themselves, and hence (like in earlier codec specification cases in SA4) are specifications that can be prepared only very late in the codec specification process. The audio codec characterisation TR is important part of the audio codec specifications but is only informative and therefore completion by TSG SA#27 is not "critical" for it. The TS on source code for the 3GPP file format (4) is a late development, but is felt useful to be prepared and still included in Rel-6. The TR on MBMS User Service guidelines (5) is informative and therefore completion by TSG SA#27 is not "critical" for it.

Enhanced aacPlus and Extended AMR-WB codecs have been defined as recommended codecs for several services: MMS (TS 26.140), PSS (TS 26.234), MBMS User Service (TS 26.346), IMS Messaging and Presence (TS 26.141). Therefore, the non-complete specification of the two codecs somewhat impacts also the finalisation of these services.

SA4 requests all the above specifications and the related work to be included into Rel-6 despite not being 100% ready for approval yet at TSG SA#27. See details in the Release 6 submission templates Tdoc SP-050100 (for MBMS User Services) and Tdoc SP-050101 (for audio codecs and related services). The completion-%s for all SA4 Rel-6 WIs at TSG SA#27 are illustrated in Table 4 below.

Table 4: Completion of SA4 work at TSG SA#27

Work Item (Rel-6)	Completion-% at SA#27	Remaining issues (after SA4#34)
Performance characterisation of default codecs for PS conv. multimedia applications	100	(none)
Codec Work to Support Speech Recognition Framework for Automated Voice Services	100	(none)
Codec Enhancements for Packet Switched Conversational Multimedia Applications	100	(none)
3G-324M Improvements	100	(none)
PoC codecs	100	(none)*
PSS Rel-6	97	Finalisation of Enhanced aacPlus and AMR-WB+ specifications: 1) conformance TSs 26.406 and 26.274, 2) TR on performance characterisation, 3) TS 26.412 on source code for 3GP file format
MMS formats and codecs	97	Same as for PSS above.
Media Codecs and Formats for IMS Messaging and Presence	97	Same as for PSS above.
AMR-WB extension for high audio quality	97	Same as for PSS above.
Definition of MBMS user services; media codecs, formats and transport/application protocols using MBMS	90	Finalisation of TR 26.946 on MBMS user service guidelines. Also, some outstanding issues remain in TS 26.346 on MBMS Protocols and codecs, foremost FEC code selection

*) for 3GPP2 originated discussion on 3GPP vs. 3GPP2 PoC codec cross-adoption, see Section 7

4. Release 7

4.1 Video Codec Performance Requirements

This work item concerns specification of video codecs for 3GPP services by creating detailed encoder and decoder specifications. The work item was approved at TSG SA#26, and the work was launched at SA4#34.

Several input documents were submitted on the new work. The structure of video codec specifications, mandatoriness of requirements, simulation conditions to be covered, objective metrics for error prone channels and the overall standardization methodology were discussed. No working methodology or detailed goals were yet agreed at SA4#34 and companies were asked to consider the proposals and respond by next meeting.

Working methodology definition is aimed to be finalized at the next SA4 meeting (to support working towards video codec specifications in a coordinated fashion).

5. New Work Item Descriptions

5.1 Performance Characterization of VoIMS over HSDPA/EUL (High Speed Downlink Packet Access / Enhanced Up Link) channels (Rel-7)

TR 26.935 “Packet-switched conversational multimedia applications; Performance characterisation of default codecs” provides information on the performances of default IMS speech codecs in PS conversational multimedia applications. The transmission of IP/UDP/RTP/AMR packets over the UMTS air interface (over DCH channels) was simulated using the Conversational PS RAB coming from TS 34.108 v4.7.0. However, it is not an optimal RAB to do PS conversational tests but was the only one available at the time the test bed and the air interface simulator were designed. RAN2 has recently defined RABs for the support of Voice over IMS on HSDPA bearers and these should be characterised as well.

The Work Item targets performing a similar set of tests as currently described in TR 26.935 by using HS-DSCH and E-DPDCH channels for carrying voice downlink and uplink, respectively. The work will be done in collaboration with relevant RAN WGs. Also, SA1 advice on any potential service requirement issues is needed. The only impacted specification is TR 26.935 into which the new test results would be included through CRs.

The WID is presented for approval in Tdoc SP-050089.

5.2 Dynamic and interactive multimedia scenes (Rel-7)

The user experience of multimedia on 3G terminals can be enhanced if the selection, control and display of the multimedia scenes are integrated into a single user interface. Also, it should be possible to update animated applications and displays incrementally in order to use bandwidth appropriately.

The enabled applications could include but are not limited to:

- browsing, preview, and selection of content (for example, when a content provider has a variety of content available);
- dynamic services such as news updates;
- integrated display of ancillary information, advertisements, or side material; and
- display of longer time-based graphical scenes, including classic animations, which need incremental update, possibly under user control.

The objective is to produce a specification for multimedia scene management, including:

- scene format and scene definition
- container and delivery formats including both file and stream forms
- the compatibility with, integration of, and building upon existing media types and formats in 3GPP specifications, including but not limited to video, audio (including both sampled audio and synthetic audio), images and graphics (SVG Tiny), storage format such as 3GPP file format and stream formats such as RTP
- management of user interactivity
- incrementally updated scenes and animations
- integration with capabilities for secure/encrypted delivery
- efficient use of the bandwidth of the radio network.

The WID is presented for approval in Tdoc SP-050090.

5.3 Combining CS and IMS Services Stage 3 (Rel-7)

TR 23.899 “Combining Circuit Switched (CS) bearers with IP Multimedia Subsystem (IMS)” has been progressed substantially and the specification of combining CS and IMS services (CSI) has been initiated under leadership of SA1. The TR 23.899 concludes a recommended architecture solution to be specified to address the combinational requirements.

In SA4, IMS codec specifications exist for PS conversational multimedia applications and for IMS messaging and presence. All these services can be combined with CS calls in the context of CSI. However, the existing Feature Work Item for “Combining CS and IMS services & Capability Detection and Exchange Mechanism” addresses only Stage 1 and Stage 2 work, while assuming that a Building Block Work Item will exist for the Stage 3 specification.

The objective of the SA4 work is to specify the Stage 3 impact on SA4 specifications for IMS codecs, formats and protocols under combined operation with CS calls, in particular:

- Suitable IMS codecs under CSI operation
- Real-time transport considerations
- Floor control during CSI operation

The WID is presented for approval in Tdoc SP-050091.

6. Communication with other WGs/TSGs/groups

Table 5 gives a complete list of the LSs sent out (to other 3GPP WGs/TSGs and 3GPP external groups) after TSG SA#26.

Table 5: SA4 LSs sent out since TSG SA#26

Tdoc no.	Title	Intended for	Copy to
TD S4-050128	Reply LS on Reception Acknowledgement for MBMS	TSG SA WG3	TSG SA WG5, TSG SA WG2, TSG SA WG1
TD S4-050197	Reply LS on Session Repetition (GP-050573, R2-050273, R2-050641, S2-050486)	GERAN WG2, TSG RAN WG2, TSG SA WG2, TSG RAN WG3, TSG CN WG1, TSG CN WG3, TSG CN WG4	TSG SA WG1
TD S4-050169	Reply LS on Simultaneous MBMS sessions	TSG RAN WG2	TSG RAN WG3
TD S4-050198	Reply LS on MBMS Session Repetition	GERAN WG2, TSG RAN WG2, TSG SA WG2	TSG RAN WG3, TSG CN WG1, TSG CN WG3, TSG CN WG4
TD S4-050214	Reply on “Reply LS on guidance and error patterns for MBMS streaming simulations”	TSG RAN and TSG GERAN	
TD S4-050216	Reply to LS on AMR multi-rate operation of VoIMS	TSG RAN WG2, TSG SA WG2	
TD S4-050218	Liaison Statement on a new basis for the 3GP file format	OMA BAC DL+DRM, 3GPP2 TSG-C	TSG SA WG3
TD S4-050237	Reply to Liaison Statement on Status of OMA Mobile Broadcast Services	OMA BCAST	TSG SA, TSG SA WG3, TSG SA WG2
TD S4-050243	Liaison Statement on RDF schemes for PSS capability vocabularies	OMA UAProf	
TD S4-050239	LS on 3GPP Release 6 MBMS Audio Codec Selection Status	DVB TM-AVC	DVB CM-AVC, DVB TM-CBMS
TD S4-050245	Liaison Statement on stream bundling for MBMS	TSG SA WG1, TSG SA WG2, TSG SA WG3 TSG RAN WG2	
TD S4-050141	Liaison statement MBMS User Service finalization	TSG SA WG2, TSG SA WG3	TSG RAN WG1, TSG RAN WG2, TSG RAN WG3, TSG RAN WG4, TSG SA WG1, TSG CN WG1, TSG CN WG3

