Source:	**TSG-SA WG4 Chairman**
Title:	**TSG-SA WG4 Status Report at TSG-SA#20**
Document for:	**Information**
Agenda Item:	**7.4.1**

Executive Summary

Since TSG-SA#19, TSG-SA WG4 (SA4) has met once as SA4 plenary. In addition, one ad-hoc meeting of SQ SWG on Speech Enabled Service codecs and two ad-hoc meetings on audio codecs have been held.

Release 5 Work Items

Extended Transparent End-to-End PS Streaming Service: The only remaining SA4 Rel-5 specification is TR 26.937 (RTP usage model). SA4 will continue finalising this "non-critical" TR based on comments now being received from other WGs before it will be brought for approval to TSG-SA.

Release 6 Work Items

Performance characterisation of default codecs for PS conversational multimedia applications: Testing methods and procedures have been progressed. Test plan is aimed to be finalised at next SA4 meeting (July). Testing is scheduled for September-October time frame targeting the TR on Performance Characterisation to be finalised by TSG-SA#22 (December).

PS Streaming Rel-6: Rel-6 streaming has been discussed further: e.g., reliable streaming, bit-rate adaptation, quality metrics and audio codecs. (For work on audio codecs, see next section.) The general principles for rate adaptation have been agreed but debate on specific solution continues. Preparation of a permanent document on quality metrics was started to guide the SA4 internal work. A LS was sent to SA1 asking information on use cases for reliable transport. SA4 agreed earlier to split TS 26.234 "PSS; Codecs and Protocols" Rel-6 into four dedicated TSs, and initial working drafts of all of these have been prepared. LS was received from OMA DRM+DL proposing cooperation in DRM protection of streamed PSS content, and SA4 responded favourably to the request.

Audio codecs (PSS/MMS default audio codecs, extended AMR-WB codec): Permanent documents (used to guide the SA4 internal work) have been finalised on Design Constraints and Performance Requirements for both PSS/MMS audio codecs and for the extended AMR-WB codec (AMR-WB+). Documents on Test and Processing Plans have been progressed, but not yet finalised. Six PSS/MMS candidate codecs were declared (non-binding declaration) by the deadline of March 31st, and three of them were confirmed by May 31st: 1) MPEG4 HE-AAC codec ("aacPlus") for low and high bit-rate range proposed jointly by Coding Technologies and NEC, 2) Coding Technologies codec ("Enhanced aacPlus") for low and high bit-rate range, and 3) Ericsson, Nokia and VoiceAge unique AMR-WB+ candidate codec for low bit-rate range; provisionally to its selection within the AMR-WB+ Work Item. As agreed earlier, combined testing for PSS/MMS and AMR-WB+ will be performed for efficient testing (to save time and testing effort). Time plan has been updated targeting tests for September-October and PSS/MMS default audio codec selection at SA4#29 (November).

Speech Recognition and Speech Enabled Services: Codec Work to Support Speech Recognition Framework for Automated Voice Services: Permanent document on Test and Processing Plan has been now finalised. The remaining document on Recommendation Criteria has been progressed but not yet finalised. The proposed codecs are: 1) AMR and AMR-WB proposed by Ericsson and Nokia and 2) DSR advanced front-end and its extension proposed by Alcatel, France Telecom and Motorola. Two ASR vendors, IBM and SpeechWorks, will conduct the codec testing on voluntary basis. The five companies proposing candidate codecs will share the cost of purchase of databases for the testing, and ETSI will manage the transfer of money (11 kEuros in total). Codec evaluations will start in July and will be completed within 3 months. Time Plan has been updated targeting codec recommendation at SA4#29.

New WIDs

Two new WIDs are brought for approval: 1) Media Codecs and Formats for IMS Messaging and Presence, 2) MBMS Codecs and Protocols.

Maintenance of releases

CRs to TSs 26.104 (Rel-4, Rel-5), 26.111 (R99, Rel-4, Rel-5), 26.173 (Rel-5), 26.234 (Rel-4, Rel-5), 26.235 (Rel-6) and 26.236 (Rel-5) are brought for approval.

Note: Annex 1 (in separate file) contains slides presentation of the status report.

TSG-SA WG4 Status Report at TSG-SA#20 - Table of Contents

1. General issues

This document gives the status report of TSG-SA WG4 (SA4) at TSG-SA#20. Slides presentation of the report is found in a separate file attached to the status report: "Annex 1 - SA4 Slides Presentation at TSG-SA#20.ppt".

1.1 Officials

There have been no changes to SA4 officials:

Chairman: Kari Järvinen   (Nokia / ETSI)

Vice Chairman: Tomoyuki Ohya   (NTT DoCoMo / ARIB)

Secretary: Paolo Usai   (3GPP Support)

SWG Chairmen:

SQ (Speech Quality):   Paolo Usai (ETSI)

PSM (Packet Switched Multimedia): Rolf Hakenberg (Panasonic / ETSI)

SA4 Vice Chairmen election will take place at the next SA4 meeting (SA4#27 in July).

Audio codec issues (of WIs PSS Rel-6 and AMR-WB+) have been progressed jointly in audio codec ad-hoc group. Imre Varga (Siemens / ETSI) has been chairing this ad-hoc group. The group met during SA4#26 and has also had two meetings outside SA4 plenary meetings.

1.2 Meetings

Since TSG-SA#19, SA4 has held one plenary meeting (in May). In addition, one ad-hoc meeting of SQ SWG on Speech Enabled Services (SES) codecs was held (in April). Also, two ad-hoc meetings on audio codecs were held (in April and June).

Meetings held:

SQ SWG ad-hoc meeting on SES Codecs	April 1-2	Host: Motorola; Venue: Basingstoke, UK.
Ad-hoc meeting on Audio Codecs #1	April 7-9	Host: Ericsson; Venue: Kista, Sweden
SA4#26	May 5-9	Host: France Telecom and NEC; Venue: Paris
Ad-hoc meeting on Audio Codecs #2	June 2-4	Host: Coding Technologies; Venue: Nuremberg, Germany

Calendar of future meetings:

SA4#27	July 7 – 11	Host: Siemens; Venue: Munich, Germany
SA4#28	Sept 1 – 5	Host: tbd; Venue: tbd
SA4#29	Nov 24 – 28	Host: tbd; Venue: tbd

During SA4#26, the PSM and SQ SWGs and the audio codec ad-hoc group met. Table 1 gives statistics from the SA4#26 meeting (including also statistics from two previous SA4 meetings for comparison).

Meeting	Number of (new) input documents	Number of participants	Number of incoming LSs	Number of outgoing LSs/communications
SA4#25	115	55	13	9
SA4#25bis	164	50	14	11
SA4#26	**171**	**55**	**18**	**17**

Table 1: Statistics of recent SA4 meetings

1.3 Input documents from SA4

Table 2 contains a list of all SA4 input documents to TSG-SA#20 (Tdocs SP-030211 until SP-030219).

The SA4 status report is contained in Tdocs SP-030211. Annex 1 contains the slides presentation of the report. Two new WIDs (in Tdocs SP-030212 and SP-030213) and several CRs (in Tdocs SP-030214 until SP-030219) are brought for approval.

Tdoc	Title	Source	Agenda item	Document for
SP-030211	TSG S4 Status Report at TSG-SA#20	SA WG4 Chairman	7.4.1	Information
SP-030212	New Work Item Description on Media Codecs and Formats for IMS Messaging and Presence (Release 6)	SA WG4	7.4.3	Approval
SP-030213	New Work Item Description on Multimedia Broadcast/Multicast Service (MBMS) codecs and protocols (Release 6)	SA WG4	7.4.3	Approval
SP-030214	CRs to TS 26.104 - Correction on codec mode handling during DTX (Release 4 and Release 5)	SA WG4	7.4.3	Approval
SP-030215	CRs to TS 26.111 - Removal of Reference to TS 26.112 (R99, Release 4 and Release 5)	SA WG4	7.4.3	Approval
SP-030216	CR to TS 26.173 - MMS compatible input/output option for fixed-point AMR-WB source code (Release 5)	SA WG4	7.4.3	Approval
SP-030217	CRs to TS 26.234 - SMIL supported event types (Rel4 and Rel 5), and Correction to the Content Model of the SMIL Language Profile (Rel 5)	SA WG4	7.4.3	Approval
SP-030218	CR to TS 26.235 Handling of DTMF in IMS (Release 6)	SA WG4	7.4.3	Approval
SP-030219	CR to TS 26.236 - Examples of QoS profiles for conversational multimedia applications (Release 5)	SA WG4	7.4.3	Approval

Table 2: List of input documents to TSG-SA#20 from SA4

2. Remaining Release 5 work

TR 26.937 "RTP usage model" is the only remaining Rel-5 specification still to be produced in SA4. This non-critical TR brings additional information to characterise the PS Streaming Service (e.g., give statistics of traffic characteristics such as packet sizes and bit-rates) and also gives useful information on issues that service providers and manufacturers should be aware of (e.g., implications of chosen RTP packet sizes and impact of different rate control strategies for video streaming).

Version 1.2.0 of the TR was presented for information at TSG-SA#18 (in Tdoc SP-020683). It (or later versions) have been sent for review to relevant WGs. Latest draft version in SA4 is v.1.5.0 produced at SA4#26 (with section on robust handover management now included). Although intended already for approval at TSG-SA, SA4 prefers to continue complementing the TR based on comments that are now being received from the other WGs before it is brought for approval to TSG-SA. Discussion is ongoing e.g. with GERAN/GERAN2 and SA2 on transfer delay aspects and on handling of packets that are received late. SA4

view is that good quality cannot be obtained with only 95% of packets and therefore the remaining 5% (late packets not received within the negotiated 'Transfer Delay' QoS attribute) should not be dropped.

