TSG-SA4#33 meeting
November 22-26, 2004, Helsinki, Finland

Tdoc S4 (04)0857

Title:	LS reply about speech Codecs for PoC

Source:	3GPP TSG SA4
To:	OMA POC WG
Cc:	3GPP TSG SA, 3GPP TSG SA2, 3GPP2 TSG-C, 3GPP2 TSG-S

Attached:	S4-040849, S4-040850

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1. LS Reply

3GPP TSG SA4 (in short: SA4) thanks OMA POC WG for the LS about speech codecs for PoC, received in Tdoc S4-040391. Meanwhile SA4 has studied the issue and would like to provide OMA POC WG with complementing information to the earlier response (S4-040554).

1 Requested Action(s)

OMA POC WG kindly requests 3GPP and 3GPP2 to provide answers to the following questions:

1. Is your organisation willing to create (in the time frame indicated above) or modify existing specification documents that OMA can reference for the purpose of describing the speech codec usage for PoC.

> SA4: SA4 would like to inform OMA PoC WG that the specifications relevant for PoC are 3GPP TS 26.235 and 3GPP TS 26.236. These specifications are presently updated in order to provide explicit support of PoC services. The corresponding CRs (see enclosure) are subject to approval by SA#26 in December 2004.

2. The preferred speech codec for PoC including encoder mode(s) and mode(s) of operation

> SA4: The default speech codecs applicable for PoC services are AMR and, in case 16 kHz audio sampling rate is supported, AMR-WB. There are no explicitly preferred codec modes for PoC.

3. Indicate if you think there is a necessity for additional PoC speech codecs, codec modes or modes of operation

> SA4: At present there are no plans to specify additional speech codecs for PoC, as it is believed that AMR and AMR-WB are suitable codec choices for this service.

4. Suitable settings for the speech codec payload format(s) that are negotiated during the SIP session set-up

> SA4: At minimum, the following settings shall be negotiable:
> - The codec type, i.e. AMR or AMR-WB (Media subtype name).
> - The payload configuration, whether to use bandwidth efficient, octet-aligned or interleaved mode of operation.

5. Your view if frame interleaving shall be supported or prohibited

SA4: Interleaving is a means for improving the quality in case of packet losses at the cost of increased transmission delay. PoC as a conversational service is to some degree sensitive to transmission delay. Hence, it is recommended to not use interleaving on the application level. However, interleaving on the application layer is not prohibited, as there might be cases, where the gain due to interleaving is significant.

6. What are the issues related to transcoding, when using the proposed PoC codec(s) (e.g. quality degradation, latency increase)

SA4: In general terms transcoding affects PoC service quality negatively, as quality decreases and delay increases. It is, however, still subject to future studies, under which circumstances transcoding might be required and what would be the specific impact on the PoC service quality.

7. If one or both organizations specify two or more codecs in order to do transcoding free interworking, what codec do you think should be suitable to be the ì common denominatorî and do you think that this method be advantageous over transcoding.

SA4 considers transcoding free interworking across 3GPP and 3GPP2 networks an important aspect to avoid transcoding equipment at the network interconnections and to keep the service quality at a maximum possible level.
It seems feasible to SA4 to use the AMR and/or AMR-WB as a common codecs for PoC in 3GPP and 3GPP2, as these codecs are already agreed as options in MMS between 3GPP and 3GPP2.
SA4 further would like to point out that AMR-WB is in addition approved by ITU-T and provides interoperability modes with VMR-WB specified in 3GPP2.

The common usage of AMR or AMR-WB would allow to avoid transcoding, without undue additional terminal implementation costs, when these Codecs are already implemented due to other services.