The main issues in the LSs are:

- TD S4-050128 This LS was sent out on the first day of SA4#34 to parallel SA3-meeting to get clarifications on reception acknowledgement in MBMS.
- TD S4-050197 SA4 explains agreements reached related to Session Id (e.g., SA4 has accepted that the size of the Session Id is 1 byte, and that Session Id is optional, but when included by the BM-SC it shall be delivered to the RAN/GERAN - which in turn shall deliver it to the UEs/MSs.)
- TD S4-050169 SA4 notes the definitions in TS 23.236 for 'broadcast session' and 'multicast session' as explained by RAN2. Since these state that a bearer service may have only one ongoing session at any one time, it is SA4's understanding that support for multiple parallel sessions over a single MBMS bearer is not needed Release-6.
- TD S4-050198 SA4 requests further information about the MBMS Session Repetition Number (e.g., is the MBMS Session Repetition Number intended as progressive number?, and which are the implications of the usage of such in the RAN?).
- TD S4-050214 As a response to TSG RAN, SA4 suggests a joint meeting during the RAN MBMS workshop on April 4-6, 2005 to discuss error patterns for MBMS streaming simulations (needed for SA4 audio codec characterisation over MBMS channels). SA4 believes that FEC on application layer should be part of the overall performance studies (and ROHC be taken into account in case it is

specified for Rel-6). SA4 asks RAN and GERAN to review and provide feedback on link level PDU error masks and simulation of RTP packet loss as proposed within SA4.

- TD S4-050216 SA4 responds to RAN2 and SA2 explaining VoIMS codec definitions in TS 26.235 and the use of DTX (Discontinuous Transmission) / SCR (Source Controlled Rate) in VoIMS. SA4 further asks if RAN2 is considering optimising MAC transport block sizes for active speech and for SID-frames (with and without RoHC in use), and asks SA2 to advise SA4 if codecs and codec modes information is expected to be available to SGSN and RNC for VoIMS optimization.
- TD S4-050218 SA4 asks OMA BAC DL-DRM and 3GPP2 TSG-C to note the updates to the 3GP file format (SA4#34 agreed CR pending SA#27 approval) and welcomes feedback.
- TD S4-050237 On request, SA4 provides feedback to OMA BCAST on preliminary OMA Mobile Broadcast Services architecture. Some functional overlap has been identified between draft 3GPP TS 26.346 and OMA draft specifications and SA4 proposes these to be harmonised by re-using text from TS 26.346.
- TD S4-050243 SA4 informs OMA UAProf that it has updated the RDF schemas for the PSS capability vocabularies in Release 5 and 6 in TS 26.234 (pending the approval of CRs at SA#27).
- TD S4-050239 SA4 informs DVB TM-AVC on the status of audio codec selection for MBMS (Enhanced aacPlus and Extended AMR-WB both recommended) and explains that audio codec characterization (evaluating the codecs at further operating conditions) is ongoing.
- TD S4-050245 SA4 asks SA1, SA2, SA3 and RAN2 to comment on whether there are any service, architectural, security or RAN-level issues, respectively, which would prevent the progression of proposal for 'stream bundling' for MBMS Forward Error Correction (multiple RTP streams to optionally be protected together for FEC purposes) as a late feature in Release 6.
- TD S4-050141 SA4 asks SA2 and SA3 view on some issues related to TS 26.346 (SA2 to confirm the assumption that the BM-SC Proxy and Transport function is not only transparent for GGSNs but also transparent for the Session and Transmission function, and SA3 to review Annex C on IANA registrations).

7. Miscellaneous

- SA4#34 analysed AMR Noise Supressor (AMR-NS) solution from Fujitsu and reviewed the presented test results against the minimum performance requirements for AMR-NS as defined in TS 26.077 "Minimum Performance Requirements for Noise Suppresser; Application to the AMR Speech Encoder". All the requirements set in TS 26.077 were considered as met by the Fujitsu AMR-NS solution. SA4 therefore endorsed the Fujitsu AMR-NS solution as meeting all the minimum performance requirements set in TS 26.077. The endorsement means that SA4 considers the algorithm to meet the recommended minimum performance requirements given in TS 26.077. There are no other implications

- A LS from 3GPP2 TSG-C was received at SA4#34 proposing that, in order to minimize transcoding for PoC services,
  a) 3GPP should consider adoption of EVRC (Enhanced Variable Rate Codec) as an optional codec for 3GPP PoC services, and
  b) 3GPP2 should consider adoption of AMR as an optional codec for 3GPP2 PoC services.

  SA4 sees that before further actions the impact of AMR transcoding with EVRC in PoC should be studied and the impact of AMR/EVRC co-existence in terminals analysed. Companies were asked to study the issue in order to respond at SA4#35.

- SA4#34 received a contribution on "Realisation of E2E encryption for VGCS/VBS subscribers" (relating to SA1 Rel-7 WI on "Enhancements of VGCS in public networks for communication of public authority officials") suggesting two solutions for discussion: "data bearer solution" and "speech bearer solution". SA4 advice was requested on the two presented solutions. SA4 felt that speech codecs above 4.75 kbit/s and 5.15 kbit/s should be preferably used and that updating of TFO could be problematic. Consequently, the data bearer solution may be better suited as a solution. Anyway, no definite conclusion can yet be given, until a thorough investigation is conducted on the delay and quality aspects tied with the data bearer solution.

- The deadline for distribution of Tdocs to SA4 meetings was shifted one day earlier to Tuesday midnight on the week preceding SA4 meetings in order to leave more time for review the input documents.

8. Documents presented for information

Tdoc	Title	Source	Agenda Item	Document for
SP-050102	Reply to Liaison Statement on Status of OMA Mobile Broadcast Services	SA WG4	7.4.1	Information
SP-050085	3GPP TS 26.406: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Conformance testing" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-050086	3GPP TS 26.274 "Audio codec processing functions, Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Conformance testing" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-050087	3GPP TS 26.412 "Source code for 3GP file format" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Information
SP-050088	Report of FEC selection	SA WG4	7.4.3	Information

9. Approval requested

9.1 Audio codec characterisation – for Phase 1

Tdoc	Title	Source	Agenda Item	Document for
SP-050132	PSS-MMS-MBMS Audio Codec Characterization Test Plan	SA WG4	7.4.3	Approval (Phase 1)

9.2 New specifications

Tdoc	Title	Source	Agenda Item	Document for
SP-050082	3GPP TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Approval
SP-050083	3GPP TS 26.273: "ANSI-C code for the Fixed-point Extended AMR Wideband codec" Version 2.0.0 (Release 6)	SA WG4	7.4.3	Approval
SP-050146	3GPP TS 26.411: "Enhanced aacPlus General Audio Codec; Fixed-point ANSI-C code" Version 1.0.0 (Release 6)	SA WG4	7.4.3	Approval