A finalised version of the TR can be expected for approval at one of the next TSG-SA meetings.

3. Release 6 Work Items

3.1 Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications

The objective of this Work Item is to characterize the performance of default codecs for PS conversational multimedia applications. The codecs are defined in TS 26.235 ("Packet Switched Conversational Multimedia Applications; Default Codecs"). Budget "up to 194 kEuro" has been allocated for this exercise (160 kEuro allocated by 3GPP PCG and the contingency of 34 kEuro left from the AMR-WB Characterisation Phase). Test plan is under preparation in SA4. Conversational (bi-directional) testing will be used to realistically capture the quality (and degradations) experienced during conversations via the PS domain. Uni-directional listening-only tests have been used in previous codec characterisations (described in the existing codec performance characterisation TRs of 26-series).

Testing procedures have been progressed at SA4#26. Test plan is currently being drafted by correspondence for the experiments on AMR-NB and AMR-WB codecs and it is targeted to be finalised at SA4#27 (July). Testing would then be conducted in September-October time frame enabling the TR on Performance Characterisation to be ready by TSG-SA#22 (December). Guidance has been asked from RAN2, TSG-RAN and TSG-CN on the use of appropriate RABs and RAB parameters, ranges of packet loss and delay values to be employed for the end-to-end conversational tests.

Depending on the decisions at TSG-SA#20, the characterisation tests will contain only IPv6 or both IPv6 and IPv4 (with some test cases for each). (At TSG-SA#19, CN3 and SA2 were asked - in the context of Tdoc TD SP-030073 – to consider any potential limitations with the current decision to allow only IPv6 for access to IMS; the issue to be further discussed at TSG-SA#20.)

The UMTS air interface and network simulations for the characterisation testing will be provided by Siemens and France Telecom. (Siemens will provide air interface simulator for end-to-end mobile-to-mobile conversation in collaboration with France Telecom. France Telecom will provide the core network simulator.) Interest to take part in the testing exercise to carry out conversational tests (on commercial basis) has been communicated from ARCON, France Telecom, Nokia and NTT-AT.

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

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
New TR 26.9yz	Performance characterization of default codecs for PS conversational multimedia applications	SA4	-	Development of test plan and definition of experimental conditions ongoing.	TSG-SA#22 (Dec 2003)

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

3.2 Packet Switched Streaming Rel-6 (excluding consideration of new audio codecs)

Rel-6 streaming has been discussed further: e.g., reliable streaming, rate adaptation, quality metrics and audio codecs. (For work on audio codecs see the dedicated next section.) On server file format, a working assumption was agreed already earlier. The general principles for bit-rate adaptation have now been established, but no specific solution could yet be agreed on. Preparation of a permanent document on PSS quality metrics was started to guide the SA4 internal work. Graphic formats with extended properties have been discussed and SA4 has liaised with W3C to get feedback on SA4 requirements (e.g. compact binary representations, extended functionality for interactivity e.g. for user interaction) and detailed information of the status and content of future releases of W3C Scalable Vector Graphics (SVG).

In addressing the requirement for reliable transport (in TS 22.233 Stage 1), SA4 has been investigating several techniques. Progressive download is seen viable to meet the requirement and was agreed to be included as an optional element to PSS Rel-6, but the details still need to be worked out. Other methods (streaming RTP over TCP, and streaming RTP over UDP with Ack/Nack based retransmission) are under investigation as they may have advantages for some use cases. To study this further, SA4 has requested further information from SA1 of the intended use cases for reliable transport.

SA4 agreed earlier to split TS 26.234 in Rel-6 into four separate dedicated TSs. Initial working drafts of all the

new TSs have now been prepared: TSs 26.234 "Protocols and codecs" (definition of default codecs for each media type and definition of streaming protocols), 26.244 "File format" (definition of a common download file format for service interaction with other 3GPP multimedia delivery services e.g. MMS), 26.245 "Timed text format" (definition of the format of timed text in downloaded files), and 26.246 "SMIL Language Profile" (definition of the format for scene description, i.e., description of the spatial layout and temporal behaviour of a presentation).

LS was received from OMA DRM+DL proposing cooperation with SA4 in DRM protection of streamed PSS content in accordance with the OMA DRM v2 and 3GPP PSS Rel-6 standards. OMA DRM+DL sees coordination of both specifications beneficial. Therefore, they presented requirements for streaming to obtain efficient DRM protection of PSS streams (e.g., by including DRM specific headers and media types for the PSS file format, and signal DRM specific headers within SDP) and asked SA4 to consider these for Rel-6 PSS. SA4 agreed that the proposed coordination is needed and is useful. The requirements from OMA were seen fitting well into SA4 objectives for PSS Rel-6.

Table 4 lists the intended PSS Rel-6 output specifications (including Stage 1 and Stage 2 since also these are covered in the SA4 lead PSS Rel-6 Work Item).

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.233	Transparent end-to-end packet switched streaming service; General description	SA4	SA2	To be updated based on the content of PSS Rel-6.	TSG-SA#22 (Dec 2003)
CRs to TS 26.234	Transparent end-to-end packet switched streaming service; Protocol and codecs	SA4	SA2	Rel-5 TS 26.234 will be split in Rel-6 into four dedicated PSS TSs: TSs 26.234, 26.244, 26.245 and 26.246. Initial working drafts of all exist in SA4.	TSG-SA#22 (Dec 2003)
New TS 26.244	Transparent end-to-end packet switched streaming service; File Format	SA4	SA2	Initial working draft exists in SA4	TSG-SA#22 (Dec 2003)
New TS 26.245	Transparent end-to-end packet switched streaming service; Timed Text Format	SA4	SA2	Initial working draft exists in SA4	TSG-SA#22 (Dec 2003)
New TS 26.246	Transparent end-to-end packet switched streaming service; SMIL Language Profile	SA4	SA2	Initial working draft exists in SA4	TSG-SA#22 (Dec 2003)
CRs to TS 22.233	Stage 1	SA1		Under SA1 responsibility.	
Possible new TS	Stage2 (non-transparent aspects), to be produced by SA2, if needed	SA2		To be produced by SA2, if needed.	

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

3.3 Audio Codecs (PSS/MMS default audio codecs, and extended AMR-WB codec)[1]

Since TSG-SA#19, the deadline for (non-binding) declaration to submit a candidate codec (for PSS/MMS default audio codec and AMR-WB+ codec) has passed. Altogether six candidates were declared by the deadline of March 31st.

At SA4#26, in order to elaborate the experiments to be included in the selection "Test and Processing Plans", and to determine the funding that would be required, the number of candidates was requested to be determined. Therefore, a further (binding) deadline was agreed requiring confirmation of the candidates by May 31st.

The list of confirmed candidates for PSS/MMS default audio codec is:

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[1] This section reports jointly the audio codec work done within "PSS Rel-6" WI on audio codecs for PSS (and MMS) and the work done for developing AMR-WB+ codec under "Extended AMR-WB codec" WI. The work in both WIs is related as the AMR-WB+ codec is considered as one candidate for PSS/MMS default audio codec, and (as agreed at SA4#25bis) the testing of codec candidates for both WIs will be carried out as combined testing. As discussed in Sections 1.1 and 1.2, the detailed audio codec work for both WIs has been progressed jointly in audio codec ad-hoc group.

1) MPEG4 HE-AAC codec ("aacPlus") (for low and high bit-rate range) proposed jointly by Coding Technologies and NEC

2) Coding Technologies codec ("Enhanced aacPlus") (for low and high bit-rate range)

3) Ericsson, Nokia and VoiceAge unique AMR-WB+ candidate codec (for low bit-rate range) provisionally to its selection within the AMR-WB+ Work Item.

Two PSS/MMS default audio codec candidates withdrew their participation: Dolby codec (for high bit-rate range) and Philips codec (for low and high bit-rate range). MPEG4 AAC is not in the list of candidates (for high bit-rate range) anymore but will be included instead in the selection tests as a reference codec.

All codec proponents have declared whether their candidate is to be considered for the low or high bit-rate audio range (as seen above). The low bit-rate audio range (12 kbit/s to < 32 kbit/s) and high bit-rate audio range are tested in separate experiments. However, in order to allow some flexibility in defining the exact breaking point between the low and high bit-rate range (should this division become necessary in TS 26.234), an area of overlap of the two bit-rate ranges between 24 kbit/s and 32 kbit/s was agreed for the selection tests. This is achieved by testing the bit-rate of 24 kbit/s for both the low and the high bit-rate range. The low bit-rate range is intended for speech, music and mixed content, while the high bit-rate range is intended specifically for music.

The set of permanent documents[2] has been progressed. The documents on Design Constraints and Performance Requirements have been finalised for both PSS/MMS audio codecs and AMR-WB+. Test and Processing Plans were progressed at SA4#26 in May and further at audio codec ad-hoc meeting #2 in early June (with SA4#26 agreed decision powers to approve the finalised versions). However, more work is needed to finalise the Test and Processing Plans.

As agreed earlier, codec testing for both PSS/MMS and AMR-WB+ is combined for efficient testing (to save time and testing effort). Therefore, the test plan for AMR-WB+ and PSS/MMS Low-Rate Audio Codec Selection is common.

The status of audio codec permanent documents is as follows:

- AMR-WB+ Design Constraints (finalised at Audio codec ad-hoc meeting #1)
- AMR-WB+ Performance Requirements (finalised at SA4#26)
- PSS/MMS Audio Codec Selection, Design Constraints and Performance Requirements (finalised at SA4#26)
- AMR-WB+ and PSS/MMS Low-Rate Audio Codec Selection Test and Processing Plan (preparation ongoing with stable draft)
- PSS/MMS High-Rate Audio Codec Selection Test and Processing Plan (preparation ongoing with stable draft)
- PSS/MMS Audio Codec Selection Rules (discussion started)

The remaining documents (Processing and Test Plans, Selection Rules) will be progressed and (possibly) finalised at SA4#27 (July).

