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

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Source: USA

Title: USA domestic network considerations

INTRODUCTION:

In the US, for low tariffed bit rate services, the full 64 kbit bandwidth is not available on DSO channels as a result of the carriers' current network implementations. In addition, the ones density requirements in the US are different from those outside North America.

Case 1: For P = 1, 2

In the US, only 56 kbits of each DSO channel are unrestricted, so that the network providers can handle their signaling and ones density requirements. The European networks do not have these constraints, and hence use the full 64 kbits. All discussion of the flexible hardware trials and the standard assume the full 64 kbits are available. Hence we propose that the international trails involving North America use p* 56 kbits so as to provide the most interconnectivity. We propose a Septet Based format according to the attached document. Also, there should be handshaking in the call initiation to indicate bitrates must be in multiples of 56 kbits.

Case 2: For P = 6, 24

The US domestic network has different ones density requirements than in Europe, and as well, can not currently handle B8ZS encoding. While the network providers are moving towards true clear channel capability, it is unlikely that facility will be available in the time frame of the flexible hardware trials or the early life of the standard. Hence consideration must be given to the modifications necessary to make sure that the coded bit stream will be transmittable. We propose that Zero Byte replacement be performed according to CCITT SGXV Specialists Group on coding for video telephony document 252.

ATTACHMENT 1

TITLE: M x 56/64 kbit/s Video Telephony: Frame Format, Coding and Network Aspects

1. *INTRODUCTION*

This attachment is meant to provide mitigation for the concerns expressed in the cover letter regarding interworking with the North American telephone networks.

It describes the network aspects for connections to 56 KbPs as well as 64 KbPs services.

Particular note should be taken of Section 3.2 for 56 KbPs operation.

2. *NETWORK ASPECTS*

2.1 Reference Connections

2.1.1 1 x 56 kb/s, V.35 Interfaces Figure 1 shows a reference connection of two 56 kb/s video telephones connected by a 56 kb/s data service using V.35 interfaces. A 56 kHz clock is available at the V.35 interface, but an 8 kHz clock is not assumed. Possible network services include 56 kb/s Digital Data Service (DDS) or 56 kb/s Public Switched Service (PSDS), using conventional data terminals having the V.35 interface.

2.1.2 2 x 56 kb/s, V.35 Interfaces Figure 2 shows a reference connection of two video telephones connected by two separate 56 kb/s data services. Neither septet timing nor septet alignment is assumed. That is, there is no 8 kHz clock, and the absolute delay of the two 56 kb/s connections may be different.

2.1.3 1 x 64 kb/s, with Octet Timing Figure 3 shows a reference connection of two video telephones connected by a 64 kb/s network service. The network provides an 8 kHz clock to each terminal, and the octet transmitted during each 125 microsecond interval will be received intact during a 125 microsecond interval at the other end of the network connection. An example of a network service would be an ISDN 64 kb/s unrestricted bearer capability call.

2.1.4 2 x 64 kb/s, with Octet Timing, without Octet Alignment Figure 4 shows a reference connection consisting of two separate 64 kb/s connections. In this case, there is octet timing as described previously. However, since the two connections were separately configured, there may be a difference in the absolute delay of the two connections. An example of a network service would be two separate 64 kb/s unrestricted ISDN calls.

2.1.5 2, 3, 4, 5, or 6 x 64 kb/s, with Octet Timing and Alignment Figure 5 shows a reference connection consisting of two video telephones connected by facilities operating at a multiple of 64 kb/s. In this case, there is zero differential delay between the several 64 kb/s channels. An example of a network service would be a DS1-rate private line.

2.2 Compatibility

2.2.1 Between Videotelephones When videotelephones are connected, they will operate according to one of the five hypothetical reference connections. Since a different network service, or a different number of 56/64 kb/s channels must be specified at the origination of the connection, the terminals will know a priori the method chosen for interworking.

At the time of the connection, the terminals will exchange capability indications, including whether they are able to operate over two more channels. It must be a user option to determine whether one or two channel operation is used in a given call, so that the user may control the trade-off between video and audio quality versus transmission cost. Furthermore, the terminal should be capable of single channel operation on either port, and if one channel of a pair in use becomes disconnected, communication should proceed without interruption on the remaining channel.

Manufacturers may choose to implement a subset of the capabilities.