9.3 New WIDs

Tdoc	Title	Source	Agenda Item	Document for
SP-050089	New Work Item Description on Performance Characterization of VoIMS over HSDPA/EUL channels (Release 7)	SA WG4	7.4.3	Approval
SP-050090	New WID for dynamic and interactive multimedia scenes (Release 7)	SA WG4	7.4.3	Approval
SP-050091	New WID for Stage 3 Specification of Combining CS and IMS services (Release 7)	SA WG4	7.4.3	Approval

9.4 CRs

Tdoc	Title	Source	Agenda Item	Document for
SP-050092	CR TS 26.140 on Introduction of PIM and DRM (Release 6)	SA WG4	7.4.3	Approval
SP-050093	CRs TS 26.234 on Corrections to Extended PSS Protocols and codecs (Releases 5 and 6)	SA WG4	7.4.3	Approval
SP-050094	CR TS 26.244 on Extended presentations in 3GP files for MBMS (Release 6)	SA WG4	7.4.3	Approval
SP-050095	CRs TS 26.401 & TS 26.405 & TS 26.410 on Corrections to Enhanced aacPlus codec specifications (Release 6)	SA WG4	7.4.3	Approval
SP-050096	CRs TS 26.290 & TS 26.304 on Corrections to Extended AMR-WB+ codec specifications (Release 6)	SA WG4	7.4.3	Approval
SP-050097	CR TS 26.235 on Correction of inconsistency regarding the maximum number of speech frames per RTP packets for PoC (Release 6)	SA WG4	7.4.3	Approval
SP-050098	CR TS 26.141 on Editorial correction on missing IMS Presence UA text (Release 6)	SA WG4	7.4.3	Approval
SP-050099	CRs TS 26.235 & TS 26.236 on Introduction of AMR SDP parameters and correction of reference (Releases 5 and 6)	SA WG4	7.4.3	Approval

9.5 Release 6 submission templates for the non-completed work

Tdoc	Title	Source	Agenda Item	Document for
SP-050100	Release 6 Submission Template for WI MBMS User Services	SA WG4	7.4.3	Approval
SP-050101	Release 6 Submission Template for audio codecs and related services	SA WG4	7.4.3	Approval

10. Request for endorsement

TSG SA Plenary is requested to “endorse” the Fujitsu algorithm for AMR Noise Suppressor (and put a sentence in the SA#27 meeting report that the Fujitsu algorithm for AMR-NS meets the minimum requirements given in TS 26.077). The endorsement means that the algorithm is considered, based on SA4 analysis, to meet the recommended minimum performance requirements given in TS 26.077. There are no other implications. (See Section 7 for further details on the endorsement.)

List of Annexes:

Annex A: Status of Rel-6 specifications for each SA4 Rel-6 Work Item

Annex B: “SP-050081 Annex B - Slides presentation.ppt” - see the attached separate file

Annex A: Status of Rel-6 specifications for each SA4 Rel-6 Work Item

(The specifications not completed by TSG SA#27 are highlighted with yellow shading.)

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
Performance characterisation of default codecs for PS conversational multimedia applications					
TR 26.935	Performance characterization of default codecs for PS conversational multimedia applications	SA4		**APPROVED AT SA#24**	
Packet Switched Streaming Rel-6 (PSS Rel-6)					
CRs to TS 26.233	Transparent end-to-end PSS; General description	SA4	SA2	**APPROVED AT SA#25**	
CRs to TS 26.234	Transparent end-to-end PSS; Protocols and codecs	SA4	SA2	**APPROVED AT SA#26**	
TS 26.244	Transparent end-to-end PSS; File Format	SA4	SA2	**APPROVED AT SA#25**	
TS 26.245	Transparent end-to-end PSS; Timed Text Format	SA4	SA2	**APPROVED AT SA#24**	
TS 26.246	Transparent end-to-end PSS; SMIL Language Profile	SA4	SA2	**APPROVED AT SA#24**	
CRs to TR 26.937	Transparent end-to-end PSS; RTP Usage Model	SA4		**APPROVED AT SA#24**	
CRs to TS 22.233	Stage 1	SA1		Under SA1 responsibility. Has been updated through CRs in SA1.	
Possible new TS	Stage2 (non-transparent aspects)	SA2		To be produced by SA2, if needed.	
MMS Rel-6					
CRs to TS 26.140	MMS; Media formats and codecs	SA4	SA2, T2	**APPROVED AT SA#26**	
Media Codecs and Formats for IMS Messaging and Presence					
TS 26.141	IMS Messaging and Presence; Media formats and codecs	SA4	SA2, CN1	**APPROVED AT SA#26**	

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
Audio codecs **(AMR-WB work done under Extended AMR-WB WI and Enhanced aacPlus work done under PSS Rel-6 WI)**					
TS 26.401	Enhanced aacPlus General Audio Codec; General Description	SA4		**APPROVED AT SA#25**	
TS 26.402	Enhanced aacPlus General Audio Codec; Additional Decoder Tools	SA4		**APPROVED AT SA#25**	
TS 26.403	Enhanced aacPlus General Audio Codec; Encoder Specification Advanced Audio Coding (AAC) part	SA4		**APPROVED AT SA#25**	
TS 26.404	Enhanced aacPlus General Audio Codec; Enhanced aacPlus encoder Spectral Band Replication (SBR) part	SA4		**APPROVED AT SA#25**	
TS 26.405	Enhanced aacPlus General Audio Codec; Encoder Specification Parametric Stereo part	SA4		**APPROVED AT SA#25**	
TS 26.410	Enhanced aacPlus General Audio Codec; Floating-point ANSI-C code	SA4		**APPROVED AT SA#25**	
TS 26.411	Enhanced aacPlus General Audio Codec; Fixed-point ANSI-C code	SA4		Contained in TS 26.410 that was presented for information at SA#24. Has been since then extracted into it's own TS.	**SA#27**
TS 26.290	Extended AMR Wideband codec; Transcoding functions	SA4		**APPROVED AT SA#25**	
TS 26.304	ANSI-C code for the Floating-point; Extended AMR Wideband codec	SA4		**APPROVED AT SA#25**	
TS 26.273	ANSI-C code for the Fixed-point; Extended AMR Wideband codec	SA4		Presented for information at SA#24.	**SA#27**
CRs to 26.244	Transparent end-to-end PSS; File Format	SA4		**APPROVED AT SA#25**	
TS 26.406	General audio codec audio processing functions; Enhanced aacPlus general audio codec; Conformance testing	SA4		Presented for information at SA#27.	**SA#28**
TS 26.274	Audio codec processing functions, Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Conformance testing	SA4		Presented for information at SA#27.	**SA#28**
TR 26.9xy	Performance characterization of audio codecs	SA4		Test Plan presented for information at SA#27 and approval for Phase 1 test plan requested	**SA#30**
TS 26.412	Source code for 3GP file format	SA4		Presented for information at SA#27.	**SA#28**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
Speech Recognition Framework for Automated Voice Services					
CRs to TS 26.235	PS Conversational Multimedia Applications; Default Codecs	SA4	SA2, T2	**APPROVED AT SA#24**	
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	**APPROVED AT SA#24**	
TS 26.243	Software documentation for fixed-point DSR Extended Advanced Front-end	SA4		**APPROVED AT SA#24**	
TS 26.177	DSR Extended Advanced Front-endf Test Sequences	SA4		**APPROVED AT SA#26**	
TR 26.943	Performance characterization of SES codecs	SA4		**APPROVED AT SA#26**	
Packet Switched Conversational Multimedia Applications					
CRs to TS 26.235	PS Conversational Multimedia Applications; Default Codecs	SA4	SA2, T2	**APPROVED AT SA#25** (adoption of H.264 (AVC) as recommended codec)	
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	(no changes needed)	
3G-324M Improvements					
TS 26.111	Codec for CS Multimedia Telephony Service; Modifications to H.324	SA4		**APPROVED AT SA#26**	
TR 26.911	Codec for CS Multimedia Telephony Service; Terminal Implementor's Guide	SA4		**APPROVED AT SA#25** (adoption of H.264 (AVC) as recommended codec)	
PoC codec(s)					
CRs to TS 26.235	PS Conversational Multimedia Applications; Default Codecs	SA4	SA2, T2	**APPROVED AT SA#26**	
CRs to TS 26.236	PS Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	**APPROVED AT SA#26**	
MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS)					
TS 26.346	MBMS Protocols and Codecs	SA4	SA2, SA3	Presented for information at SA#26	**SA#27**
TS 22.246	MBMS user services; Stage 1	SA1		Prepared by SA1. **APPROVED AT SA#22**	
TR 26.946	Multimedia Broadcast/Multicast Service (MBMS) user service guidelines	SA4	SA2, SA3		**SA#28**