The agreed PSS/MMS audio codec performance requirements are highlighted in Table 5 for the low bit-rate range and in Table 6 for the high bit-rate range. At the low bit-rate range, performance "no worse than the better of AMR-WB and MPEG-4 AAC-LC" is required. (Thus performance has to be at least as good as with the best out of these two.) In one test case, performance has to be better. At the high bit-rate range, performance better than AAC-LC is required. The codecs are tested using floating point implementations.

Criteria	Performance Requirement	Performance Objective
Audio quality	No worse than the better of AMR-WB and MPEG-4 AAC-LC at the same bitrate in any test case based on the average performance over music, mixed content and speech, and better in at least one test case. Test cases covered shall be 14kbit/s mono, 18kbit/s stereo, 24kbit/s mono and 24kbit/s stereo	Maximum performance across all relevant bitrates and content types
Error Robustness	At 3% frame-loss rate no worse than the better of AMR-WB and MPEG-4 AAC-LC at the same bitrate and frame loss rate in any test case based on the	At 5% frame-loss rate no worse than the better of AMR-WB and MPEG-4 AAC-LC at the same bitrate and frame loss rate in any test case

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[2] Permanent documents are SA4 internal documents used to guide the development and selection of codecs, e.g., to define codec selection Test and Processing Plan, Design Constraints (limits for implementation complexity etc.) and Performance Requirements for speech/audio quality. These documents are updated in SA4 meetings under version control.

	average performance over music, mixed content and speech. Test cases covered shall be 14kbit/s mono and 24kbit/s stereo.	based on the average performance over music, mixed content and speech. Test cases covered shall be 14kbit/s mono and 24kbit/s stereo.

Table 5: PSS/MMS audio codec performance requirements (and objectives) for low bit-rates

Criteria	Performance Requirement	Performance Objective
Audio quality	Better than MPEG-4 AAC-LC in all test cases. Test cases are 24kbit/s mono, 24kbit/s stereo, 32kbit/s stereo and 48kbit/s stereo.	Maximum performance across all relevant bitrates and content types
Error Robustness	At 1% frame-loss rate no worse than MPEG-4 AAC-LC at the same frame loss rate, tested at 32 kbit/s stereo.	At 3% frame-loss rate no worse than MPEG-4 AAC-LC at the same frame loss rate, tested at 32 kbit/s stereo.

Table 6: PSS/MMS audio codec performance requirements (and objectives) for high bit-rates

The content types used in testing codecs at low bit-rate range are: speech (clean speech and speech with background noise), music (classical and popular music with and without vocals), mixed content 1 (speech over music) and mixed content 2 (speech in between music). Each content type consists of 25% of the overall content to be used in the tests. For the high bit-rate range, aimed specifically for music, the test content consists of music (containing both instrumental music and music with vocals).

In the PSS/MMS audio codec design constraints, the computational complexity of server-based PSS encoder is limited to 8 times the complexity of AMR-WB codec. A low-complexity encoder intended for MMS will also be specified with complexity limited to 2 (stereo) and 1.2 (mono) times that of AMR-WB codec. Decoder complexity is limited to 3 (mono) and 4 (stereo) times that of the AMR-WB decoder. Only one decoder version will be specified (interoperable with both encoder versions). (The complexity of floating point AMR-WB codec is about 39.0 WMOPS and AMR-WB decoder complexity is about 7.8 WMOPS.)

Time plan of PSS/MMS and AMR-WB+ codec development and specification has been revised targeting selection tests for September-October and codec selection at SA4#29 (November). The codec selection has been moved from SA4#28 (September) to allow sufficient time for the testing of the candidates. The main milestones for PSS/MMS audio codec selection (after SA4#26) are:

- End of May: confirmation of candidatures (for PSS/MMS default audio codec and AMR-WB+)
- Audio codec ad-hoc meeting #2 (on 2-4 June): Test and Processing Plans progressed
- SA4#28 (July) / SA4#29 (September): all remaining permanent documents finalised
- September-October 2003: selection tests ongoing
- SA4#29 (November): analysed selection test results available, draft specifications and other documentation from codec proponents (e.g. justification of having met Design Constraints), selection of default audio codec for PSS and MMS, finalisation of related TSs and CRs, start verification tests
- TSG-SA#22 (December): the audio codec selection and related specifications are brought for approval to TSG-SA.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to 26-series AMR-WB TSs/TRs	Relevant AMR-WB specifications of 26 –series	SA4	-	Codec specifications will be produced if AMR-WB+ will be defined for use in PSS/MMS.	TSG-SA#22 (Dec 2003)
New audio codec TS(s)		SA4	-	These will be produced if new codec specifications needed.	TSG-SA#22 (Dec 2003)
CRs to TS 26.234	Transparent end-to-end packet switched streaming service; Protocol and codecs	SA4	SA2	Default codec definition for the audio media type needs to be updated based on the selection of new audio codec(s).	TSG-SA#22 (Dec 2003)

Table 7: List of output TSs/TRs/CRs for audio codecs (for WIs "PSS Rel-6" and "Extended AMR-WB codec")

3.4 Speech Recognition and Speech Enabled Services: Codec Work to Support Speech Recognition

Framework for Automated Voice Services

SA4 has finalised Test and Processing Plan for comparing the candidate SES codecs, but more time is needed to finalise Recommendation Criteria. Recommendation Criteria is the only remaining SES permanent document. The status of the permanent documents is as follows:

- Design Constraints (finalised at SA4#25bis)
- Test and Processing Plan (finalised at SA4#26)
- Recommendation Criteria (under preparation)

Out of the three candidate codecs announced earlier for the selection (non-binding indication), Siemens has since TSG-SA#19 decided not to put forward a candidate. Therefore, the full list of codecs to be considered for the selection is:

1) AMR and AMR-WB codec (proposed by Ericsson and Nokia)
2) ETSI DSR standard ES 202 050 and its extension (proposed by Alcatel, France Telecom and Motorola)

Two Automatic Speech Recognition (ASR) vendors, IBM and SpeechWorks, will carry out the testing of the codec candidates on voluntary basis. The ASR vendors will conduct tests and will then report the results of their evaluations to SA4.

The recognition test experiments used in the codec evaluation cover a range of tasks: connected digit recognition task, sub-word trained model recognition task and tone confusability task. Testing will be done in error-free channel as well as under packet loss situations. The channel error experiments will cover average channel BLock Error Rates (BLER) of 1%, 3% and 10%. The BLERs of 1% and 3% will be used as part of the recommendation criteria while 10% is to be used for informative purposes. Testing will cover Error Patterns (EP) for UTRAN and EGPRS/GPRS channels. Each ASR vendor will run tests for both the AMR/AMR-WB codec and the ETSI DSR standard ES 202 050. ASR vendors have a free choice over the recogniser back-end configuration. The AMR modes of 4.75 and 12.2 are included in the tests for 8 kHz sampling rate test case, and AMR-WB modes 12.65 and 23.85 for 16 kHz sampling rate case.

Databases to be used in the testing include ones developed in ETSI Aurora, ones from companies in SA4, ones publicly available elsewhere and proprietary ones from ASR vendors. The databases contain connected digits, names, street names, organization names, commands and tonality confusability database (Mandarin Chinese names). Several languages will be covered including English, German, Italian, Japanese, Mandarin Chinese and Spanish. The five companies proposing the candidate codecs (Alcatel, Ericsson, France Telecom, Motorola and Nokia) share the cost of the purchase of the public domain speech databases (11000 Euros in total). Each company will contribute with equal share.

SA4#26 has requested ETSI to collect the contributions from the five funding companies and to ensure the transfer of the sum to the two ASR vendors. ETSI has carried out similar tasks in the past codec evaluations[3]. Once received the total funding, ETSI will transfer the money, and sign as well with both ASR vendors an NDA on the provision of results (complying with the SES test and processing plan approved at SA4#26). Approval at PCG level for this task was requested by PCG Secretary (by correspondence within Friday 23rd May, avoiding the need to wait until TSG-SA#20). The PCG Secretary then communicated to the SA4 Secretary that approval was granted, since no objections nor comments against this action were received.

SES codec Time Plan has been updated targeting codec recommendation to be made at SA4#29 (November) instead of SA4#28 (September) to allow sufficient time for the testing. Codec executables will be provided for testing to the ASR vendors in late July, and codec evaluations will then be completed within 3 months. The main milestones (after SA4#26) are:

- June: error patterns available, completion of NDAs associated with data and software to be exchanged, databases delivered to ASR vendors
- Late July: codec executables delivered to ASR vendors, ASR vendors start testing
- SA4#28 (July) / SA4#29 (September): the remaining permanent document on Recommendation Criteria finalised
- End of October: test results available from ASR vendor evaluations, fixed point complexity assessment and documentation available from codec proponents (e.g. justification of having met the Design Constraints)
- SA4#29 (November): analysed results from tests available, make recommendation of SES

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[3] A similar action for ETSI is foreseen also for the AMR-WB+ and PSS/MMS default audio codec selection (and characterisation) tests. In this case, formal contracts between ETSI and the subjective testing/processing laboratories are also needed, since the laboratories will work on "commercial" and not on "voluntary" basis. Approval of this task for audio codecs is foreseen to be requested at PCG level (by correspondence) avoiding the need to wait until TSG-SA#21.

- codec, finalisation of related specifications
  - TSG-SA#22 (December): the SES codec selection and related specifications are brought for approval to TSG-SA.