2.2.2 Between Videotelephones and PCM Terminals Since PCM terminals and/or interfaces to the PSTN require 64 kb/s operation with octet timing, interworking with PCM terminals is only possible in configuration 3. However, in the case of configuration 1 on a PSDS service, the Data Service Unit (DSU) may have a separate means of intercommunication with PCM terminals.

2.2.3 Between Videotelephones and 7 kHz Audio or Audio/Data Terminals Intercommunication between videotelephones and 7 kHz audio or audio/data terminals is possible in configuration 3, since the same framing and signal formats are used.

It is noted that 7 kHz audio or audio/data terminals may also, in the future, be specified for 56 kb/s operation (configuration 1). The 7 x 80 bit frame specified for 56 kb/s videotelephony should be compatible with that for 7 kHz audio and audio/data terminals.

The Recommendation H.221 now provides for specific submultiplexing of data at the standard rates of 300, 1200, 4800, 9600 and 14400 bit/s. Furthermore, it is expected that the 16 kbit/s speech coding algorithm and line format will actually need the whole 16 kbit/s channel during talking intervals. Therefore, it appears more appropriate to define a septet-oriented format for 56 kbit/s transmission, rather than to define the necessary rate adaptions needed to derive standard rates from an octet-oriented format transmitted at 56 kbit/s.

2.3 Calling Procedures

Terminals will be able to distinguish which reference connection is in use be virtue of which loop interface and which call type is being used.

2.3.1 64 kb/s ISDN Calling Calls between 64 kb/s terminals will observe the procedures of Recommendation G.725.

2.3.2 56 kb/s Calling Calls within PSDS will be completed according to the procedures applying to setting up a 56 kb/s digital data connection. Once this connection is set up, the terminals will come into frame, and the procedures of Recommendation G.725 will be used.

2.3.3 Interconnection Between ISDN and PSDS Terminals If an ISDN videotelephone connects with a PSDS terminal, the connection will be a 56 kb/s data call, rate adapted to the 64 kb/s bearer channel, so far as the ISDN terminal is concerned. The ISDN videotelephone may optionally be equipped to intercommunicate with such an arrangement, operating as though it were a V.35 56 kb/s videotelephone connected to an ISDN V.35 terminal adaptor.

3. *TRANSMISSION FORMATS*

3.1 Framing Signal

The transmission shall be arranged in 80 octet as specified in CCITT draft Recommendation H.221 for n x 64 kbit/s, and in 80 septet frames for 56 or 2 x 56 kbit/s. Sixteen frames are grouped in a multiframe as specified in H.221. The least significant bit of each octet/septet shall be the service channel, the first eight bits of the service channel in each frame shall carry the frame alignment signal, and the second eight bits of the service channel shall carry the bitrate allocation signal as specified in H.221.

3.2 Transmission Formats

3.3 56 kb/s Operation

In 56 kb/s operation, the septets of each 7 x 80 bit frames will be transmitted in order, most significant bit first at the 56 kb/s rate. Septet alignment will be recovered from the frame alignment signal as specified in H.221.

3.3.1 2 x 56 kbit/s Operation In 2 x 56 operation, each of the 56 kbit/s channels will be framed and transmitted separately. Septet timing will be recovered independently from the frame alignment signal of each channel, and the different delay between the channels will be compensated for on the basis of the multiframe numbering method specified in H.221.

The voice signal will be carried in one of the two channels. However, video, graphics and auxiliary data communications may be carried by either or both of the channels.

3.3.2 64 kb/s Operation In 64 kb/s operation, the octets of each frame will be transmitted in order, most significant bit first, at the 64 kbit/s rate. Each frame will be transmitted in 10 msec. Octet alignment will be derived from the network, and the terminal will use network octet timing to send correctly aligned octets. However, the terminal may choose to frame on the received signal independent of network octet timing.

3.3.3 2 x 64 kb/x Operation Octet timing will be derived from the network, and the terminal will transmit correctly aligned octets.

3.3.3.1 Low Rate Encoded Speech When low rate encoded speech is used, then speech will be transmitted in one of the two channels. However, either or both of the channels may contain video, graphics, and auxiliary data signals.

Each channel will be framed separately, and differential delay will be determined and compensated for by the multiframe numbering technique of H.221.

3.3.3.2 7 kHz Audio When 7 kHz audio is used, then one of the two 64 kb/s channels will contain video, graphics and auxiliary data signals.

The other channel will contain only audio and auxiliary data signals. This channel will be framed and transmitted according to H.221 and G.725.

