CCITT SGXV
Working Party XV/1
Specialists Group on Coding for Visual Telephony

Document #247
July 6, 1987

SOURCE: CHAIRMAN
TITLE : COMPARISON OF PROPOSALS ON FRAME STRUCTURE FOR mx64 kbit/s CODEC

---

## 1. Introduction

This paper provides a discussion material for further investigation on the frame structure for the mx64 kbit/s codec, summarizing the views expressed in contributions and meetings.

## 2. Function of frame structure

Frame structure gives a mechanism to multiplex multimedia signals (audio, video, data, Control & Indication, etc.) into a single bit stream.

## 3. Requirements from the system

Requirements to the frame structure are pointed out in the following documents;

- Annex 2 to the Report of WP XV/1, TD No.12-XV/1, April 1987,
- Doc. #237, June 1987,
- Section 6/Doc. #240, June 1987.

These are listed on the left column of the attached comparison table. The order of items are not necessarily in the order of priority, they are grouped as follows;

- Network (1 - 3)
- Performance (4 - 9)
- Extended application (10 - 11)
- Implementation (12)

It should be noted that how weigh each requirement is also a subject for consideration.

## 4. Schemes

We have two proposals and one information at hand for the mx64 kbit/s frame structure.

1) Y.221 approach: Draft Recommendation Y.221, Annex 2 (Question 5/XV) to COMXV-R16, November, 1987; Doc. #237, June 1987

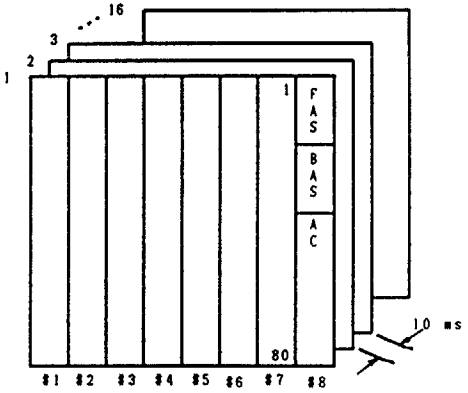
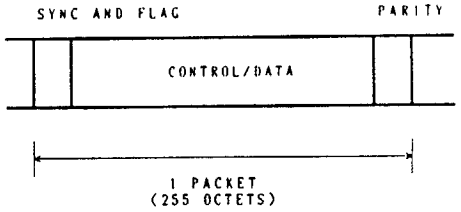
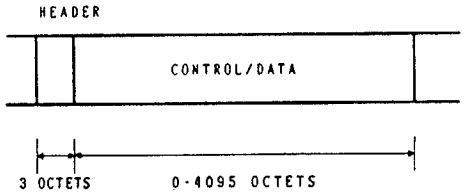
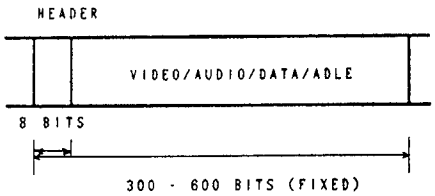
2) Packet approach (Varaible length packet): Doc. #241, June 1987

3) Packet approach (Fixed length): COMXV-No.135, February 1987

## 5. Comparison

Characteristics or realization method of each scheme for each requirement is described in the attached comparison table.

End

| SCHEMES / REQUIREMENTS | Y.221 APPROACH (Doc. #237) | PACKET APPROACH (Doc. #241) | PACKET APPROACH (COMXV-No.135) |
|---|---|---|---|
| | Multimedia information is multiplexed by assigning the the sub-channel or bit position to each medium.<br>  <br><br>1 channel=8 sub-channels<br>1 frame=80 octets<br>1 multiframe=16 frames | 1) Lower layer: The following functions are performed;<br>- Synchronization of multiple channels<br>- Error correction<br>- Encryption<br>- Communication procedures<br>  <br><br>2) Higher layer: A packet header indicates the information type, video/audio/data.<br>  <br> | A packet header indicates the information type. The transmission priority is in the order of;<br>- audio<br>- data<br>- video<br>- idle.<br>  <br> |
| 1. Compatibility between audiovisual services, ie. audioconference, video-conference, enhanced telephony, etc. | Compatible | ? | ? |
| 2. Multimedia applications (sound, picture, C&I, user to user signalling, messages, etc.) with basic telephone teleservice | - Multimedia<br>- Interworkable with telephone | - Multimedia<br>- Interworking with telephone? | - Multimedia<br>- Interworking with telephone? |
| 3. Adapted for public switched networks (ISDN or CSDN) | Designed for the circuit switched network application | Designed for the circuit switched network application | Designed for the circuit switched network application |

| REQUIREMENTS | Y.221 APPROACH (Doc. #237) | PACKET APPROACH (Doc. #241) | PACKET APPROACH (COMXV-No.135) |
|---|---|---|---|
| 4. Efficient channel utilization (less overhead, more bit rate for video) | Overhead = 16/640 = 0.025, excluding error correction | - Lower layer overhead = 7/255 = 0.027, including error correction<br>- Higher layer overhead = 3/4098 = 0.001 min<br>= 3/128 = 0.023 example | Overhead = 8/500 = 0.016 example, excluding error correction |
| 5. Allow dynamic bit allocation for video, audio, and data. Bit allocation change should be fast. | Once every 80ms (min) | Determined by the higher layer packet length | Packet length (around 10ms) + alpha |
| 6. Procedure to synchronize two B channels. This will allow 128 kbit/s applications without requiring TSSI to be maintained in the network. | - Initiation sequence sent at the start of the call, or<br>- Synchronization patterns in both B channels (Overhead in the 2nd channel = 8/640), or<br>- Video sent with identifiable packet header | Sequence number in the lower layer packet (mod 128) | ? |
| 7. Real time transmission for the low bit rate (eg 2400 bit/s) data | A 300 bit/s telewriter channel already been implemented. An alternative is to use the 4 kbit/s message channel. | Delayed by the time determined by the higher layer packet length | Semi-real time transmission since the data has the second transmission priority |
| 8. Minimize the absolute transmission delays, taking into account the processing delays in video codecs | No delay due to multiplexing | Some delay due to packetizing, the value being dependent on the higher layer packet length | Audio delay and transmission efficiency is a trade-off.<br>Efficieny Delay<br>0.980 50ms<br>0.990 100ms |
| 9. Ensure correct operation in presence of transmission errors | - BAS: majority decision (5 out of 8)<br>- Video/audio/data/C&I: error corrected outside Y.221 | Double error correcting Reed-Solomon codes for the lower layer 255 octets | - Header: BCH coded<br>- Information: each signal is error corrected as necessary. |
| 10. Allow multipoint working | MCU performs processing of multimedia signals. | Use of BR command in the lower layer | ? |
| 11. Permit forward compatibility with emerging ISDN recommendations for terminal parameter negotiating sequences and for dynamic network allocation control | Protocol using BAS and AC? | Through PD, PC, RD, RC commands in the lower layer | ? |
| 12. Easy to implement and cheap, microprocessor implementation | - Already implemented using a micro controller.<br>- An LSI chip is under development. | Byte oriented | Byte oriented |