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.235	Packet Switched Conversational Multimedia Applications; Default Codecs	SA4	SA2, T2	To be prepared based on the codec selection.	TSG-SA#22 (Dec 2003)
CRs to TS 26.236	Packet Switched Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	To be prepared based on the codec selection	TSG-SA#22 (Dec 2003)
Possible new TSs	Codec specification	SA4		To be prepared, if needed.	TSG-SA#22 (Dec 2003)

Table 8: Status list of output TSs/TRs/CRs for Codec Work to Support Speech Recognition Framework for Automated Voice Services

4. New Work Items

4.1 New WID on "Media Codecs and Formats for IMS Messaging and Presence" (Release 6)

The architecture aspects of enhanced IMS services are being specified in SA2. SA2 has explained to SA4 that the relevant 3GPP WGs should now study the content format issues for content delivered in SIP message bodies (e.g. for Presence and Messaging) and, therefore, requested SA4 to start to define codecs and media formats for IMS Messaging and Presence type of content exchange.

SA2 Secretary has informed off-line the SA4 Secretary that SA2 would prefer SA4 to raise a new WID on this work (instead of carrying out the work under existing WIs). Consequently, SA4 brings a new WID on this for approval in Tdoc SP-030212.

4.2 New WID on "Multimedia Broadcast/Multicast Service (MBMS) Codecs and Protocols" (Release 6)

Several LSs have been exchanged on MBMS codecs and on the role of SA4 in the overall MBMS work. SA2 has confirmed that the ownership of data types, application level signalling and transport protocol definition is in SA4. With this background SA4 brings a new WID on "MBMS Codecs and Protocols" now for approval in Tdoc SP-030213.

SA4 would like to point out that the SA4 work and progress in MBMS is to a large extent subject to a deep understanding of MBMS use cases and architecture and is dependent on the work still under progress in other WGs, and especially on the stability and schedule of Stage 2 (from SA2) and the relevant RAN and GERAN MBMS-specifications. SA4 believes that the specification on SA4 part (MBMS codecs and protocols) could be completed about 3-6 months after the related Stage 2, RAN and GERAN specifications (stable versions) are available.

SA4#26 felt that a joint ad-hoc meeting on MBMS use cases and application architecture and other codec related aspects with relevant WGs (at least SA1 and SA2, maybe RAN2, RAN3, GERAN2 and others interested) would be useful for the MBMB codecs work. This would provide a better way into definition of the codecs and related protocols in co-operation with the relevant WGs than what can be expected to be achieved through LS exchange procedure. SA4 Chairman was tasked to contact the relevant WG Chairmen to try to find out possibilities and if there is interest in the relevant WGs to organise such a joint meeting.

5. Communication with other WGs/groups

Table 9 lists all LSs sent to other WG/groups since TSG-SA#19.

The communication includes the following issues:
- feedback and related discussion on draft TR 26.937 "RTP Usage Model"
- discussion on MBMS (characteristics of MBMS bearers, use of RTCP signalling for MBMS etc.)
- discussion on possible improvements to requirements and test signals for terminal acoustic characteristics in TSs 26.131 and 26.132 (with GCF UTRA Agreement Group)
- request to ISMA to send their specifications on content protetion for review

- two new SA4 draft WIDs (as a result of earlier LS communication) sent for information to the relevant WGs
- discussion concerning the usage of maximum SDU size (UMTS bearer attribute)
- request for information from W3C SVG working group on status of Scalable Vector Graphics mobile profile
- favourable responses to requests for actions from other groups: CN1 request to include also example cases using IPv6 into TS 26.236 (Rel-5 onwards), CN3 request to specify MIME type and RTP payload for DTMF in TS 26.235 (Rel-6), OMA DRM+DL request for coordination of PSS Rel-6 and OMA DRM specifications
- request to SA1 to clarify some PSS Rel-6 Stage 1 issues: use cases of reliable transport, and inclusion of Content Cache

Tdoc no.	Title	Intended for	Copy to
TD S4-030362	Reply to LS on "Meaning of the 'transfer delay' QoS attribute for packet-switched streaming bearers"	GERAN WG2	TSG SA WG2
TD S4-030363	Reply to LS on "Further discussion on the meaning of the Transfer Delay QoS parameter for Streaming services"	TSG GERAN	TSG SA WG2
TD S4-030392	Reply LS on Audio Test Signals, re: TS 26.132, TC 7.8.1	GCF UTRA Agreement Group (UAG)	
TD S4-030412	Liaison Statement on Content Protection	ISMA	OMA
TD S4-030413	Liaison response On Minimum UE Capability Required for supporting MBMS	TSG SA WG2	TSG RAN WG1, TSG RAN WG2, GERAN WG1, GERAN WG2, TSG SA WG1
TD S4-030388	Liaison Response on RTCP signalling in MBMS	TSG RAN WG2	TSG SA WG2, TSG RAN WG3
TD S4-030418	Reply LS on media codecs and formats for Presence and Messaging	TSG SA WG2	TSG CN WG1
TD S4-030364	Reply to "Reply LS on Radio Access Bearer for PS conversational testing"	TSG CN WG1	TSG RAN WG2, GERAN WG2
TD S4-030415	Reply to "Reply to Liaison Statement on MBMS Codec Requirements"	TSG SA WG2	TSG SA WG1, TSG SA WG3, TSG SA WG5, TSG RAN WG2, TSG RAN WG3, GERAN WG1, GERAN WG2, TSG CN WG1
TD S4-030361	Reply to "Reply to LS on <Meaning of the 'transfer delay' QoS attribute for packet-switched streaming bearers>"	TSG SA WG2	GERAN WG2
TD S4-030419	Liaison response on LS on Protocols, Codecs and Media formats for MBMS	TSG SA WG3	TSG SA WG1, TSG SA WG2
TD S4-030366	LS on DRM Content Format	OMA DRM+DL	TSG SA WG3
TD S4-030384	Reliable Transport: Status Update and Clarification on Use Cases	TSG SA WG1	
TD S4-030420	Reply to "LS on Usage of UMTS Bearer Service attribute Maximum SDU size"	TSG SA WG2, TSG RAN WG2, TSG RAN WG3, GERAN WG2	
TD S4-030426	LS on implications of Content Cache Language in TS 22.233	TSG SA WG1	TSG SA WG2
TD S4-030427	Reply Liaison Statement on Handling of DTMF in IMS	TSG CN WG3	TSG CN WG1
TD S4-030429	LS on SVG requirements	W3C SVG working group	

Table 9: SA4 LSs sent out since TSG-SA#19

6. Miscellaneous

- On the LS "Additional Release 5 work needed for Policy Control and Subscription Control of Media" (in Tdoc SP-020839), the conclusion as explained in TSG-SA#19 remains: SA4 has not identified any essential changes needed to SA4 specifications. The specification TS 26.235 "Packet Switched Conversational Multimedia Applications; Default Codecs (Release 5)" defines the default multimedia codecs to be used within 3GPP specified IP Multimedia Subsystem. (Confirmation that no SA4 work is expected has been communicated by SA4 Chairman to the contact person of the LS.)

- Tdoc S4-030282 "CR to TS 26.233 on Declaration of Content Cache" was postponed from SA4#26 until next meeting since SA4 noted that the corresponding CR to State 1 TS 22.232 (approved earlier by SA1 and TSG-SA) results in an architectural change that may require PSS Rel-6 to become a

non-transparent service. As such, it may result into substantial new PSS work, and could impact the schedule of PSS work. Therefore, a LS was sent to SA1 (Cc: SA2) asking feedback on if architectural change was intended by the definition of content cache network element in Stage 1.

- As requested at TSG-SA#19, SA4 work related to the work in OMA has been identified and reported to TSG-T Vice Chairman to collate inputs for TSG-SA#20. The only clear OMA relationship has been identified in PSS where OMA DRM is expected to be used in Rel-6 specifications. (Coordination of OMA DRM and 3GPP PSS specifications has been started between OMA DRM+DL and 3GPP SA4 as described in Section 3.2.)

7. Maintenance of Releases

CRs to TSs 26.104 (Rel-4, Rel-5), 26.111 (R99, Rel-4, Rel-5), 26.173 (Rel-5), 26.234 (Rel-4, Rel-5), 26.235 (Rel-6) and 26.236 (Rel-5) are brought for approval. These are contained in Tdocs SP-030214 until SP-030219.

Most of the CRs are for Rel-5. There are also some CRs concerning Rel-4 and one for R99 (CR 007 to TS 26.111 in Tdoc SP-030215); these are felt needed to ensure correct and faultless operation.

The following tables summarise the content of the CR Tdocs:

Tdoc SP-030214 CRs to TS 26.104 "ANSI-C code for the floating-point AMR speech codec"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.104	025		Rel-4	Correction on codec mode handling during DTX	F	4.4.0	S4	TSG-SA WG4#26	S4-030340
26.104	026		Rel-5	Correction on codec mode handling during DTX	A	5.1.0	S4	TSG-SA WG4#26	S4-030341

These correct a bug in the floating-point code. Due to the bug the floating-point code gives poor comfort noise performance and also deviates from the fixed-point version.

Tdoc SP-030215 CRs to TS 26.111 "Codec for circuit switched multimedia telephony service; Modifications to H.324"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.111	007	1	R99	Removal of Reference to TS 26.112	F	3.4.0	S4	TSG-SA WG4#26	S4-030423
26.111	008	1	Rel-4	Removal of Reference to TS 26.112	A	4.0.0	S4	TSG-SA WG4#26	S4-030424
26.111	009	1	Rel-5	Removal of Reference to TS 26.112	A	5.0.0	S4	TSG-SA WG4#26	S4-030425

Currently TS 26.111 states that call set-up procedures for CS multimedia telephony service are given in TS 26.112. However, such a TS does not exist. This incorrect reference in the specification has caused confusion and waste of time for implementers, and may potentially result in incorrect implementations. Therefore, SA4 sees that it should be corrected.

