Doc # 237

Coding
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Source: France, UK, Sweden, Italy, Norway, FRG , Netherlands

Title: Frame Structure for m x 64kbit/s codecs

INTRODUCTION

During the last meetings of both the specialists group and the main working party, documents were produced by the USA and KDD questioning the use of Y221 type framing for video codecs at 1 or 2 x 64kbit/s.

In addition at the San Jose meeting delegates were asked to list the requirements of a frame structure for the m x 64kbit/s codec and check whether Y221 in its present state is applicable. It was also stated that Y221 is not complete and available for extension to meet these requirements.

REQUIREMENTS

The following requirements can be identified;-

1. Compatibility should be provided between audiovisual services ie audioconference, videoconference, enhanced telephony, etc.

2 The system needs to be devoted to multimedia applications (sound, picture, C and I, user to user signalling or messages etc...) with basic telephone teleservice.

3 Adapted for public switched networks (ISDN or CSDN)

4 Easy to implement and cheap

5 Facilitate the beginning of the videophone service on existing networks, ie it should cope with the fact that time slot integrity will generally not be available with multiple 64kbit/s paths.

[illegible] that Y.221 permits a changeover in 80 ms. The case [illegible] audio switch faster than this is not at all clear. The video processing will involve a far greater delay, so audio buffering of at least this magnitude will be required to maintain lip synchronism. Subjectively a switch rate of 80ms appears instantaneous anyway.

3 Bit errors

Y.221 employs protection against bit errors in a manner similar to that in H.120: this provides considerable resilience.

4 KDD Packet proposal

The KDD contribution mentions a fixed length frame. This structure, in reality, does not differ much from Y.221 in flexibility, but is clearly incompatible. No definition of length of header (and hence overhead) is given. Y.221 is 1.6/64.

5 Variable bit-rate Assignment to Video

The contribution proposes allocating bit rate to audio only when audio present. This means that the video quality will degrade when a person speaks, further adding to the dynamic quality observed by users. This is probably highly undesirable.

6 Multipoint Use

Use of the KDD packet approach will cause considerable problems when interfacing to MCUs, as multiplexing of the audio will require much more processing of packets.

7 Compatibility with other audiovisual services

All other audiovisual services are being designed around one framing structure Y.221. To define a different structure just for videophone is highly undesirable as interworking with other services is essential.

SERVICE PROPOSALS

Interworking of all narrow band videophone services is highly desirable. Until coding costs and qualities are clearer, it is not possible to define the service as either 2B or 1B, so the following is proposed:

At least two videophone services arrangements are allowed, the first 2B, the second 1B. The 2B service will use one channel for coded video, the other for Y.221 audio (G.722). The 1B service will use, for example, 48 kbit/s for video and 16 kbit/s audio (narrowband, perhaps based on mobile telephony standards). The 2B service shall fall back to the 1B service in the event of:

Case 2

B1 unframed, B2 supports only video.
B1 supports no special frame structure and conveys and audio media compatible with CCITT rec G711 (PCM sound coding) dedicated for basic telephony.

Case 3

B1 is a multimedia frame bearer according to CCITT Y 221 draft recommendation compatible with other RTAV services and basic telephony.

B2 supports only video with no special frame structure (although a basic frame alignment pattern may need to be added to cope with time slot integrity problems)). This scenario could appear as a good choice but we must notice that the video channel is limited to 64 kbit/s limiting the picture quality.

Case 4

For increased picture quality B1 supports a multimedia Y221 frame structure and some 8 kbit/s subchannels are occupied by video data (see CCITT rec. G 722).

B2 supports only video.

A mechanism has to be invented to synchronise the two video streams shared on the two bearers. It could be achieved by using a framing structure on the video channel based on a packet technique or other.

It is submitted for further study. We summarise the merits and demerits of each scenario in table 1.

CONSEQUENCES AND CONCLUSIONS

We have distinguished 4 alternatives of videophony for the basic service.

Our choice does lead to implement frame structures that, for the time being, will not shrink the place left for the video bit stream within the frame. Hence our frame proposal will not hamper the codec designers until they provide us more information (autual Q 5 picture quality according to the size of the screen viewed, bit/octet structure, etc...).

If we had to choose among the four scenarios above, the third one would be well suited for our task. In case there is a risk of failure of the videotelephone service due to a poor quality of the picture, the fourth one is well fitted for increasing the picture quality and compensating the delay. But this scenario is left for further study because some technical points are unresolved.

	Case : mono bearer	unfram.		Case 3 Y221		Case 4 Y221	
	multimedia	audio	video	multi media	video	multi media + video	video
Compatibility with other RTAV	FFS.		-	+		+	
Multimedia application flexibility	+		-	+		+	
I/W with basic telephony	+		+	+		+	
Public network oriented	+		+	+		+	
In band message channel capability	?		+	+		+	
Dynamic multiplexing	+		-	+		+	
Picture quality offered			?	?		+	
DTD compensation			-	-		+	
Network aspect							
error correction capbility	?		-	+		+	
Quality of service (CRC)	+		-	+		+	
Service aspect							
Encryption	?		?	+		+	
Supplementary Facilities (Fax, Telematic)	?		-	+		+	
Multipoint capability	+		?	+		+	
MCU additional delay	+		?	+			
Terminal Complexity							
Network interface			+	+		FFS	
Cost (cheapness)			+	+		FFS	
Existing VLSI			+	+		FFS	

Table 1. Frame structures

Comparison of diff. cases A two level scale is used (+ or -) to judge each factors.

The question mark (?) means unresolved question

FFS means for further study .