Differential delay between the two channels need not be compensated for, considering that it will be possible to limit differential delay to 50 msec by ISDN signaling requests, or by private network design.

3.3.4 2, 3, 4, 5 or 6 x 64 kb/s

3.3.4.1 With Low Rate Speech Encoding In this case the signal is structured into 80 octet frames and the octets are transmitted in order, most significant bit first, at the rate of 128, 192, 256, 320 or 384 kb/s. The time to transmit one frame is 5, 10/3, 2.5, 2 or 5/3 ms.

It is noted that this approach causes the transmission rate of each signal transmitted in the frame to scale proportionately. Thus, if 2 bits per octet in each frame are used for speech, the speech rate for 6 x 64 kb/s transmission becomes 96000 bit/s. However, in this case the speech can be transmitted in every sixth two-frame submultiframe in order to reduce the average speech transmission rate to 16000 bit/s.

3.3.4.2 With 7 kHz Audio Encoding In this case 1, 2, 3, 4, or 5 channels are used for the transmission of video, graphic and auxiliary data information, and they are combined to form a framed channel of 64, 128, 192, 256 or 320 kb/s.

The other channel is frames separately, and carries 7 kHz audio auxiliary data channels as described for the 2 x 64 kb/s case above.

The compatibility of 6 x 64 kb/s with 384 kb/s video telephony is under study.

3.3.4.3 Dynamic Allocation within DS1 Rate Channels

Intelligent terminals may have a means for dynamically increasing or decreasing the bitrate during a connection. The means for controlling such allocations are beyond the scope of this standard, since the means must operate on channels not carrying videotelephony information. However, it is noted that the 2, 3, 4, 5, and 6 x 64 kbit/s signals are compatible with this mode of operation, and that the low rate encoded speech format and the video/graphics part of the 7 kHz audio format can be sent at any speed, not necessarily multiples of 64 kb/s. When rates which are not multiples of 64 are used, then network octet timing is not meaningful, and the framing must be extracted from the received signal independently.

3.4 Bitrate Allocation

The bitrate allocation signal is transmitted according to H.221, and defines the content of each two-frame submultiframe.

4. CONCLUSION

We believe this proposal will enable efficient interworking of 56 KbPs and 64 KbPs networks for the lower values of (P) (1,2) in P x 64 video teleconferencing service.

Figure 1

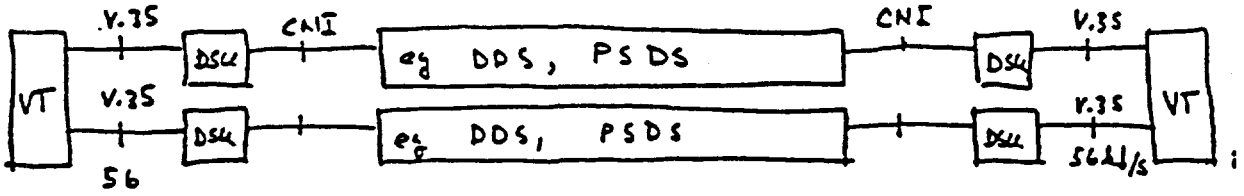

Figure 2

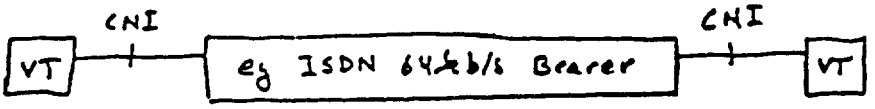

Figure 3

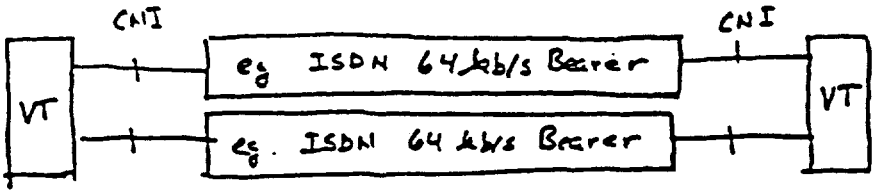

Figure 4

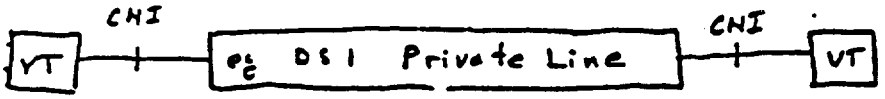

Figure 5