CCITT SGXV
Working party XV/4
Specialists Group on Coding
for Visual Telephony

Document no.270
Oct 1987

Title : Frame structure for m x 64kbit/s videophone
Source : NL, F, S, N, FRG, UK, I

1 Introduction

The aim of this document is to evaluate different frame structures. A comparison is made between the different approaches (doc 247, 241 and 251 250 issued by Japan) and the submitted document by PictureTel entitled: " Frame structure for m x 56/64 kbit/s video telephony.

2 Technical comparison

We distinguish three different subjects to evaluate the frame structures.

- Multiplexing
- Service Aspects

- Costs

A comparision will be made with:

- Case 1:
  Mono bearer multimedia videophone using Y221 as framing
- Case 2:
  Two times 64 kbit/s bearer multimedia using at least one Y221 framed bearer. The media could be shared on the two bearers if both are supported by Y221.
- Case 3:
  Japan proposal using Y221 unframed and Y221 modified (BAS possible change every 20/40 ms supporting BCH error correction).
- Case 4:
  Japan proposal using a mixed framing Y221 in the call setup phase and packet mode in the active phase.
- Case 5:
  Refering PictureTel approach.

Each item given in document 247 relates to the items tabulated in table 1, see annex C.

3 Conclusion

According to the parameters read on table 1 we can conclude: one of the main advantages of Y221 framed bearer is the ease of implementation on a public network (ISDN, PSTN and IDN). According to G72Y Y221 allows a full interworking with telephony and other Audio Visual-services (AV-services) and allows also call conference by means of MCU and call transfers.

The two mixed approaches of Japan imply either a change of Y221 or a packet mode structure which at the moment is not yet fully defined.
For interworking with public telephone and other AV-services both mixed approaches make use of in-channel signalling, by means of a non-modified Y221 frame structure.

The PictureTel proposel does not yet provide any interworking functions with telephone and other AV-services.

4 Annex A Comments to Table 1

- + and - denote advantage and disadvantage
- ? denotes not resolved or lack of information at the moment
- / denotes does not matter

- M1 Y221 is in principle flexible
- M2 Y221 allows data transmission at bitrates multiple of 8 kbit/s. (or multiple of 100 bits/s if Application Channel is used but switchable at a 800 bit/s rate) Existing synchronous terminal can be connected directly. Asynchronous terminal can be introduced by CCITT standard TA (terminal adapter)
- M3
  Y221 allows differential time delay recovery by using some available free bits of FAS. This approach allows also Multibearers synchronisation.
- M4
  BAS is protected by a majority criterion (5/8) more efficient in presence of burst errors which are general present in the digital connection. The majority criterion was already tested in videoconferencing tests. Data could also be protected e.g. by octets in the application channel.
- M5/M6
  The Y221 change over seems suitable for AV services. The video coding delay is longer than the changeover. It will allow any kind of voice activation procedure. The modulation index:

$$\frac{624 - 408}{624} \approx 20\,\%$$

can introduce complexity in comparison with the available quality. A changeover with 20/40 ms seems to be too fast for AV-service since the video codec processing delay is greater than 200 ms. In the case of a combination of motion and speech a good picture should be guaranteed therefore a study is necessary.
"Furthermore, it is not at all clear that reducing the switching time from 80 to 20ms will provide any useful gain in video performance for dynamic audio systems. Studies in audioconferencing suggest that reducing the hangover from 80 to 20ms will provide at most 2-3capacity for video information."

- M7
  Too long packet solution can introduce delay.
- M8
  Experimental results according to proposal of Japan should be provided in order to prove the quality.
- M9
  Y221 uses existing standard (e.g. G72Y) and can use 16 kbit/s audio coding when it will be standardized.

- S1/S2
  Only Y221 allows a full interconnection with basic telephony. It allows also compatibility with other AV services.
- S3
  Y221 is public network oriented (ISDN, IDN)
- S4
  Y221 allows multipoint capability with less difficulties (real time signalling e.g. fast update freeze frame audio detection etc.)
- S6
  See M2

- S7
  Y221 allows allocation of overhead bits for the key dynamic exchange DES algorithm or B-CRYPT system need a 64 bit structure.