2. Actions:
None

3. Dates of Next TSG-SA4 Meetings:
SA4#34   21 ñ 25 February 2005   Lisbon, Portugal

CR-Form-v7.1

CHANGE REQUEST

⌘ **26.235** CR **010** ⌘**rev** **-1** ⌘ Current version: **6.2.0** ⌘

For **HELP** *on using this form, see bottom of this page or look at the pop-up text over the* ⌘ *symbols.*

Proposed change affects: UICC apps⌘ ☐ ME **X** Radio Access Network ☐ Core Network **X**

Title: ⌘	Inclusion of PoC support		
Source: ⌘	Ericsson, NEC, Nokia, Siemens		
Work item code:⌘	PoC	***Date:*** ⌘	17/11/2004
Category: ⌘	**B**	***Release:*** ⌘	Rel-6

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change: ⌘	Presently there is no provision in the specification for Push-to-talk over Cellular (PoC)
Summary of change:⌘	PoC is referenced and an informative annex is added on how to use audio in the context of PoC.
Consequences if not approved: ⌘	It is unclear how to implement PoC.

Clauses affected: ⌘	1, 2, 3.2, 6.2, Annex

	Y	**N**			
Other specs ⌘	**X**		Other core specifications	⌘	26.236
affected:		**X**	Test specifications		
		X	O&M Specifications		

Other comments: ⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

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downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

FIRST CHANGE

1   Scope

The present document introduces the set of default codecs for packet switched conversational multimedia applications within 3GPP IP Multimedia Subsystem. Visual and sound communication are specifically addressed. The intended applications are assumed to require low-delay, real-time functionality.

The present document is applicable, but not limited, to services such as PS video telephony and Push to talk over Cellular (PoC).

The applicability of this specification to GERAN is FFS.

SECOND CHANGE

2   References

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[42]   ISO/IEC 14496-10/FDAM1: "AVC Fidelity Range Extensions".

[43]   IETF Internet Draft: "RTP payload Format for H.264 Video", Wenger S. et al, http://www.ietf.org/internet-drafts/draft-ietf-avt-rtp-h264-11.txt, August 2004.

[44]   3GPP TS 23.221: ì Architectural requirementsî

THIRD CHANGE

3.2   Abbreviations

For the purposes of the present document, the following abbreviations apply:

AMR	Adaptive MultiRate codec
AVC	Advanced Video Codec
DSR	Distributed Speech Recognition
IETF	Internet Engineering Task Force
IM Subsystem	Internet protocol Multimedia Subsystem
ITU-T	International Telecommunications Union-Telecommunications
PoC	Push to talk over Cellular
RFC	IETF Request For Comments
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
SDP	Session Description Protocol
SES	Speech Enabled Services
SIP	Session Initiated Protocol

6.1 Audio

3G PS multimedia terminals offering audio communication (including PoC services) shall support AMR narrowband speech codec [9], [10], [11] to [12].

The AMR wideband speech codec shall be supported when the 3G PS multimedia terminal supports wideband speech working at 16 kHz sampling frequency [16], [17], [39], [40].

The usage of telephone-event media format is recommended for DTMF.

Annex E provides guidelines for using audio in the context of PoC services.

Annex E (informative): Push-to-Talk over cellular (PoC)

For PoC the audio codecs specified in section 6.1, namely AMR or AMR-WB are applicable~~shall be used~~. Speech codec bit rates and transport formats settings have to be selected considering the available transmission bandwidth and the allowable transport delay. In order not to introduce undue delay of more than 200 ms for RTP packetization, it is recommended to limit the number of speech codec frames per packet to 10 and not to use interleaving.

Under the assumption of RTP packetization according to [35] using octet-aligned mode, no interleaving and using 10 frames per RTP packet and depending on the IP version in IMS, the following tables show the required bandwidth for the available AMR and AMR-WB speech codec modes. Bandwidth restrictions may imply that only the lowest AMR/AMR-WB modes can be used for PoC. In order to maximize speech quality, it is recommended to use the respective highest possible bit rate.
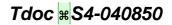
Table 1: Required bandwidth for PoC using AMR

AMR Mode	Required bandwidth when IPv4 is used [bits/s] [Note]	Required bandwidth when IPv6 is used [bits/s]
AMR 4.75	6840	7640
AMR 5.15	7240	8040
AMR 5.9	8040	8840
AMR 6.7	8840	9640
AMR 7.4	9640	10440
AMR 7.95	10040	10840
AMR 10.2	12440	13240
AMR 12.2	14440	15240
Note: For the usage of IP version in IMS see TS 23.221 [44], subclause 5.1.		

