CCITT SG XV
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Title: Some comments on m x 64 kbit/s codec standardization

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1. Introduction

This document discusses the range of alternatives concerning m x 64 kbit/s codec standardization. It suggests discussion points for our future work.

2. Application of 64 kbit/s codec

In general, when developing a new codec,

(1) Application or purspose of the codec
(2) Required characteristics for the codec
(3) Algorithm which suits to the required characteristics,

should be clarified.

Among them, "application" has first prioriy, since we need a common understanding concerning the application in advance of discussing 64 kbit/s codec details.

2.1 Application of 64 kbit/s codec

(1) Videoconferencing: Conference where approximately six people participate in each conferencing room

(2) Videophone: Person-to-person communication. Is this a degenerate application of Videoconference or an extended application of telephone in which visual information is added to voice?

1.2 Characteristics required for 64 kbit/s codec

The required characteristics for 64 kbit/s Codec can be summarized in Table 1, when we think of spatial and temporal resolution.

Table 1 Examples of required resolution

Service	Signal to be transmitted	Spatial resolution (pels H x V)	Temporal resolution (frame/sec)
Video-conference	up to six people	360 x 288	10 to 15
Video-phone	one person	240 x 192 180 x 144	5 to 15

Even if we consider forthcoming technology for several years, our target for 64 kbit/s cannot be the same quality as 384 kbit/s codec. Our target

will become videophone application, after investigating the possibility whether application of such low resolution video codec is accepted by users.

3. Video format

There are three possible formats for 64 kbit/s codec:

(1) The same common intermediate format with 384 kbit/s codec
(2) A common intermediate format specific for 64 kbit/s codec
(3) Other than common intermediate format (Dual approarch)

4. Algorithm and compatibility to n x 384 kbit/s

4.1 Algorithm of 64 kbit/s codec

There may be optimum algorithms depending on different bit-rates and applications, although we have no firm evidence. Therefore, we should start our algorithm study from the beginning. The algorithm of 384 kbit/s codec should be treated as one of the possible candidates.

4.2 Compatibility

At present, we are in an open position whether the 64 kbit/s codec should have compatibility with 384 kbit/s codec or it should have independent algorithm.

In order to realize compatibility, one of the following functions should be employed.

(1) Transcoder
(2) Fallback

Both of them need the support from outside of the codec, e.g., network, MCU or terminal.

(1) Transcoder

The transcoding degrades the picture quality of 64 kbit/s transmission service, since 64 kbit/s codec will have no margin in quality. Therefore, its specification such as video format and algorithm for coding should be the same with 384 kbit/s codec as far as possible.

(2) Fallback

Transmission is made at the rate of 64 kbit/s all through the channels. 384 kbit/s codec needs to have 64 kbit/s rate transmission mode, or both 64 and 384 kbit/s codecs needs to have common 64 kbit/s rate mode, which may be different from our aiming 64 kbit/s algorithm. Since 64 kbit/s algorithm to be standardized may be more complicated and sophisticated, it may be difficult that 384 kbit/s codec is provided with 64 kbit/s algorithm.

5. Bit rate

We have three possible bit rates, if we assume 64 kbit/s codec as a multi-media service codec:

(1) 1 x 64 kbit/s : (Example) Audio 16 kbit/s + Video 48 kbit/s.

(2) 2 x 64 kbit/s : (Example) Audio 64 kbit/s(High quality audio)
+ Video 64 kbit/s.
Interconnection with 384 kbit/s codec and other teleconferencing service may be insured by this approarch at least in audio and control part.

(3) 128 kbit/s : (Example) Audio 32 kbit/s + Video 96 kbit/s.
Picture and audio quality can be improved and be well balanced by this approarch. BSI and channel integrity have to be supported by ISDN.

6. Hardware architecture

In the near future, DSP architecture approarch is the most promising for 64 kbit/s codec. Algorithm to be standardized may be influenced by the architecture, where version-up will be easily made and compatibility between the old and new version can be guaranteed when the new version has both versions in it.

7. Audio coding technique

Since transmission of 16 kbit/s and 8 kbit/s rate for voice signal will be standardized in the near future, it may be possible to introduce them to our codec. Interconnection between the different rate channel need investigation as it is suggested for video coding in Sec. 4.

8. Transmission frame structure

The frame format used in 384 kbit/s is one of the possible candidates. Packet approarch also becomes a candidate?

9. Time schedule

The target for standardization will be around 1990?

10. Conclusion

We have discussed possible range of alternatives for 64 kbit/s codec standardization. We have to clarify its application (user acceptance) and the required characteristics before detailed algorithm study.