Tdoc SP-030216 CR to TS 26.173 "ANSI-C code for the Adaptive Multi Rate (AMR) Wideband speech codec"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.173	017	1	Rel-5	MMS compatible input/output option for fixed-point AMR-WB source code	F	5.6.0	S4	TSG-SA WG4#26	S4-030400

Optional input/output format is included into the C-code to enable AMR-WB fixed-point code to cope with speech data using MIME file storage format. This format is used by MMS, for which AMR-WB codec is specified to be supported (for wideband speech working at 16 kHz sampling frequency). This optional input/output format has already earlier been included into the floating-point version of the AMR-WB codec (CR 004 to TS 26.204 in Tdoc SP-030090) and, therefore, this CR also aligns these two code versions.

Tdoc SP-030217 CRs to TS 26.234 "PSS; Protocols and codecs"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.234	059		Rel-4	Correction to SMIL supported event types	F	4.5.0	S4	TSG-SA WG4#26	S4-030283
26.234	058	1	Rel-5	Correction to SMIL supported event types	A	5.4.0	S4	TSG-SA WG4#26	S4-030401
26.234	060		Rel-5	Correction to the Content Model of the SMIL Language Profile	F	5.4.0	S4	TSG-SA WG4#26	S4-030288

These correct errors in the supported event types and content models in Synchronised Multimedia Integration

Language (SMIL).

Tdoc SP-030218 CR to TS 26.235 "Packet switched conversational multimedia applications; Default Codecs"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.235	005	1	Rel-6	Handling of DTMF in IMS	C	5.1.0	S4	TSG-SA WG4#26	S4-030402

On the request of CN3, the usage of MIME type format for DTMF is specified. (The "telephone event" MIME type and the RTP payload as specified in RFC 2833 are recommended for DTMF.)

Tdoc SP-030219 CR to TS 26.236 "Packet switched conversational multimedia applications; Transport protocols"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.236	005		Rel-5	Examples of QoS profiles for conversational multimedia applications	F	5.2.0	S4	TSG-SA WG4#26	S4-030382

Examples for mapping of SDP parameters to UMTS QoS parameters are included for IPv6 also. (Previously only IPv4 headers were considered.)

8. Approval requested

SA4 requests TSG-SA#20 to approve the following:

Work Item Descriptions:

Tdoc SP-030212   New Work Item Description on Media Codecs and Formats for IMS Messaging and Presence (Release 6)

Tdoc SP-030213   New Work Item Description on Multimedia Broadcast/Multicast Service (MBMS) Codecs and Protocols (Release 6)

Change Requests:

Tdoc SP-030214   CRs to TS 26.104 - Correction on codec mode handling during DTX (Release 4 and Release 5)

Tdoc SP-030215   CRs to TS 26.111 - Removal of Reference to TS 26.112 (R99, Release 4 and Release 5)

Tdoc SP-030216   CR to TS 26.173 - MMS compatible input/output option for fixed-point AMR-WB source code (Release 5)

Tdoc SP-030217   CRs to TS 26.234 - SMIL supported event types (Release 4 and Release 5), and Correction to the Content Model of the SMIL Language Profile (Release 5)

Tdoc SP-030218   CR to TS 26.235 Handling of DTMF in IMS (Release 6)

Tdoc SP-030219   CR to TS 26.236 - Examples of QoS profiles for conversational multimedia applications (Release 5)

Annex 1: Slides Presentation (in attached file)

Slides presentation of the report is found in a separate file attached into the status report:

☞ "Annex 1 - SA4 Slides Presentation at TSG-SA#20.ppt".

TSG-SA WG4 (SA4) - CODEC

Status Report at TSG-SA#20

Kari Järvinen
TSG-SA WG4 Chairman

☞ *These slides: Annex 1 of the status report (Tdoc SP-030211)*

Content

- **General issues**

- **Review of SA4 work progress**
  - **Release 5**
  - **Release 6**

- **Proposed New Work Items**

- **Approval requested**

General: SA4 officials

- **Chairman:**   **Kari Järvinen (Nokia / ETSI)**

- **Vice Chairman:**   **Tomoyuki Ohya (NTT DoCoMo / ARIB)**

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

- **Sub Working Groups:**
  - Speech Quality (SQ)   Paolo Usai (ETSI)
  - Packet Switched Multimedia (PSM)   Rolf Hakenberg (Panasonic / ETSI)

- **Audio codec issues (of WIs "PSS Rel-6" and "Extended AMR-WB codec") have been progressed jointly in audio codec ad-hoc group:**
  - Audio codec ad-hoc group   Imre Varga (Siemens / ETSI)

- **SA4 Vice Chairmen election will take place at the next SA4 meeting (SA4#27 in July).**

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General: SA4 meetings

- **Meetings held**
  - SQ SWG ad-hoc meeting on SES Codecs   April 1-2   Host: Motorola; Venue: Basingstoke, UK.
  - Ad-hoc meeting on Audio Codecs #1   April 7-9   Host: Ericsson; Venue: Kista, Sweden
  - SA4#26   May 5-9   Host: France Telecom and NEC; Venue: Paris
  - Ad-hoc meeting on Audio Codecs #2   June 2-4   Host: Coding Technologies; Venue: Nuremberg, Germany

- **Calendar of future meetings**
  - SA4#27   July 7-11   Host: Siemens; Venue: Munich, Germany
  - SA4#28   Sept 1-5   Host: tbd; Venue: tbd
  - SA4#29   Nov 24-28   Host: tbd; Venue: tbd

- **Meeting statistics**

Meeting	Number of (new) input documents	Number of participants	Number of incoming LSs	Number of outgoing LSs/communications
SA4#25	115	55	13	9
SA4#25bis	164	50	14	11
SA4#26	**171**	**55**	**18**	**17**

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General: Input documents

Tdoc	Title	Source	Agenda item	Document for
SP-030211	TSG S4 Status Report at TSG-SA#20	SA WG4 Chairman	7.4.1	Information
SP-030212	New Work Item Description on Media Codecs and Formats for IMS Messaging and Presence (Release 6)	SA WG4	7.4.3	Approval
SP-030213	New Work Item Description on Multimedia Broadcast/Multicast Service (MBMS) codecs and protocols (Release 6)	SA WG4	7.4.3	Approval
SP-030214	CRs to TS 26.104 - Correction on codec mode handling during DTX (Release 4 and Release 5)	SA WG4	7.4.3	Approval
SP-030215	CRs to TS 26.111 - Removal of Reference to TS 26.112 (R99, Release 4 and Release 5)	SA WG4	7.4.3	Approval
SP-030216	CR to TS 26.173 - MMS compatible input/output option for fixed-point AMR-WB source code (Release 5)	SA WG4	7.4.3	Approval
SP-030217	CRs to TS 26.234 - SMIL supported event types (Rel4 and Rel 5), and Correction to the Content Model of the SMIL Language Profile (Rel 5)	SA WG4	7.4.3	Approval
SP-030218	CR to TS 26.235 Handling of DTMF in IMS (Release 6)	SA WG4	7.4.3	Approval
SP-030219	CR to TS 26.236 - Examples of QoS profiles for conversational multimedia applications (Release 5)	SA WG4	7.4.3	Approval

Release 5: Remaining Rel-5 work

- **TR 26.937 (RTP usage model) is the only remaining Rel-5 specification**

  - This "non-critical" TR brings additional information to characterise PSS (e.g., statistics of traffic characteristics such as packet sizes and bit-rates) and gives useful information on issues that service providers and manufacturers should be aware of (e.g., implications of chosen RTP packet sizes and impact of different rate control strategies for video streaming)

  - Version 1.2.0 presented for information at TSG-SA#18. Draft versions under review in other WGs. Latest draft version in SA4 is v.1.5.0

  - Although intended for approval at TSG-SA#19, SA4 prefers to complement the TR based on comments that are now being received from the other groups (e.g. GERAN2, SA2) before it is brought for approval to TSG-SA

  - A finalised version could be expected for approval at one of the next TSG-SA meetings

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Release 6: SA4 WIDs

- **Performance Characterisation of Default Codecs for PS Conversational Multimedia Applications**

- **Packet Switched Streaming (PSS) Rel-6**
    - **Non audio codec issues**
    - **Definition of default audio codec**

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

- **Speech Recognition and Speech Enabled Services: Codec Work to Support Speech Recognition Framework for Automated Voice Services ("SES Codecs")**

Performance Characterisation of Default Codecs for PS Conversational Multimedia applications

- **The objective is to characterize the performance of default codecs for PS conversational multimedia applications (as defined in TS 26.235 "Default Codecs"). Budget "up to 194 kEuro" allocated (160 kEuro allocated by 3GPP PCG and the contingency of 34 kEuro left from the AMR-WB Characterisation).**

- **Conversational (bi-directional) testing will be used to realistically capture the quality (and degradations) experienced during conversations. Uni-directional listening-only tests used in previous codec characterisations (in the 26-series TRs).**

- **The network and air-interface simulators will be provided by Siemens and France Telecom.**

- **Guidance requested from RAN2, TSG-RAN and TSG-CN on the use of appropriate RABs and RAB parameters, ranges of packet loss and delay values to be used in the tests.**

- **Test methods and procedures further debated in SA4#26. Test plan is being drafted by correspondence. Finalisation targeted at SA4#27 (July).**

Performance Characterisation of Default Codecs for PS Conversational Multimedia applications

- **Depending on the decisions at TSG-SA#20, the tests will contain only IPv6 or both IPv6 and IPv4 (with some cases for each).**