Table 2: Required bandwith for PoC using AMR-WB

AMR-WB Mode	Required bandwidth when IPv4 is used [bits/s] [Note]	Required bandwidth when IPv6 is used [bits/s]
AMR-WB 6.60	8840	9640
AMR-WB 8.85	11240	12040
AMR-WB 12.65	14840	15640
AMR-WB 14.25	16440	17240
AMR-WB 15.85	18040	18840
AMR-WB 18.25	20440	21240
AMR-WB 19.85	22040	22840
AMR-WB 23.05	25240	26040
AMR-WB 23.85	26040	26840
Note: For the usage of IP version in IMS see TS 23.221 [44], subclause 5.1.		

Annex ~~E~~ F (informative): Change history

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END OF CHANGES

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CR-Form-v7.1

CHANGE REQUEST

| ⌘ | **26.236** CR **013** | ⌘**rev** | **-1** | ⌘ | Current version: | **6.0.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

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  R97   *(Release 1997)*
  R98   *(Release 1998)*
  R99   *(Release 1999)*
  Rel-4   *(Release 4)*
  Rel-5   *(Release 5)*
  Rel-6   *(Release 6)*
  Rel-7   *(Release 7)*

Reason for change: ⌘	Presently there is no provision in the specification for Push-to-talk over Cellular (PoC)
Summary of change: ⌘	RTP session description parameters for audio in PoC are specified. Note that it is still possible to specify Octet Aligned Operation for PoC in Rel-6 if required.
Consequences if not approved: ⌘	The change is required to make PoC work.

Clauses affected: ⌘	2, 4, 5.1

	Y	N		⌘	
Other specs affected: ⌘	X		Other core specifications	⌘	26.235
		X	Test specifications		
		X	O&M Specifications		

Other comments: ⌘	

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FIRST CHANGE

2 References

Ö

[29]   RTP Payload Formats for European Telecommunications Standards Institute (ETSI) European Standard ES 202 050, ES 202 211, and ES 202 212 Distributed Speech Recognition Encoding draft-ietf-avt-rtp-dsr-codecs-00.txt.

CR Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[30]   Open Mobile Alliance: ì PoC User Plane Version 1, Draft Version 1.0.10 Nov 2004î, OMA-UP-PoC-V1_0_10-20041103-D.

SECOND CHANGE

4 General

3G PS multimedia terminals provide real-time video, audio, SES or data, in any combination, including none, over 3GPP IM Subsystem. Terminals are based on IETF defined multimedia protocols SIP, SDP, RTP and RTCP. Communication may be either 1-way or 2-way. Such terminals may be part of a portable device or integrated into an automobile or other non-fixed location device. They may also be fixed, stand-alone devices; for example, a video telephone or kiosk. Multimedia terminals may also be integrated into PCs and workstations.

In the case of SES then uplink communication is from the terminal to a server containing speech recognition.

The transmission and reception of audio in Push-to-Talk over Cellular (PoC) communication is controlled by a RTCP APP conveyed Talk Burst Control Protocol defined in OMA PoC User Plane Version 1 [30].

In addition, interoperation with other types of multimedia telephone terminals, such as 3G-324M may be possible, however in such case a media gateway functionality supporting 3G-324M - IM Subsystem interworking will be required within or outside the IM subsystem.

THIRD CHANGE

5.1 Audio

5.1.1 RTP session description parameters

The IETF AMR and AMR-WB RTP payload format [19] offers different options. Here is the list of options and how they should be used by the transmitter. The receiver shall at least support the options as they are listed (For PoC please see below):

-   the bandwidth efficient operation shall be used,

-   only one speech frame shall be encapsulated in each RTP packet,

- the multi-channel session shall not be used,

- interleaving shall not be used,

- internal CRC shall not be used.

For PoC services less restrictive IETF AMR and AMR-WB RTP payload format [19] options apply:

- the multi-channel session shall not be used,

- internal CRC shall not be used,

- octet aligned operation shall be used,

- the number of speech frames encapsulated in each RTP packet should not exceed 1020,

- interleaving should not be used.

- The total packetization delay (including any interleaving delay) shall not exceed 500 (TBD) ms.

END OF CHANGES