TSG-SA WG4 (SA4) - CODEC Status Report at TSG-SA#27

Kari Järvinen
TSG-SA WG4 Chairman

☞ ***SA4 status report in Tdoc SP-050081***

☞ ***These slides are attached in Annex B (of Tdoc SP-050081)***

Content

- **General issues** 
- **Maintenance of releases**
- **Release 6 work**
- **Release 7 work**
- **Miscellaneous**
- **Documents and issues for discussion, information and approval**

General: SA4 meetings

- **Meetings held**
  - **Audio codec ad-hoc** — **December 17, 2004** — **[teleconference call]**
  - **Video codec ad-hoc** — **January 28 and February 3, 2005** — **[teleconference calls]**
  - **Audio codec ad-hoc and SQ SWG** — **February 7-8, 2005** — **Host: Siemens; Venue: Munich, Germany**
  - **SA4#34** — **February 21-25, 2005** — **Host: The European Friends of 3GPP; Venue: Lisbon, Portugal**
  - **Audio codec ad-hoc*** — **March 9, 2005** — **[teleconference call]**
- **Planned meetings**
  - **PSM SWG meeting**** — **April 6-7, 2005** — **Host and venue tbd**
  - **SA4#35** — **May 9-13, 2005** — **Host: Qualcomm; Venue: San Diego, USA**
  - **SA4#36** — **September 5-9, 2005** — **Host and venue tbd**
  - **SA4#37** — **November 14-18, 2005** — **Host and venue tbd**

**) SA4 decision power given to approve the fixed-point C-code TSs based on verification test results*
***) Rights to send out LSs on MBMS on behalf of SA4 given by SA4#34*

- **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
SA4#33	265	55	32	14
SA4#34	**254**	**52**	**22**	**12**

General: SA4 leadership and subgroups

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

Nikolaus Färber was not able to attend SA4#34, and Thomas Stockhammer (Siemens, ETSI) kindly chaired the video codec ad-hoc sessions during SA4#34.

This was the last physical meeting of the audio codec ad-hoc group. SA4 thanks the audio codec ad-hoc group Chairman, Imre Varga, and the audio codec ad-hoc group for the good work done!

General: Progress overview

- **Agreed 3 new Rel-6 TSs**
- **Agreed 28 Rel-6 CRs and 2 Rel-5 CRs**
- **Agreed 3 new Rel-7 WIs**
- **Rel-6 work completed by SA#27 except:**
  1. MBMS User Service (only one TR on guidelines not yet completed)
  2. Enhanced aacPlus and Extended AMR-WB audio codecs (conformance TS for both codecs, performance characterisation TR, file format software TS)

     Note: The remaining audio codec work impacts also the work completion for the services using the new audio codecs: PSS, MMS, MBMS User Services, IMS Messaging and Presence.

  All remaining Rel-6 TSs are presented for information at SA#27 and are expected to be finalised by SA#28. The remaining Rel-6 work is requested to be part of Rel-6 even though it will be completed after SA#27**.**

General: Input documents

- **For information:**
  - **SP-050081: SA4 Status Report at TSG SA#26; Source: SA4 Chairman**
  - **SP-050102: Reply to Liaison Statement on Status of OMA Mobile Broadcast Services; Source SA4**
  - **SP-050085: TS 26.406: "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Conformance testing" Version 1.0.0 (Release 6); Source SA4**
  - **SP-050086: TS 26.274 "Audio codec processing functions, Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Conformance testing" Version 1.0.0 (Release 6); Source SA4**
  - **SP-050087: TS 26.412 "Source code for 3GP file format" Version 1.0.0 (Release 6); Source SA4**
  - **SP-050088: Report of FEC selection for MBMS; Source SA4**
- **For approval (all from SA4):**
  - **SP-050082: TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 2.0.0 (Release 6)**
  - **SP-050083: TS 26.273: "ANSI-C code for the Fixed-point Extended AMR Wideband codec" Version 2.0.0 (Release 6)**
  - **SP-050146: 3GPP TS 26.411: "Enhanced aacPlus General Audio Codec; Fixed-point ANSI-C code" Version 1.0.0 (Release 6)**
  - **SP-050089: New WID on Performance Characterization of VoIMS over HSDPA/EUL channels (Release 7)**
  - **SP-050090: New WID for dynamic and interactive multimedia scenes (Release 7)**
  - **SP-050091: New WID for Stage 3 Specification of Combining CS and IMS services (Release 7)**
  - **SP-050092 - SP-050099: Change Requests (Rel-5 and Rel-6)**
  - **SP-050100 and SP-050101: Release 6 Submission Templates for MBMS User Services and for Audio codecs and related services**
  - **SP-050102: Reply to Liaison Statement on Status of OMA Mobile Broadcast Services**
  - **SP-050132 : PSS-MMS-MBMS Audio Codec Characterization Test Plan (Phase 1)**

Content

- **General issues**
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Maintenance of releases

- **CRs have been agreed to TSs 26.140 (Rel-6), 26.141 (Rel-6), 26.234 (Rel-5 and Rel-6), 26.235 (Rel-6), 26.236 (Rel-5 and Rel-6), 26.244 (Rel-6), 26.290 (Rel-6), 26.304 (Rel-6), 26.401 (Rel-6), 26.405 (Rel-6) and 26.410 (Rel-6).**

Content

- General issues
- Maintenance of releases
- Release 6 work 
- Release 7 work
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- Documents and issues for discussion, information and approval

Release 6 work

1. **Audio codecs (Enhanced aacPlus and Extended AMR-WB)**
2. **MBMS User Services: Definition of MBMS user services, media codecs, formats and transport/application protocols using Multimedia Broadcast/Multicast Service (MBMS)**

Audio codecs (Enhanced aacPlus and AMR-WB+) (1/3)

- **Some specification work remained after SA#26:**
  1. **Fixed-point reference C-code versions of codecs and related TSs**
  2. **Conformance requirements (e.g. test sequences) and relevant TS(s)**
  3. **Characterisation testing and performance characterisation TR**

- **Fixed-point C-code versions prepared by codec proponents and verified in SA4 (subjective quality, implementation complexity, quality of C-code). Finalised TSs are brought for approval. (The fixed-point or the floating-point codec may be used depending on if the implementation platform is better suited for a floating-point or a fixed-point implementation.)**

- **Codec conformance requirements (with respect to the reference C-codes e.g. test sequences) progressed. Draft TSs presented for information. Framework similar for both codecs: in addition to bit-exactness (for fixed-point codec) or using the reference C-code as such (for floating-point codec), objective or subjective measures can alternatively be used for showing conformance.**

- **Test plan for codec characterisation progressed. Phase 1 test plan (error-free conditions across various bit-rates) now finalised and presented for approval. Phase 1 tests to be carried out between SA#27 and SA#28; results to be presented for information at SA#28.**

Audio codecs (Enhanced aacPlus and AMR-WB+) (2/3)