- **Interest to take part in the subjective testing (on commercial basis) from ARCON, France Telecom, Nokia, NTT-AT.**

- **Testing in September-October enabling the TR on Performance Characterisation to be ready by TSG-SA#22 (December).**

- **Output specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
New TR 26.9yz	Performance characterization of default codecs for PS conversational multimedia applications	SA4	-	Development of test plan and definition of experimental conditions ongoing.	TSG-SA#22 (Dec 2003)

Packet Switched Streaming (PSS) Rel-6

- **The work addresses more advanced PSS aspects (over Rel-5 Streaming). SA4 is discussing enhancements e.g:**
  - Quality metrics (for servers to receive from the handset on client experience)
  - Server file formats (to provide easy interoperability between Content Creators and Service Providers)
  - Bit-rate adaptation (e.g., for network bandwidth variability and service interruptions)
  - Robust handover mechanisms
  - Reliable streaming (e.g., transmitting using TCP (RTP/TCP) instead of UDP (RTP/UDP) protocol)
  - Consideration of new codecs

- **On some of the above, a working assumption has been agreed. Details still under study.**
  - On server file format, working assumption was agreed already earlier.
  - General principles for bit-rate adaptation now established, but no specific solution yet agreed on.
  - Preparation of a permanent document on PSS quality metrics started (to guide the SA4 internal work).
  - SA1 being asked for information of use cases for reliable transport. (Progressive download, streaming RTP over TCP, and streaming RTP over UDP with Ack/Nack based retransmission under consideration in SA4.)
  - Graphic formats discussed; SA4 has liaised with W3C to get feedback on SA4 requirements (e.g., compact binary representations, extended functionality for interactivity for user interaction) and request more information of the status and content of future releases of W3C Scalable Vector Graphics (SVG)
  - Selection process for default audio codec for PSS (and MMS) ongoing - status described in detail later.

- **TS 26.234 in Rel-6 split into four separate TSs: Initial working drafts of all prepared (TSs 26.234 "Protocols and Codecs", 26.244 "File Format", 26.245 "Timed Text Format" and 26.246 "PSS SMIL Language Profile").**

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Packet Switched Streaming (PSS) Rel-6

- **LS received from OMA DRM+DL proposing coordination of OMA DRM and 3GPP PSS Rel-6 specifications**
    - OMA suggested some requirements for PSS Rel-6 from DRM point of view as needed for efficient DRM protection for PSS streams (e.g., to include DRM specific headers and media types for the PSS file format, and signal DRM specific headers within SDP in PSS).
    - OMA requests seen fitting well into overall SA4 work and objectives for PSS Rel-6. SA4 responded favourably to the proposed coordination.

- **The intention is to finalise specifications by TSG-SA#22**

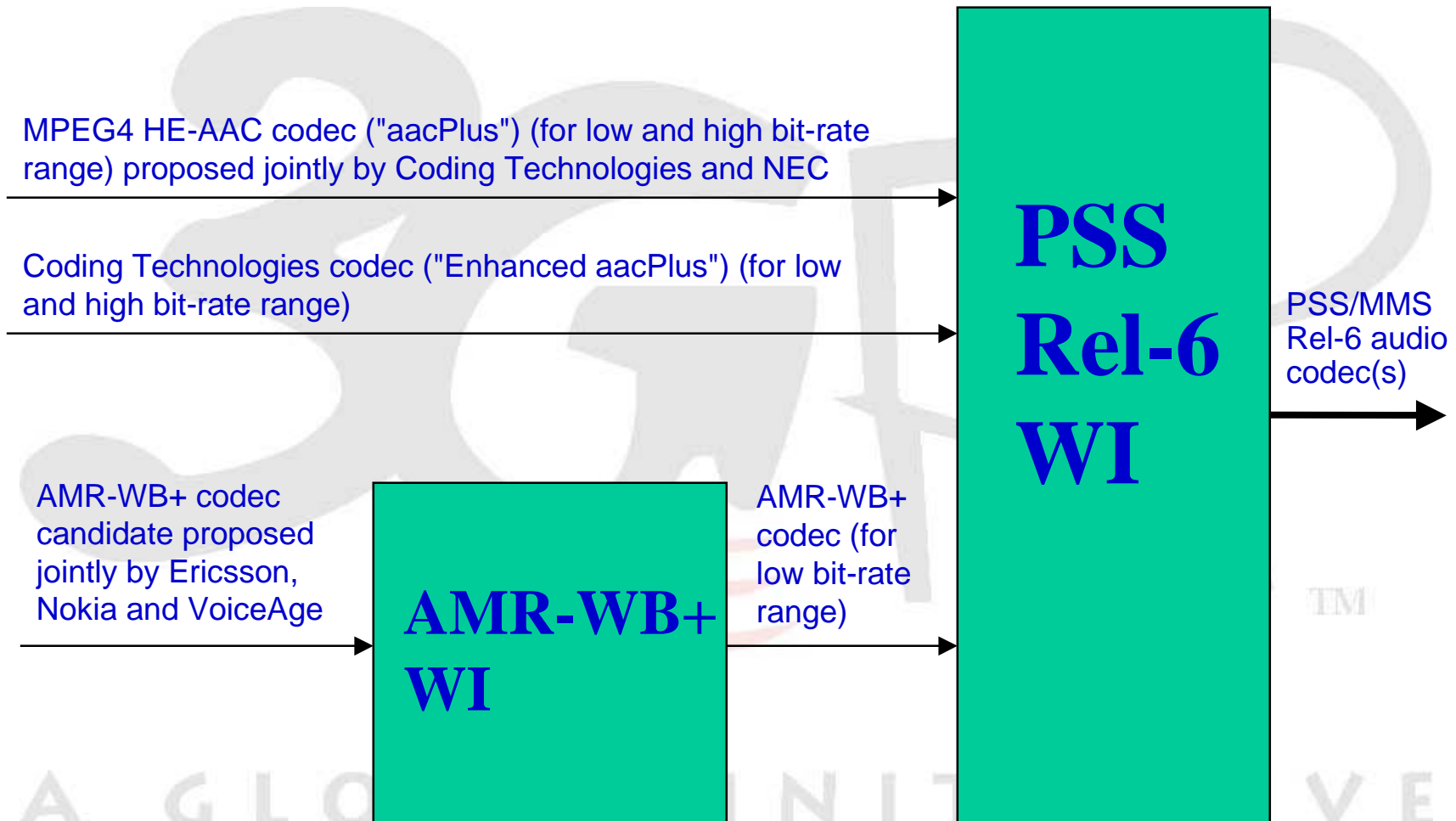| Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.233	Transparent end-to-end packet switched streaming service; General description	SA4	SA2	To be updated based on the content of PSS Rel-6.	TSG-SA#22 (Dec 2003)
CRs to TS 26.234	Transparent end-to-end packet switched streaming service; Protocol and codecs	SA4	SA2	Rel-5 TS 26.234 will be split in Rel-6 into four dedicated PSS TSs: TSs 26.234, 26.244, 26.245 and 26.246. Initial working drafts of all exist in SA4.	TSG-SA#22 (Dec 2003)
New TS 26.244	Transparent end-to-end packet switched streaming service; File Format	SA4	SA2	Initial working draft exists in SA4	TSG-SA#22 (Dec 2003)
New TS 26.245	Transparent end-to-end packet switched streaming service; Timed Text Format	SA4	SA2	Initial working draft exists in SA4	TSG-SA#22 (Dec 2003)
New TS 26.246	Transparent end-to-end packet switched streaming service; SMIL Language Profile	SA4	SA2	Initial working draft exists in SA4	TSG-SA#22 (Dec 2003)
CRs to TS 22.233	Stage 1	SA1		Under SA1 responsibility.	
Possible new TS	Stage2 (non-transparent aspects), to be produced by SA2, if needed	SA2		To be produced by SA2, if needed.	

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Audio codecs (PSS/MMS default audio codec, extended AMR-WB codec)*

- Since TSG-SA#19, the deadline for (non-binding) declaration to submit a candidate codec (for PSS/MMS default audio codec and AMR-WB+ codec) has passed. Altogether six candidates were declared by the deadline of March 31st.

- At SA4#26, in order to elaborate the experiments to be included in the selection "Test and Processing Plans" and to determine the funding that would be required, the number of candidates was requested to be determined. Therefore, a further (binding) deadline was agreed requiring confirmation of the candidates by May 31st.

- The list of confirmed candidates for PSS/MMS default audio codec is:

  1) **MPEG4 HE-AAC codec ("aacPlus")** (for low and high bit-rate range) proposed jointly by Coding Technologies and NEC

  2) **Coding Technologies codec ("Enhanced aacPlus")** (for low and high bit-rate range)

  3) **Ericsson, Nokia and VoiceAge unique AMR-WB+ candidate codec** (for low bit-rate range) provisionally to its selection within the AMR-WB+ Work Item

- Two PSS/MMS default audio codec candidates withdrew their participation: Dolby codec (for high bit-rate range) and Philips codec (for low and high bit-rate range). MPEG4 AAC is not in the list of candidates (for high bit-rate range) anymore but will be included instead in the selection tests as a reference codec.

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*) This part reports jointly the audio codec work done in WIs "PSS Rel-6" and "Extended AMR-WB codec". (These WIs are related as AMR-WB+ codec is considered as one candidate for PSS/MMS default audio codec, and as agreed at SA4#25bis the testing will be carried out as combined testing.)