- S8
  G72Y allows call transfer and it includes Y221

- C1:
  Terminal and MCU hardware are less complex with Y221 than in the case of packet.

- C2:
  The network interface is less expensive with Y221 The circuit will be available in 1988. It will be 8 bit CPU oriented component.

5 Annex B: Answers to documents

5.1 PictureTel

- The CCITT SGXV/4 Specialists Group on Coding for Visual Telephony is concerned only with m x 64 kbit/s (where m = 1,2).
- A dynamic bit allocation could be used with Y221 it could be implemented by means of a suitable procedure. Actually the problem is to regulate the audio and video codecs.
- The problem of transmitting asynchronous data always exists.
- Variable bit rate for audio is possible with Y.221
- Multiplexing of multiple data side channels may easily be defined in Y.221.
- The service channel can be used for audio and video (except 1.6 kbit/s).
- Synchronisation of the two B channels is possible with Y.221 (example the Bell Core proposal which could be amended).
- Error correction may be defined if found necessary.
- Byte orientation is not necessaty. A VLSI implementation is under progress.

Conclusion of problems raised by PictureTel

The problems with Y.221 raised by PictureTel have been seriously considered. It has been found that sufficient solutions could be provided without modifications of Y.221.

6 Annex C:

Relation between table given in DOC 247 (CCITT SGXV/4 Chairman issue) and table 1 paper.

Row Document 247	footnote		Table 1 References
1		---------->	S2
2		---------->	M2/S1
3	(1)	---------->	S3
4	(2)	---------->	M4
5		---------->	M6
6		---------->	M3
7		---------->	S7
8		---------->	M7
9	(3)	---------->	M4
10	(4)	---------->	S4
11	(5)	---------->	S3
12	(6)	---------->	C1/C2

Footnotes

- (1) Packet approach does not provide interworking with present basic ISDN teleservices and hence appears as incompatible with AV hierarchy (problem of closed users group). But it could be implemented on IDN.
- (2)(3) Y221 could allow error correction for instance by inserting an error correction capability in the application channel.
- (4) The packet mode must be mixed with a Y221 framing in a MCU (for instance if some PictureTel videophones and telephones would exchange information by means of a MCU)
- (5) G72Y performs a suitable scenario for interworking between all AV services.
- (6) The microprocessor implementation (byte structure) is not a relevant problem for Y221 (it is a sequentialy processing).

		Europe Case 1 Mono bearer Multi media Y221	Europe Case 4 multi bearer multi media + video	Japan Modified Y221	Japan Packet	USA PictureTel
	MULTIPLEXING					
M1	Dynamic multiplexing	+	+	+	+	+
M2	Multimedia flexibility	+	+	+	+	+
M3	Differential time delay compensation	+	+	+	+	+
M4	Protection					
M4a	Prot header or BAS	+	+	?	?	?
M4b	Prot . of diff media	+	+	?	?	?
M5	Dynamic bit allocation	+	+	?	?	/
M6	Change over requirment	+	+	+	+	+
M7	Recovery time demultipl	/	/	/	/	-
M8	Experimental result					
M8a	picture quality	?	+	?	?	+
M8b	audio quality	?	+	?	?	?
M9	Existing standard	+	+	+	?	?
M10	MCU additional delay	/	/	/	?	-
M11	Video efficiency	?	+	+	+	+
	SERVICE					
S1	Interconnection with basic telephone	+	+	- ?	- ?	-
S2	Compatibility with other Audio visual service	+	+	- ?	- ?	-
S3	Public network oriented	+	+	- ?	- ?	-
S4	Multipoint capability	+	+	- ?	- ?	-
S5	Message channel	+	+	+	+	+
S6	Supplementary facilities (fax, telematic, C&I)	+	+	+	+	+
S7	Encryption	+	+	?	?	+
S8	Call Transfer capability	+	+	?	-	-
	COSTS					
C1	Terminal complexity	+	+	?	-	-
C2	Network interface	+	+	?	?	?
C3	Existing VLSI\ CPU orient	+	+	?	?	?

Table 1