- **Characterisation testing (PSS-MMS-MBMS):**
  - **Phase 1: Characterization of the codecs across various bit rates (for approval)**
    - Experiment 1: Mono signal with bit rates of 10 kbit/s, 16 kbit/s and 20 kbit/s; no transmission errors
    - Experiment 2: Stereo signal with bit-rates of 14 kbit/s, 21 kbit/s, 28 kbit/s; no transmission errors
  - **Phase 2: Characterization of the codecs across error conditions (for information)**
    - Experiment 1: GPRS/EGPRS error conditions
    - Experiment 2: UTRAN error conditions
  - **Allocation of laboratories and funding agreed at SA4#33.**
  - **SA4 would (still) need support to obtain suitable MBMS streaming channel error patterns for Phase 2. SA4#34 suggested to TSG RAN that a joint meeting between SA4 and relevant RAN WGs could take place during the RAN MBMS workshop on April 4-6 in Sophia Antipolis (France). For the error patterns, such aspects as RoHC, FEC and RTP-packetization would need to be considered as well.**
  - **Also, companies in SA4 are investigating possibilities to provide the EPs to SA4.**

Audio codecs (Enhanced aacPlus and AMR-WB+) (3/3)

- **Volunteers needed for some complementing verification and characterisation items (for the floating- and fixed-point codec versions)**
- **CRs on corrections are brought for approval for both codecs**
- **Also, SA4#34 agreed to create a new TS 26.412 to contain a pointer to the reference 3GPP file format software (maintained by MPEG as part of overall file format software). Both audio codec reference software ANSI-C codes use the 3GPP input/output file format, but it is used also for all media types and is not limited to audio. Draft TS is brought for information to SA#27.**

MBMS User Services: General (1/2)

- **TS 26.346 "MBMS Protocols and codecs" presented for approval. (Version 1.5.0 was presented for information at SA#26.)**
- **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.**
- **The main work completed since SA#26 include the following:**
  - SA#26 agreement on audio codecs included into the TS (both Enhanced aacPlus and Extended AMR-WB recommended with applications/use scenarios identified)
  - Agreement on video codecs (H.264 recommended, the usability of H.263 noted)
  - Definition of other codecs and media formats (codec status in terms of "shall" vs. "should" is still tbd)
  - Definition of FEC (Forward Error Correction) buffering method
  - SDP for download (FLUTE) session and for streaming (RTP) included
  - Identification of end-of-transmission (end-of-files) for download delivery
  - Encapsulation of metadata fragments in aggregated document
  - MBMS service announcement compression with Gzip
  - Extending file formats to container file format for multimedia presentations
  - QoE (Quality of Experience) metrics for the reception reporting procedures
  - Ptm repair for file repair procedure
  - Guidelines for RTP packetization
  - Use of new IETF RFC 3640 "RTP Payload Format for Transport of MPEG-4 Elementary Streams" (instead of IETF RFC 3016) for Enhanced aacPlus - pending evidence of the benefits to be shown at SA4#35
  - Security aspects from SA3 updated (e.g., security description metadata, HTTP procedure to request keys or key-updates)
  - Description of BM-SC Proxy aligned to SA2 view
  - Several updates e.g. for Service Discovery / Announcement function, Security description, FEC mechanism for RTP
  - Harmonisation of terminology, updates to figues (e.g. protocol stack overview), new references

MBMS User Services: General (2/2)

- **TS 26.346 is mature for SA#27 approval and stable enough. However, some outstanding issues remain:**
  - Decision of status ("shall" vs. "should") for some codecs (speech, synthetic audio, still images, bitmap graphics, vector graphics, text and timed text). Note that the media types and codecs themselves are defined already - and only the status of some codecs remains open. (The codecs are the same as the ones defined for PSS.)
  - SA4#34 was not able to reach consensus on the FEC code selection (and on status, i.e., "shall/should/may be supported"). Two FEC codes still remain under consideration (Reed-Solomon and Raptor).
  - Also, there are SA4 agreements on some issues but the specification text for these is not yet ready and not included (Service Announcement over interactive bearers, MBMS session identity definition, and using 2 TMGIs for several access networks). Also, RTP stream bundling, i.e., multiple RTP streams to be protected together for FEC purposes is agreed pending on confirmation from SA1, SA2, SA3 and RAN2. All these are planned to be included later through CRs.
- **Several LSs exchanged on MBMS with relevant WGs to finalise the remaining issues. Draft TS sent for review to many WGs and feedback received.**
- **TR 26.946 "MBMS user service guidelines" remains to be prepared and SA4 asks more time for completion of this TR.**

MBMS User Services: Audio codecs

- **The audio codec agreement from SA#26 has been included in TS 26.346: Enhanced aacPlus and AMR-WB+ are both recommended, and a table of applications/use scenarios is included to help the operator/manufacturer decide which to use for their particular applications.**

MBMS User Services: Video codecs

- **A "working assumption" was formulated during SA4#33, i.e. :**
  - **H.264 Baseline Profile Level 1b decoder recommended ("should be supported"), and**
  - **H.263 Baseline profile Level 45 defined as "may be supported".**
  - **Further, a decoder can still be raised to become default ("shall be supported") at SA4#34 based on further consideration.**
- **The requirements for a video codec to become mandatory have been debated. However, a list of requirements agreeable to all SA4 could not be concluded. Nevertheless, this is seen as useful basis for the Rel-7 work on video codec performance requirements.**
- **At SA4#34, several companies argued that since H.264 shows consistent performance gain over H.263 it should be chosen as the single default ("shall be supported") video codec for MBMS User Services. This however was not agreeable to several other companies. They felt that the evidence does not justify making H.264 default and requested SA4 to stay with the working assumption; concerns expressed e.g. on performance in error-prone conditions, lack of clarity in simulations and some open issues.**
- **A way forward was found by a slight modification of the working assumption:**
  - **H.264 Baseline Profile Level 1b decoder is recommended for MBMS User Services, and (only) a sentence is added in TS 26.346 explaining that H.263 profile 0 level 45 decoder may be used for MBMS User Services, since (according to TS 26.234) it shall be supported for PSS.**
  - **The details of the use of H.263 in MBMS User Services will be explained in TR 26.946 "MBMS user service guidelines".**

MBMS User Services: Other codecs

- **For the other media types and codecs besides audio and video (i.e., speech, synthetic audio, still images, bitmap graphics, vector graphics, text and timed text), the same codecs as for PSS have been defined.**
- **However, the status of these codecs remained still open at SA4#34 (either default i.e. “shall be supported” or recommended i.e. “should be supported”) and will be closed by SA#28.**

MBMS User Services: FEC method (1/3)

- **The forward error correction code (FEC) mechanism is used on the application layer to allow MBMS receivers to recover lost SDUs.**
- **Motivation:**
  - **About one year ago SA4 was made aware of the radio link quality offered by GERAN and UTRAN; error rates perceived at application layer were higher than those achievable for other services (such as PSS).**
  - **One possibility was to accept the radio link quality and not try to improve the performance. However, despite this was also initially considered, SA4 decided to include FEC as a mechanism for improving the error resilience of a data stream.**
  - **FEC algorithms allow reducing the application residual error rate by adding a certain amount of redundancy (or FEC overhead) to the transmitted data stream.**
- **Process:**
  1. **Request information from GERAN/RAN WGs about characteristics for the radio link performance**
  2. **Define a set of simulation guidelines for SA4 internal use, with the objective of evaluating the performance of different FEC algorithms.**
  3. **Select one (or more) FEC algorithms based on the performance and other characteristics**

MBMS User Services: FEC method (2/3)