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Audio codecs (PSS/MMS default audio codec, extended AMR-WB codec)

MPEG4 HE-AAC codec ("aacPlus") (for low and high bit-rate range) proposed jointly by Coding Technologies and NEC

Coding Technologies codec ("Enhanced aacPlus") (for low and high bit-rate range)

AMR-WB+ codec candidate proposed jointly by Ericsson, Nokia and VoiceAge

AMR-WB+ WI

AMR-WB+ codec (for low bit-rate range)

PSS Rel-6 WI

PSS/MMS Rel-6 audio codec(s)

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Audio codecs (PSS/MMS default audio codec, extended AMR-WB codec)

- **The low bit-rate audio range (12 kbit/s to < 32 kbit/s) and high bit-rate audio range are tested in separate experiments. To allow some flexibility in defining the exact breaking point (should this division become necessary in TS 26.234), an area of overlap of the two bit-rate ranges between 24 kbit/s and 32 kbit/s was agreed for the seletion tests: 24 kbit/s in tested for both the low and the high bit-rate range.**

- **The low bit-rate range is intended for speech, music and mixed content, while the high bit-rate range is intended specifically for music.**

- **Preparation of permanent documents ongoing (to guide the SA4 work):**

  – **AMR-WB+ Design Constraints** (finalised at Audio codec ad-hoc meeting #1)

  – **AMR-WB+ Performance Requirements** (finalised at SA4#26)

  – **PSS/MMS Audio Codec Selection, Design Constraints and Performance Requirements** (finalised at SA4#26)

  – **AMR-WB+ and PSS/MMS Low-Rate Audio Codec Selection Test and Processing Plan** (preparation ongoing with stable draft)

  – **PSS/MMS High-Rate Audio Codec Selection Test and Processing Plan** (preparation ongoing with stable draft)

  – **PSS/MMS Audio Codec Selection Rules** (discussion started)

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Audio codecs (PSS/MMS default audio codec, extended AMR-WB codec)

- **PSS/MMS performance requirements (e.g.):**
  - At the low bit-rate range, performance "no worse than the better of AMR-WB and MPEG-4 AAC-LC" is required. (Except in one test case, where performance has to be better.)
  - At the high bit-rate range, performance better than AAC-LC is required.

- **PSS/MMS design constraints (e.g.):**
  - Computational complexity
    - Server-based stereo encoder (PSS and/or MMS): ≤ 8 times the complexity of AMR-WB codec
    - Low-complexity encoder for MMS: ≤ 2 (stereo) or 1.2 (mono) times that of AMR-WB codec
    - Decoder (for both encoders): ≤ 3 (mono) or 4 (stereo) times that of the AMR-WB decoder

      (The complexity of floating-point AMR-WB codec is about 39.0 WMOPS and AMR-WB decoder complexity is about 7.8 WMOPS.)
  - Modes in selection tests:
    - Low bit-rate range: 14 kbit/s mono, 18 kbit/s stereo, 24 kbit/s mono and 24 kbit/s stereo
    - High bit-rate range: 24 kbit/s mono, 24 kbit/s stereo, 32 kbit/s stereo and 48 kbit/s stereo

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Audio codecs (PSS/MMS default audio codec, extended AMR-WB codec)

- **Time plan revised targeting codec selection at SA4#29 (November) - instead of SA4#28 (September) - to give sufficient time for the testing. Main milestones:**

  - **End of May**: confirmation of candidatures (for PSS/MMS default audio codec and AMR-WB+)

  - **Audio codec ad-hoc meeting #2 (2-4 June):** Test and Processing Plans and Selection Rules progressed

  - **SA4#28 (July) / SA4#29 (September):** all remaining permanent documents finalised

  - **September-October 2003**: selection tests ongoing

  - **SA4#29 (November):** analysed selection test results available, draft specifications and other documentation from codec proponents (e.g. justification of having met Design Constraints), selection of default audio codec for PSS and MMS, finalisation of related TSs and CRs, start verification tests

  - **TSG-SA#22 (December):** the audio codec selection and related specifications are brought for approval to TSG-SA.

- **Output specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to 26-series AMR-WB TSs/TRs	Relevant AMR-WB specifications of 26 –series	SA4	-	Codec specifications will be produced if AMR-WB+ will be defined for use in PSS/MMS.	TSG-SA#22 (Dec 2003)
New audio codec TS(s)		SA4	-	These will be produced if new codec specifications needed.	TSG-SA#22 (Dec 2003)
CRs to TS 26.234	Transparent end-to-end packet switched streaming service; Protocol and codecs	SA4	SA2	Default codec definition for the audio media type needs to be updated based on the selection of new audio codec(s).	TSG-SA#22 (Dec 2003)

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Codec Work to Support Speech Recognition Framework for Automated Voice Services

- **The candidate SES codecs are:**
  1. **AMR and AMR-WB codec** (proposed by Ericsson and Nokia)
  2. **ETSI DSR standard ES 202 050 and its extension** (proposed by Alcatel, France Telecom and Motorola)

     (Out of the three codec candidates announced earlier (non-binding indication), Siemens has since TSG-SA#19 decided not to put forward a candidate codec.)

- **SA4 has agreed on the Test and Processing Plan, but more time is needed to finalise Recommendation Criteria. This is the only remaining "permanent document":**
  - **Design Constraints** (finalised at SA4#25bis)
  - **Test and Processing Plan** (finalised at SA4#26)
  - **Recommendation Criteria** (under preparation)

- **Two Automatic Speech Recognition (ASR) vendors, IBM and SpeechWorks, will carry out the testing on voluntary basis.**

- **Test and Processing Plan:**
  - The recognition test experiments cover a range of tasks: connected digit recognition task, sub-word trained model recognition task and tone confusability task.
  - Testing will be done in error-free channel as well as under packet loss situations. Experiments will cover BLERs of 1%, 3% and 10% with EPs for UTRAN and GPRS/EGPRS channels. (1% and 3% will be used as part of the recommendation criteria while 10% is to be used for informative purposes.)
  - The AMR modes of 4.75 and 12.2 are included in the tests for 8 kHz sampling rate test case, and AMR-WB modes 12.65 and 23.85 for 16 kHz sampling rate case.
  - Each ASR vendor will run performance tests for both the AMR/AMR-WB codec and the ETSI DSR standard codec. ASR vendors have a free choice over the recogniser back-end configuration.

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Codec Work to Support Speech Recognition Framework for Automated Voice Services

- **Databases used in testing include ones developed in ETSI Aurora, ones from companies in SA4, ones publicly available elsewhere and proprietary ones from ASR vendors**
  - The databases contain connected digits, names, street names, organization names, commands and tonality confusability database (Mandarin Chinese names).
  - Several languages will be covered including English, German, Italian, Japanese, Mandarin Chinese and Spanish.
  - The five companies proposing the candidate codecs (Alcatel, Ericsson, France Telecom, Nokia and Motorola) share the cost of the purchase of public domain speech databases (11000 Euros in total). Each company will contribute with equal share.

- **ETSI has agreed to collect the funding and to ensure the transfer of the sum (to purchase the necessary database) to the two ASR vendors**
  - ETSI has carried out similar tasks in the past codec evaluations. Once received the total funding, ETSI will transfer the money, and sign as well with both ASR vendors an NDA on the provision of results (complying with the SES test and processing plan approved at SA4#26).
  - Approval of the ETSI involvement at PCG level (by correspondence within Friday 23rd May avoiding to wait until TSG-SA#20). PCG Secretary communicated to SA4 Secretary that approval was granted, since no objections nor comments against this action were received.

Codec Work to Support Speech Recognition Framework for Automated Voice Services

- **Main milestones:**
  - **June:** error patterns available, completion of NDAs associated with data and software to be exchanged, databases delivered to ASR vendors
  - **Late July:** codec executables delivered to ASR vendors, ASR vendors start testing
  - **SA4#28 (July) / SA4#29 (September):** the remaining permanent document on Selection Criteria finalised
  - **End of October:** test results available from ASR vendor evaluations, fixed point complexity assessment and documentation available from codec proponents (e.g. justification of having met the Design Constraints)
  - **SA4#29 (November):** analysed results from tests available, make recommendation of SES codec, finalisation of related specifications
  - **TSG-SA#22 (December):** the SES codec selection and related specifications are brought for approval to TSG-SA.

- **Output specifications**

Deliverable	Title	Prime resp. WG	2nd resp. WG	Comment/Status	TSG-SA approval target
CRs to TS 26.235	Packet Switched Conversational Multimedia Applications; Default Codecs	SA4	SA2, T2	To be prepared based on the codec selection.	TSG-SA#22 (Dec 2003)
CRs to TS 26.236	Packet Switched Conversational Multimedia Applications; Transport Protocols	SA4	SA2, T2	To be prepared based on the codec selection	TSG-SA#22 (Dec 2003)
Possible new TSs	Codec specification	SA4		To be prepared, if needed.	TSG-SA#22 (Dec 2003)

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Communication with other WGs/groups

- **SA4 LSs sent out since TSG-SA#19 include the following issues:**
  - feedback and related discussion on draft TR 26.937 "RTP Usage Model"
  - discussion on MBMS (characteristics of MBMS bearers, use of RTCP signalling for MBMS etc.)
  - discussion on possible improvements to requirements and test signals for terminal acoustic characteristics (with GCF UTRA Agreement Group)
  - request to ISMA to send their specifications on content protection for review
  - two new SA4 draft WIDs (as a result of earlier LS communication) sent for information to the relevant WGs
  - discussion concerning the usage of maximum SDU size (UMTS bearer attribute)
  - request for information from W3C SVG working group on status of Scalable Vector Graphics mobile profile
  - favourable responses to requests for actions from other groups: CN1 request to include also example cases using IPv6 into TS 26.236 (Rel-5 onwards), CN3 request to specify MIME type and RTP payload for DTMF in TS 26.235 (Rel-6), OMA DRM+DL request for coordination of PSS Rel-6 and OMA DRM specifications
  - request to SA1 to clarify some PSS Rel-6 Stage 1 issues: use cases of reliable transport, and inclusion of Content Cache

Proposed New Work Items

- **New WID on "Media Codecs and Formats for IMS Messaging and Presence" (Release 6)**
  - The architecture aspects of enhanced IMS services are being specified in SA2. SA2 has explained to SA4 that the relevant 3GPP WGs should now study the content format issues for content delivered in SIP message bodies (e.g. for Presence and Messaging) and, therefore, requested SA4 to start to define codecs and media formats for IMS Messaging and Presence type of content exchange.
  - SA2 Secretary has informed off-line the SA4 Secretary that SA2 would prefer SA4 to raise a new WID on this work (instead of carrying out the work under existing WIs). Consequently, SA4 brings a new WID on this for approval in Tdoc SP-030212.

