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Specialists Group on Coding for Visual Telephony - Contribution No. 273

Source : BELL COMMUNICATIONS RESEARCH

Title : AN EVALUATION OF DRAFT RECOMMENDATION Y.221 AGAINST THE
REQUIREMENTS PROPOSED IN THE US CONTRIBUTION

1. ABSTRACT

This contribution compares Draft Recommendation Y.221 against the requirements that are listed
and classified in the US contribution titled "Requirements for m x 56/64 kbps Frame Structures
for Visual Telephony". The comparison follows the classification in the US contribution, that is,
the draft recommendation is compared against the "essential" requirements.

2. COMPARISON AGAINST ESSENTIAL REQUIREMENTS

1. *Interworking with ordinary telephone service and with audio-only teleconferencing terminals
   (e.g., G.722, G.72y)* - Draft Recommendation Y.221 explicitly specifies some of the algorithms
   that are compatible with the frame format. Among these are G.711, G.721, and G.722. In
   addition, Draft Recommendation G.72y relies on the Y.221 frame format, for both audio
   only and audio/data operation.

2. *Adaptability for public switched network* - Y.221 is designed for the circuit switched public
   network.

3. *Allow dynamic bit allocation for video, audio, and data. Fast bit allocation* - The switching can
   be done after the switching signal has been transmitted for one submultiframe (80 msec).
   Therefore, the time before an actual switch can be made is between 80 and 160 msec (0 to 80
   msec till the beginning of the next submultiframe, plus 80 msec for the signal).

4. *Terminal procedure to allow operation over two ISDN B channels (at 128 kbps) without
   requiring Time Slot Sequence Integrity to be maintained within the network* - Currently there
   is no scheme to allow the synchronous operation of the two B channels embedded in the
   frame format. However, a contribution from Bellcore proposes a scheme which utilizes some
   of the currently reserved bits to allow for a synchronization procedure.

5. *Assure proper operation in the presence of transmission errors* - The majority decision of the
   BAS provides for a false detection probability of

$$P_{false} = \binom{8}{5} \sum_{e=1}^{8} \binom{8}{e} P_e^5$$

where P_e is the probability of an octet with a given error structure of e bit errors.

$$P_e = p^e (1-p)^{8-e}, \qquad e = 1,...,8$$

Inserting $p = 10^{-3}$ yields a value of $P_{false} = 4.33 \cdot 10^{-13}$. Even in a relatively high bit error rate, the probability of a false detection is very small.

As far as data transmission is concerned, Y.221 allows for any type of error correction mechanism to be inserted in a higher layer of the protocol.

6. *Support multipoint working* - Draft Recommendation Y.221 allows for multipoint working, where network equipment, namely a MCU, performs processing of multimedia signals.

7. *Provide for flexibility in bit rates; i.e., m x 56 kbps, m x 64 kbps, m = 1,...,6* - Y.221 is specified for a single 64 kbps channel. However, nothing in the recommendation precludes its use in a multiple channel configuration. It is also possible to slightly modify Y.221 to allow for 56 kbps operation. If such a modification is required, it could be achieved, for example, by moving the signaling to the seventh bit and searching for framing in both positions.

To summarize, it seems that Y.221 answers most of the requirements that were designated as "essential". It could be enhanced to allow for synchronization of several channels. It could also be slightly modified (preferably on a national basis, provided that compatibility with international standards is preserved) to allow operation over 56 kbps links. It is further suggested that the usage of the CRC procedure (proposed in a liaison from SG XVIII) be optional, or defined for national use.

As far as the other requirements are concerned, Y.221 demonstrates good performance regarding most of the requirements specified as "desirable" and "nice". It has multimedia capability and it can be interworked with the telephone network, it has only 2.5% overhead, it has no delay due to multiplexing, it provides forward compatibility with emerging ISDN recommendations because there are a lot of yet undefined codes that can be defined as capability codes, and it is easy to implement on a single microprocessor.