- **Five FEC proposals were presented in October 2004. At SA4#33, they were reduced into the following three:**
  1. **Reed-Solomon codes**
  2. **LDPC (Low Density Parity Check) Copper codes**
  3. **Raptor codes**
- **At SA4#34, the proposals were further discussed and debated based on simulation results and other information/evidence on the algorithms.**
- **In the interest of progressing towards consensus within the Rel-6 timeframe the LDPC Copper code proposal was withdrawn, leaving Reed-Solomon and Raptor as the two remaining contenders.**
- **Both Raptor and Reed-Solomon codes were supported by several companies and consensus could not be reached at SA4#34.**

MBMS User Services: FEC method (3/3)

- **Digital Fountain, Ericsson, Vodafone, Telecom Italia S.p.A., T-Mobile and Siemens asked Raptor to be defined as the single mandatory ("shall be supported") FEC code, and the same position was expressed by Bamboo** (position expressed during PSM SWG within SA4#34 – company not present in the final SA4 plenary session)**.**
- **Nokia requested Reed-Solomon to be defined as the single mandatory ("shall be supported") FEC code, as well as did Toshiba** (position expressed during PSM SWG). **Vidiator and "3" requested Reed-Solomon to be defined as the single "mandatory" FEC code and Raptor as "optional". NTT DoCoMo supported Reed-Solomon (without position expressed on "mandatory" vs. "optional").**
- **Alcatel supported one "mandatory" FEC code and no optional FEC code to be defined** (position expressed during PSM SWG)**. Apple further suggested one or two "non-mandatory" FEC codes, and justified this position.**
- **A report on FEC code selection for MBMS from SA4#34 is presented for information at SA#28.**
  - **Contains still some provisional figures on the proposals; these were agreed to be confirmed or updated by SA#27, possibly on grounds of further individual contributions provided to SA#27.**

Overview of Rel-6 work status (1/2)

- **Release 6 work completed by SA#27 except:**

  1. **MBMS User Service (only one TR on guidelines not yet completed)**
     - TR 26.946 “MBMS user service guidelines – Status: expected for approval at SA#28, however completion date depends on the extent of the content!
  2. **Enhanced aacPlus and Extended AMR-WB audio codecs (conformance TS for both codecs, performance characterisation TR, file format software TS)**
     - TS 26.406 “Enhanced aacPlus general audio codec; Conformance testing” – Status: presented for information at SA#27, expected for approval at SA#28
     - TS 26.274 “Extended AMR-WB codec; Conformance testing” – Status: presented for information at SA#27, expected for approval at SA#28
     - TR 26.9xy “Performance characterization of audio codecs” – Status: pending on testing; Phase 1 test plan presented for approval at SA#27 and Phase 1 test results expected for information at SA#28, complete TR with Phase 2 results including error conditions (and depending on provision of ERROR PATTERNS by RAN and GERAN) expected for approval at SA#30
     - TS 26.412 “Source code for 3GP file format” – Status: presented for information at SA#27, expected for approval at SA#28. (Note: The TS is relevant also for other media types than audio)

  Note: The remaining audio codec work impacts also the work completion for the services using the new audio codecs: PSS, MMS, MBMS User Services, IMS Messaging and Presence.

- **All remaining TSs are presented for information at SA#27; all are expected to be finalised by SA#28. All remaining Rel-6 work is requested to be part of Rel-6 even though it will be completed after SA#27.**

Overview of Rel-6 work status (2/2)

- **Summary table of work status and completion-% for each Rel-6 SA4 WI**

Work Item (Rel-6)	Completion-% at SA#27	Remaining issues (after SA4#34)
Performance characterisation of default codecs for PS conv. multimedia applications	100	(none)
Codec Work to Support Speech Recognition Framework for Automated Voice Services	100	(none)
Codec Enhancements for Packet Switched Conversational Multimedia Applications	100	(none)
3G-324M Improvements	100	(none)
PoC codecs	100	(none)*
PSS Rel-6	97	Finalisation of Enhanced aacPlus and AMR-WB+ specifications: 1) conformance TSs 26.406 and 26.274, 2) TR on performance characterisation, 3) TS 26.412 on source code for 3GP file format
MMS formats and codecs	97	Same as for PSS above.
Media Codecs and Formats for IMS Messaging and Presence	97	Same as for PSS above.
AMR-WB extension for high audio quality	97	Same as for PSS above.
Definition of MBMS user services; media codecs, formats and transport/application protocols using MBMS	90	Finalisation of TR 26.946 on MBMS user service guidelines. Also, some outstanding issues remain in TS 26.346 on MBMS Protocols and codecs, foremost FEC code selection

*) for 3GPP2 originated discussion on 3GPP vs. 3GPP2 PoC codec cross-adoption, see under Miscellaneous

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Video Codec Performance Requirements

- **WID approved at SA#26, work launched at SA4#34. The work is on specification of video codecs for 3GPP services by creating detailed encoder and decoder specifications.**
- **The structure of video codec specifications, mandatoriness of requirements, simulation conditions to be covered, objective metrics for error prone channels and the overall standardization methodology were discussed. No working methodology or detailed goals were yet agreed and companies were asked to consider the proposals and respond by next meeting.**
- **Working methodology definition for the work is to be finalized at the next SA4 meeting (to support working towards video codec specifications in a coordinated fashion).**

Proposed new WIs

1) Performance Characterization of VoIMS over HSDPA/EUL channels

- Characterisation of VoIMS over HSDPA/EUL (High Speed Downlink Packet Access / Enhanced Up Link) channels and inclusion of results into TR 26.935 “PS conversational multimedia applications; Performance characterisation of default codecs”

2) Dynamic and interactive multimedia scenes

- Production of a specification for multimedia scene management, where the selection, control and display of the multimedia scenes are integrated into a single user interface

3) Combining CS and IMS Services Stage 3

- Covers Stage 3 work on IMS codec specifications

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Miscellaneous

- **AMR Noise Suppressor (AMR-NS) solution from Fujitsu was endorsed as meeting the minimum performance requirements given in TS 26.077 "Minimum Performance Requirements for Noise Suppresser; Application to the AMR Speech Encoder". The endorsement means that SA4 recognizes the algorithm from Fujitsu meeting, on grounds of the results provided at SA4#34, the recommended minimum performance requirements set in TS 26.077. There are no other implications.**

- **SA4 studying 3GPP2 proposal on adoption of 3GPP2 EVRC codec to 3GPP PoC.**
  - A LS from 3GPP2 TSG-C proposed that, in order to minimize transcoding for PoC services, a) 3GPP should consider adoption of EVRC (Enhanced Variable Rate Codec) as an optional codec for 3GPP PoC services and b) 3GPP2 should consider adoption of AMR as an optional codec for 3GPP2 PoC services.
  - SA4: The impact of AMR transcoding with EVRC in PoC should be studied and the impact of AMR/EVRC co-existance in terminals analysed. Companies were asked to study the issue in order to respond at SA4#35.

- **Relating to SA1 Rel-7 WI on "Enhancements of VGCS in public networks for communication of public authority officials", two solutions for realisation of E2E encryption for VGCS/VBS subscribers presented for comments to SA4: "data bearer solution" and "speech bearer solution".**
  - SA4 felt that speech codecs above 4.75 kbit/s and 5.15 kbit/s should be preferably used and that updating of TFO specifications could be problematic. Consequently, the data bearer solution may be better suited as a solution. However, no definite conclusion can yet be given, until the consequences on delay and quality are thoroughly investigated.