- **New WID on "Multimedia Broadcast/Multicast Service (MBMS) Codecs and Protocols" (Release 6)**
  - Several LSs have been exchanged on MBMS codecs and on the role of SA4 in the overall MBMS work. SA2 has confirmed that the ownership of data types, application level signalling and transport protocol definition is in SA4. With this background SA4 brings a new WID on "MBMS Codecs and Protocols" now for approval in Tdoc SP-030213.
  - SA4 would like to point out that the SA4 work and progress in MBMS is to a large extent subject to a deep understanding of MBMS use cases and architecture and is dependent on the work still under progress in other WGs, and especially on the stability and schedule of Stage 2 (from SA2) and the relevant RAN and GERAN MBMS-specifications. SA4 believes that the specification on SA4 part (MBMS codecs and protocols) could be completed about 3-6 months after the related Stage 2, RAN and GERAN specifications (stable versions) are available.
  - SA4#26 felt that a joint ad-hoc meeting on MBMS use cases and application architecture and other codec related aspects with relevant WGs (at least SA1 and SA2, maybe RAN2, RAN3, GERAN2 and others interested) would be useful for the MBMB codecs work. This would provide a better way into definition of the codecs and related protocols in co-operation with the relevant WGs than what can be expected to be achieved through LS exchange procedure. SA4 Chairman was tasked to contact the relevant WG Chairmen to try to find out possibilities and if there is interest in the relevant WGs to organise such a joint meeting.

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Documents for approval: WIDs & CRs

- **WIDs:**

  Tdoc SP-030212   **New Work Item Description on Media Codecs and Formats for IMS Messaging and Presence (Release 6)**

  Tdoc SP-030213   **New Work Item Description on Multimedia Broadcast/Multicast Service (MBMS) Codecs and Protocols (Release 6)**

- **CRs:**

  Tdoc SP-030214   **CRs to TS 26.104 - Correction on codec mode handling during DTX (Release 4 and Release 5)**

  Tdoc SP-030215   **CRs to TS 26.111 - Removal of Reference to TS 26.112 (R99, Release 4 and Release 5)**

  Tdoc SP-030216   **CR to TS 26.173 - MMS compatible input/output option for fixed-point AMR-WB source code (Release 5)**

  Tdoc SP-030217   **CRs to TS 26.234 - SMIL supported event types (Release 4 and Release 5), and Correction to the Content Model of the SMIL Language Profile (Release 5)**

  Tdoc SP-030218   **CR to TS 26.235 Handling of DTMF in IMS (Release 6)**

  Tdoc SP-030219   **CR to TS 26.236 - Examples of QoS profiles for conversational multimedia applications (Release 5)**

Approval Requested – Change Requests

Tdoc SP-030214 CRs to TS 26.104 "ANSI-C code for the floating-point AMR speech codec"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.104	025		Rel-4	Correction on codec mode handling during DTX	F	4.4.0	S4	TSG-SA WG4#26	S4-030340
26.104	026		Rel-5	Correction on codec mode handling during DTX	A	5.1.0	S4	TSG-SA WG4#26	S4-030341

Tdoc SP-030215 CRs to TS 26.111 "Codec for circuit switched multimedia telephony service; Modifications to H.324"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc	
26.111	007	1	R99	Removal of Reference to TS 26.112	F	3.4.0	S4	TSG-SA WG4#26	S4-030423	*
26.111	008	1	Rel-4	Removal of Reference to TS 26.112	A	4.0.0	S4	TSG-SA WG4#26	S4-030424	
26.111	009	1	Rel-5	Removal of Reference to TS 26.112	A	5.0.0	S4	TSG-SA WG4#26	S4-030425	

Tdoc SP-030216 CR to TS 26.173 "ANSI-C code for the Adaptive Multi Rate (AMR) Wideband speech codec"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.173	017	1	Rel-5	MMS compatible input/output option for fixed-point AMR-WB source code	F	5.6.0	S4	TSG-SA WG4#26	S4-030400

*) Currently TS 26.111 states that call set-up procedures for CS multimedia telephony service are given in TS 26.112. However, such a TS does not exist. This incorrect reference in the specification has caused confusion for implementers, and could potentially result in incorrect implementations. Therefore, SA4 sees that it should be corrected and the CR is needed for faultless operation.

Approval Requested – Change Requests

Tdoc SP-030217 CRs to TS 26.234 "PSS; Protocols and codecs"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.234	059		Rel-4	Correction to SMIL supported event types	F	4.5.0	S4	TSG-SA WG4#26	S4-030283
26.234	058	1	Rel-5	Correction to SMIL supported event types	A	5.4.0	S4	TSG-SA WG4#26	S4-030401
26.234	060		Rel-5	Correction to the Content Model of the SMIL Language Profile	F	5.4.0	S4	TSG-SA WG4#26	S4-030288

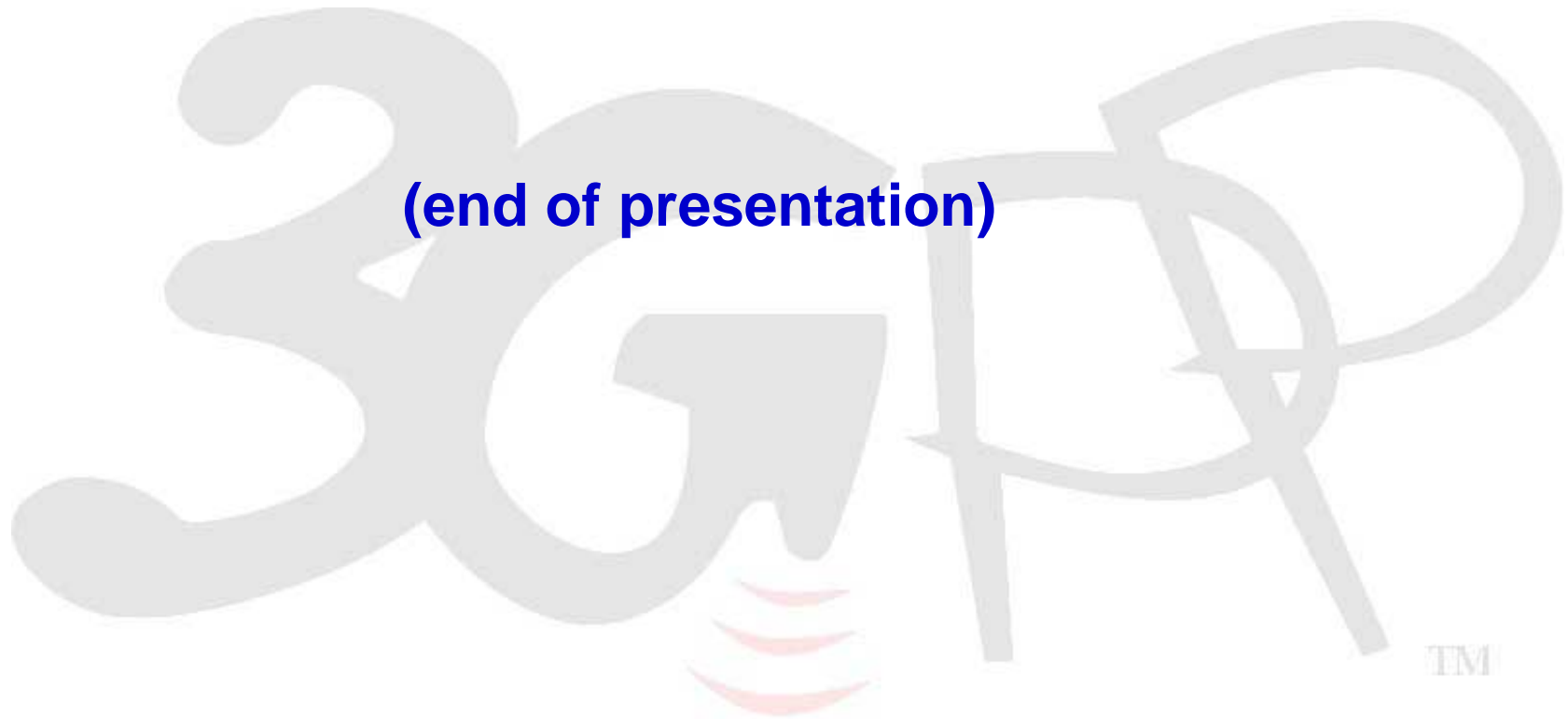Tdoc SP-030218 CR to TS 26.235 "Packet switched conversational multimedia applications; Default Codecs"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.235	005	1	Rel-6	Handling of DTMF in IMS	C	5.1.0	S4	TSG-SA WG4#26	S4-030402

Tdoc SP-030219 CR to TS 26.236 "Packet switched conversational multimedia applications; Transport protocols"

Spec	CR	Rev	Phase	Subject	Cat	Vers	WG	Meeting	S4 doc
26.236	005		Rel-5	Examples of QoS profiles for conversational multimedia applications	F	5.2.0	S4	TSG-SA WG4#26	S4-030382

(end of presentation)