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

Doc. # 536
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Subject: Improvements to H.221 for Audio/Visual Services

Source: Bellcore

1. Introduction

H.221 is becoming quite complicated in response to the need to support various Audio/Visual services. A major problem that is identified is the specification and negotiation of the new functions as they are being added. This document provides some comments and possible solutions to the above issue.

2. Applications Channel

With the revised version of H.221, phase B2 establishes common parameters specific to videophone applications. These parameters are negotiated through applications channel and they include: video/audio encryption, clock source, 56 Kbps network etc.. In our opinion, it may be desirable to use BAS codes rather than AC for such applications. In fact, one source of complexity in H.221 is the existence of both an applications channel and a data channel. It is suggested that some functions envisioned for the applications channel can be carried out by the BAS. Other functions of the applications channel can be implemented over a sub-channel of the data channel as discussed in the next section. **We therefore propose the elimination of the applications channel - as part of H.221 - be studied and considered.**

3. Data Channel

Standards exist (or are being studied by data experts) for rate adaptation, sub-multiplexing, and communication of interface status over a data channel.

One possibility is to use V.120, which uses a full LAPD implementation at layer 2 and has some layer 3 header bytes for control purposes. It can perform the aforementioned functions, but it is relatively inefficient at 6.4 kb/s.

Another possibility is to use frame relaying, or another "core LAPD" protocol. These will be much more efficient for rate adaptation and sub-multiplexing at 6.4 and 14.4 kb/s. Frame relaying is not yet defined to communicate interface status, so far as we know. If a packet protocol is used to sub-multiplex the data channel, then one sub-multiplex channel can be used to communicate that "application channel" information which cannot be put into the BAS channel. This makes it unnecessary to specifically identify an application channel in the H.221 frame formats.

The rates of the data channels identified for attributes 011 and 101 should be 300, 1200, 4800, 14400, 38400, 56000, and 64000 bit/s to accommodate single-channel synchronous data communications at commonly used rates. The rates of 6.4, 14.4, 22.4, 30.4, 38.4, 46.4, 54.4 and 62.4 kbit/s should be defined to accommodate single or multi-channel data communications using packet protocols. Whether the data channel can be synchronous transparent, V.120, frame relaying, audiographic stack, videographic stack,

etc. should be communicated by separate capability/command BAS.

4. BAS Code Escape Plan

Since the simpler terminals will not want to implement the full data capabilities, their C&I needs should be accommodated within the BAS structure.

At present, the BAS have a hierarchical structure based upon the:

< attribute | attribute value >.

It is proposed that the hierarchical structure be extended by two more layers so that the full hierarchy consists of:

< attribute class | attribute family | attribute | attribute value >.

Attribute class and attribute family would be 3 bits long, each, and they would have the default value of 000. They can be changed to other values by BAS with attribute 111, according to the table and notes in the annex.

It is further proposed that escape code tables be defined for each combination of attribute class, attribute family.

One function of the application channel was to indicate the capability for one or more "non-standard" algorithms or systems operation aspects. A BAS message approach is one way of communicating this more complicated information, and is suggested in the annex.

5. Video Decoder Capabilities

In SG XV, Temporary Document 99-E (March 13-22), video decoder capabilities are constrained to the following parameter values:

a) Picture format
b) Maximum decoding bit rate
c) Maximum frame rate

The question is to define the number and/or hierarchy (if any) of video decoder capabilities. In the US some thought has been given to the above and it is suggested that a new parameter indicating "Maximum rate of significant blocks" be added to the above. This parameter may, for example, set an upper limit on the number of coded 8X8 blocks per frame for every 33 msec interval. In addition, we feel the meaning of "Maximum decoding bit rate" and its relation to the transfer rate capability should be further clarified.

6. C&I Signaling

A fundamental question is how C&I signals for Audio/Visual services are negotiated (through H.221, or be synchronized with video) ? An equivalent question is whether a layered or mixed layered (as is practiced now) protocol approach should be taken ?

7. 64/56 Kbps Interworking

We feel no requirement should be placed on 64 Kbps terminals to operate by any other method than network supplied octet timing. This will remove the burden of H.221 bit searching cost unless the manufacturer chooses so. For your information, we have

provided the "Status of 56 Kbps Transmission of 7 Khz Audio" in a companion document. It is our opinion that a similar approach may be used for videophone videoconferencing applications.

ANNEX

Attribute	Attribute Value	Meaning
111	00000	Set attribute class to 000 (Note 1)
	00001	Set attribute class to 001
	00010	Set attribute class to 010
	00011	Set attribute class to 011
	...	...
	00111	Set attribute class to 111
111	01000	Set attribute family to 000 (Note 1)
	01001	Set attribute family to 001
	01010	Set attribute family to 010
	01011	Set attribute family to 011
	...	...
	01111	Set attribute family to 111
111	10000	Set escape table index to 000 (Note 2)
	10001	Set escape table index to 001
	10010	Set escape table index to 010
	10011	Set escape table index to 011
	...	...
	10111	Set escape table index to 111
111	11000	Start of BAS Message (Note 1, 3)
	11001	Reserved
	...	...
	11110	Start of non-CCITT Capabilities Message (Note 4)
	11111	Start of Select non-CCITT Mode of Operation Message (Note 5)

Note 1: These 8 attribute values have the same meaning for all attribute classes and families.

Note 2: These 8 attribute values have a unique meaning for each attribute class, attribute family combination. Each attribute family, attribute class combination has a set of 8 escape tables with 256 entries each. The BAS received in the next submultiframe is interpreted according to the corresponding entry of the table whose index is identified in the present submultiframe. Thus, for each attribute class, attribute family combination:

224 capabilities or commands may be sent in a single submultiframe by sending a BAS in the range 000 00000 to 110 11111, and

2048 capabilities or commands may be sent in two submultiframes by sending a BAS in the range 111 10000 to 111 10111 followed by a BAS in the range 000 00000 to 111 11111.

Note 3: The BAS message format is as follows:

111 11000
length of information in octets, N
information octet 1
information octet 2
...
information octet N

Note 4: The message format is as follows:

111 11110
6
Standards organization (msb)
Standards organization (lsb)
Manufacturer identifier (msb)
Manufacturer identifier (lsb)
Type identifier (msb)
Type identifier (lsb)

The message may be sent several times to indicate multiple capabilities.

Note 5: This message has the same format as in Note 4. It is sent to indicate that communication according to the non-CCITT mode of operation will commence in the next submultiframe.