- **The deadline for Tdocs to SA4 meetings was moved one day earlier, i.e., to Tuesday midnight (on the week preceeding SA4 meetings) to leave more time for review.**

Communication with other WGs/TSGs/groups

Tdoc no.	Title	Intended for	Copy to
TD S4-050128	Reply LS on Reception Acknowledgement for MBMS	TSG SA WG3	TSG SA WG5, TSG SA WG2, TSG SA WG1
TD S4-050197	Reply LS on Session Repetition (GP-050573, R2-050273, R2-050641, S2-050486)	GERAN WG2, TSG RAN WG2, TSG SA WG2, TSG RAN WG3, TSG CN WG1, TSG CN WG3, TSG CN WG4	TSG SA WG1
TD S4-050169	Reply LS on Simultaneous MBMS sessions	TSG RAN WG2	TSG RAN WG3
TD S4-050198	Reply LS on MBMS Session Repetition	GERAN WG2, TSG RAN WG2, TSG SA WG2	TSG RAN WG3, TSG CN WG1, TSG CN WG3, TSG CN WG4
TD S4-050214	Reply on “Reply LS on guidance and error patterns for MBMS streaming simulations”	TSG RAN and TSG GERAN	
TD S4-050216	Reply to LS on AMR multi-rate operation of VoIMS	TSG RAN WG2, TSG SA WG2	
TD S4-050218	Liaison Statement on a new basis for the 3GP file format	OMA BAC DL+DRM, 3GPP2 TSG-C	TSG SA WG3
TD S4-050237	Reply to Liaison Statement on Status of OMA Mobile Broadcast Services	OMA BCAST	TSG SA, TSG SA WG3, TSG SA WG2
TD S4-050243	Liaison Statement on RDF schemes for PSS capability vocabularies	OMA UAProf	
TD S4-050239	LS on 3GPP Release 6 MBMS Audio Codec Selection Status	DVB TM-AVC	DVB CM-AVC, DVB TM-CBMS
TD S4-050245	Liaison Statement on stream bundling for MBMS	TSG SA WG1, TSG SA WG2, TSG SA WG3 TSG RAN WG2	
TD S4-050141	Liaison statement MBMS User Service finalization	TSG SA WG2, TSG SA WG3	TSG RAN WG1, TSG RAN WG2, TSG RAN WG3, TSG RAN WG4, TSG SA WG1, TSG CN WG1, TSG CN WG3

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Documents for information: LS

- **SP-050102: Reply to Liaison Statement on Status of OMA Mobile Broadcast Services**
  - On request, SA4 provides feedback to OMA BCAST on preliminary OMA Mobile Broadcast Services architecture. Some functional overlap was identified between draft TS 26.346 and OMA draft specifications and SA4 proposes these to be harmonised by re-using text from TS 26.346.

Documents for information: Audio codec TSs

- **SP-050085: TS 26.406 "General audio codec audio processing functions; Enhanced aacPlus general audio codec; Conformance testing" Version 1.0.0 (Release 6), and**
- **SP-050086: TS 26.274 "Audio codec processing functions, Extended Adaptive Multi-Rate - Wideband (AMR-WB+) codec; Conformance testing" Version 1.0.0 (Release 6)**
  - These TSs specify the digital test sequences and conformance criteria for the Enhanced aacPlus and Extended AMR-WB audio codecs.
  - The general framework for conformance is similar for both codecs:
    - Fixed-point encoder and decoder conformance can be met by showing either bit-exactness to the fixed-point reference C-code or by meeting a set of objective performance requirements. (The bit-exact approach should be preferred over objective measures if it can be achieved without undue penalty on computational complexity.)
    - Floating-point encoder and decoder conformance can be met by utilizing (compiling) the reference floating-point source code in specifications as such or by meeting a set of objective performance requirements. For encoder, this is only recommended unless it is used in terminal equipment (MMS use case).
  - Conformance testing is also allowed alternatively by using subjective tests, in which performance not worse than that of the reference codec must be achieved. For Enhanced aacPlus this is allowed only for encoder, while for AMR-WB+ also for decoder.

Documents for information: new TS on file format software

- **SP-050087: TS 26.412 "Source code for 3GP file format" Version 1.0.0 (Release 6)**
  - The definition of the 3GPP file format is derived from the ISO Base Media File Format, as published by ISO/IEC in 14496-12. The reference software for the file format is also therefore maintained by ISO/IEC.
  - Users of 3GPP specifications have had difficulty in finding the reference code for the 3GPP file format. (E.g., the Enhanced aacPlus source code and the Extended AMR-WB source code both rely on use of the file-format for their file input/output.)
  - SA4#34 therefore agreed to create a new TS 26.412 to contain pointer to the reference 3GPP file format software (maintained by MPEG as part of their overall file format software).
  - Since this file format source code is reference software in MPEG, copyright cannot easily be assigned to 3GPP partners and the actual MPEG ANSI-C source code cannot be included into the 3GPP TS. However, it does assist users if there is a visible specification which documents how to access the source code. In the future, it may be possible to provide a copy of the source code in the TS. Currently, the TS includes a compiled library with headers for use on Windows.
  - Note that this TS is relevant for all media types - and not limited to audio.

Documents for information

- **SP-050088: Report of FEC selection for MBMS**
  - Gives the motivation and background for FEC development, reviews the selection process in SA4 (requested information, simulation guidelines etc.) and explains the main aspects of the two remaining proposals (with respect to computational complexity, memory consumption, flexibility, latency etc.)
  - Contains still some provisional figures on the proposals. These were agreed at SA4#34 to be confirmed or updated by SA#27 (possibly by providing new individual contributions directly to SA#27 Plenary).

Documents for approval: Audio codec characterisation test plan - for Phase 1

- **SP-050132: PSS-MMS-MBMS Audio Codec Characterization Test Plan**
  - **Phase 1: Characterization of the codecs across various bit rates (for approval)**
    - Experiment 1: Mono signal with bit rates of 10 kbit/s, 16 kbit/s and 20 kbit/s; no transmission errors
    - Experiment 2: Stereo signal with bit-rates of 14 kbit/s, 21 kbit/s, 28 kbit/s; no transmission errors
  - **Phase 2: Characterization of the codecs across error conditions (for information)**
    - Experiment 1: GPRS/EGPRS error conditions
    - Experiment 2: UTRAN error conditions

Documents for approval: New TSs

- **SP-050082: TS 26.346 "Multimedia Broadcast/Multicast Service; Protocols and Codecs" Version 2.0.0 (Release 6)**

  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. This specification does not preclude the use of other delivery methods.

  Outstanding Issues:

  – FEC code selection from two candidates (Reed-Solomon and Raptor) and decision of status ("shall" vs. "should" vs. "may").

  – Decision of status ("shall" vs. "should") for some codecs (speech, synthetic audio, still images, bitmap graphics, vector graphics, text, and timed text).

Documents for approval: New TSs

Main content of TS 26.346:

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:**
   - Download delivery based on IETF FLUTE
   - Streaming delivery based on RTP (without RTCP in uplink to avoid channel congestion): audio, video, speech, timed text
   - Service Announcement using download delivery (FLUTE)
   - Associated delivery procedures: e.g.
     - File repair (repair lost or corrupted file fragments in download delivery): a scalable solution to handle congestion and server overload, file repair requests and responses take place in a single TCP session using HTTP-protocol
     - Reception reporting procedure (to report complete reception of file(s) in download delivery, to report statistics in streaming delivery)
4. **Definition of media codecs and formats (all media types and codecs defined; only status (“shall” vs. “should”) for some codecs still tbd)**
5. **Specification of FEC encoder and decoder (two candidates: Reed-Solomon and Raptor)**

Documents for approval: New TSs

- **SP-050083: TS 26.273 "ANSI-C code for the Fixed-point Extended AMR Wideband codec" Version 2.0.0 (Release 6)**
  - The fixed-point C-code defines, besides the floating-point C-code specified in TS 26.304, a valid reference implementation for the Extended Adaptive Multi-Rate Wideband codec.
  - Standard conformance is enforced by meeting the conformance criteria defined in TS 26.274.
  - The fixed-point codec or the floating-point codec may be used depending on if the implementation platform is better suited for a floating-point or a fixed-point implementation.

- **SP-050146: TS 26.411 "Enhanced aacPlus General Audio Codec; Fixed-point ANSI-C code" Version 1.0.0 (Release 6)**
  - The fixed-point C-code defines, besides the floating-point C-code specified in TS 26.410, a valid reference implementation for the Enhanced aacPlus codec.
  - Standard conformance is enforced by meeting the conformance criteria defined in TS 26.406.
  - The fixed-point codec or the floating-point codec may be used depending on if the implementation platform is better suited for a floating-point or a fixed-point implementation.

Documents for approval: New WIDs

- **SP-050089: Performance Characterization of VoIMS over HSDPA/EUL channels (Release 7)**
  - Characterisation of VoIMS over HSDPA/EUL (High Speed Downlink Packet Access / Enhanced Up Link) channels and inclusion of results into TR 26.935 “Packet-switched conversational multimedia applications; Performance characterisation of default codecs”
- **SP-050090: Dynamic and interactive multimedia scenes (Release 7)**
  - Production of a specification for multimedia scene management, where the selection, control and display of the multimedia scenes are integrated into a single user interface
- **SP-050091: Combining CS and IMS Services Stage 3 (Release 7)**
  - Covers Stage 3 work on IMS codec specifications

Documents for approval: CRs

- **SP-050092: CR to TS 26.140 "MMS; Media formats and codes" on Introduction of PIM and DRM (Release 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.140	011	1	Rel-6	Introduction of PIM and DRM	C	6.1.0	S4	TSG-SA WG4#34	S4-050222

- **SP-050093: CRs to TS 26.234 "PSS; Protocols and codecs" on Corrections (Releases 5 and 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.234	081		Rel-6	Correction to NADU "NUN" field regarding MPEG-4 Video	F	6.2.0	S4	TSG-SA WG4#34	S4-050022
26.234	082		Rel-5	Correction of RDF schema for UAProf	F	5.6.0	S4	TSG-SA WG4#34	S4-050081
26.234	083		Rel-6	Correction of RDF schema for UAProf	A	6.2.0	S4	TSG-SA WG4#34	S4-050082
26.234	084		Rel-6	Correction of syntax and references	F	6.2.0	S4	TSG-SA WG4#34	S4-050083

- **SP-050094: CR to TS 26.244 "PSS; 3GPP file format (3GP)" on Extended presentations in 3GP files for MBMS (Release 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.244	008	1	Rel-6	Extended presentations in 3GP files for MBMS	B	6.2.0	S4	TSG-SA WG4#34	S4-050171

Documents for approval: CRs

- **SP-050095: CRs to TSs 26.401 ”Enhanced aacPlus general audio codec; General description”, 26.405 “… Encoder specification; Parametric stereo part”, and 26.410 “… Floating-point ANSI-C code” on Corrections (Release 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.401	002	1	Rel-6	Correction to written specification: add missing reference to MPEG corrigendum	F	6.1.0	S4	TSG-SA WG4#34	S4-050151
26.405	001	1	Rel-6	Correction to written specification: wrong formula on ICC parameter extraction	F	6.0.0	S4	TSG-SA WG4#34	S4-050179
26.410	014	1	Rel-6	Correction to C-code: 3GPP file format wrong writing of brand	F	6.1.1	S4	TSG-SA WG4#34	S4-050180
26.410	015	1	Rel-6	Correction to C-code: remove copyright notice from 3GPP file format header files	F	6.1.1	S4	TSG-SA WG4#34	S4-050181
26.410	016	1	Rel-6	Correction to C-code: add capability for 10 kbit/s, mono and 16 kbit/s stereo encoding	F	6.1.1	S4	TSG-SA WG4#34	S4-050153
26.410	017	1	Rel-6	Correction to C-code: add capability for data stream element parsing	F	6.1.1	S4	TSG-SA WG4#34	S4-050154
26.410	018	1	Rel-6	Correction to C-code: PNS decoding algorithm not conform to MPEG	F	6.1.1	S4	TSG-SA WG4#34	S4-050155
26.410	019	1	Rel-6	Correction to C-code: the decoder mono only compile target not working correctly	F	6.1.1	S4	TSG-SA WG4#34	S4-050182
26.410	020	1	Rel-6	Correction to C-code: PS-decoding with varying upper frequency border not working correctly	F	6.1.1	S4	TSG-SA WG4#34	S4-050183
26.410	021	1	Rel-6	Correction to C-code: PS-decoding with variable framing not working correctly	F	6.1.1	S4	TSG-SA WG4#34	S4-050184
26.410	022		Rel-6	Correction to written specification: move WMOPS numbers to informative Annex	F	6.1.1	S4	TSG-SA WG4#34	S4-050165

Documents for approval: CRs

- **SP-050096: CRs to TSs 26.290 "AMR-WB+; Transcoding functions" and 26.304 "AMR-WB+; Floating-point ANSI-C code" on Corrections (Release 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.290	005	1	Rel-6	Update for TCX coding mode selection table	F	6.1.0	S4	TSG-SA WG4#34	S4-050163
26.304	019	1	Rel-6	AMR-WB/AMR-WB+ switching	F	6.1.0	S4	TSG-SA WG4#34	S4-050156
26.304	020	2	Rel-6	Cleanup of unused C-code functions	F	6.1.0	S4	TSG-SA WG4#34	S4-050185
26.304	021	1	Rel-6	Correction of misbehaviour of constrained cholesky	F	6.1.0	S4	TSG-SA WG4#34	S4-050158
26.304	022	1	Rel-6	Source code bit exact editorial changes	F	6.1.0	S4	TSG-SA WG4#34	S4-050159
26.304	023	2	Rel-6	Correction of last frame processing	F	6.1.0	S4	TSG-SA WG4#34	S4-050160
26.304	024	1	Rel-6	Correction of frame erasure concealment	F	6.1.0	S4	TSG-SA WG4#34	S4-050207
26.304	025	1	Rel-6	Correction of references and terminology	F	6.1.0	S4	TSG-SA WG4#34	S4-050246

- **SP-050097: CR to TS 26.235 "PS conversational multimedia applications; Default codecs" on Correction of inconsistency regarding the maximum number of speech frames per RTP packets for PoC (Release 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.235	012	1	Rel-6	Correction of inconsistency regarding the maximum number of speech frames per RTP packets for PoC	F	6.3.0	S4	TSG-SA WG4#34	S4-050228

- **SP-050098: CR to TS 26.141 "IMS Messaging and Presence; Media formats and codecs" on Editorial correction on missing IMS Presence UA text (Release 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.141	001	1	Rel-6	Editorial correction on missing IMS Presence UA	F	6.0.0	S4	TSG-SA WG4#34	S4-050223

Documents for approval: CRs

- **SP-050099: CRs TS 26.235" PS conversational multimedia applications; Default codecs" and TS 26.236 "PS conversational multimedia applications; Transport protocols" on Introduction of AMR SDP parameters and correction of reference (Releases 5 and 6)**

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.236	014		Rel-5	Introduction of AMR SDP parameters	F	5.5.0	S4	TSG-SA WG4#34	S4-050224
26.236	015	1	Rel-6	Introduction of AMR SDP parameters	A	6.1.0	S4	TSG-SA WG4#34	S4-050225
26.235	013	1	Rel-6	Correction of reference	F	6.3.0	S4	TSG-SA WG4#34	S4-050226

Documents for approval: Release 6 submission templates for the yet non-completed work

- **SP-050100: Release 6 Submission Template for WI MBMS User Services**
- **SP-050101: Release 6 Submission Template for audio codecs and related services**

Request of endorsement

- **TSG SA Plenary is requested to "endorse" the Fujitsu algorithm for AMR Noise Suppressor (and put a sentence in the SA#27 meeting report that the Fujitsu algorithm for AMR-NS meets the minimum requirements given in TS 26.077).**
- **The endorsement means that the algorithm is considered, based on SA4 analysis, to meet the recommended minimum performance requirements given in TS 26.077. There are no other implications. (See Slide 28 for further details on the endorsement.)**

(end of presentation)