Telecommunications Standardisation sector
Study Group 15
Experts Group for Video Coding and Systems
in ATM and Other Network environments

Document AVC-795
Version 1
15-18 May, Haninge

Source: BT
Title: Outstanding H.245 issues for ATM-based systems
Purpose: Discussion and proposal

At the meeting of the SG15-LBC group in Geneva in March 1995, it was agreed to harmonise the PSTN control Recommendation, H.246, with the ATM equivalent, H.245, into a single Recommendation, H.245. Draft Recommendation H.246 no longer exists.

This contribution lists the outstanding issues related to H.245 for ATM-based systems, considers issues raised using e-mail and proposes some solutions. Commonality with solutions for PSTN systems is proposed wherever this is possible.

1. Logical channel acknowledged procedures

H.324 does not have the equivalent of PSI/PSM tables and puts this functionality into the control Recommendation, H.245. This functionality includes acknowledged procedures for logical channel set up, and mode switching. These mode switching and logical channel set up procedures are very similar to those currently defined in H.222.1.

The issue here is where should this be specified in the ATM-based case (H.245 or H.222.1) and in which channel should it be transmitted (H.245 or PSI/PSM)?

It would seem quite ridiculous to define a set of acknowledged procedures in H.245 that shall be used in PSTN-based systems but shall not be used in ATM systems, and to define an analogous set of procedures within H.222.1 to be used for ATM. This is not in the spirit of harmonisation. In addition to this, H.245 messages will be transported using a reliable (X.214) service, while H.222.1 transmission provides only CRC checking.

It is proposed that the logical channel signalling acknowledged procedures currently defined in H.245 for PSTN-based systems also be used in ATM-based systems in preference to those defined in H.222.1.

2. Initial communication and logical channel acknowledged procedures

It is not clear how acknowledged procedures should be used at the start of communication, such as for the channels for PAT, PMT (PSM) and the control channel, and for initial audio communication.

The following describes initial communication in PSTN-based systems (H.324). There is no PAT and PMT, and logical channel (LC) zero is always used for H.245 control data. All LCs are set up using the H.245 logical channel signalling procedures, and no mode indication messsages (like PMT/PSM) are defined. No data is transmitted until LCs are set up according to the acknowledged procedures.

In ATM-based (H.310) systems, there are two scenarios: single VC and multiple VC.

In the multiple VC case, one VC is set up to carry only H.245 data. Other VCs can be set up as required, and all logical channels within them can be set up using the H.245 acknowledged procedures, although this is probably unnecessary for PAT and PMT/PSM.

The single VC case is not quite so 'clean'. The control channel must be established before it can be used to set up other LCs: this is done using the PAT and PMT/PSM.

It is proposed that PAT, PMT/PSM and the control channel are not subject to the acknowledged LC procedures in either of these cases. All terminals must be capable of receiving these channels, and these

will persist throughout the call. Acknowledged procedures are most useful for channels that appear for a time and then disappear again, and carry data that not all terminals will understand by default.

The initial audio channel is different: it will not necessarily last for ever; also does it always need to exist? if the capability exchange is fast enough, why not go straight to the desired (high quality) mode? It is proposed that LC signalling be used for the 'initial' audio channel; if this is the default (G.711), then this signalling can occur at the same time as the capability exchange and therefore need not incur a lot of delay.

If this were done, then it would be possible to mandate the use of H.245 logical channel acknowledged procedures in all bi-directional communication (and never use them in uni-directional communication). This would overcome the current confusion about the legality of using acknowledged procedures to close channels that were opened in an unacknowledged way.

It is proposed that these details be added to section 4.4, 'H.310 Call Phases', of H.310.

3. Repetition of PAT and PMT/PSM

When logical channel acknowledged procedures are used, PAT and PMT/PSM are not particularly important: H.324 has no equivalent mechanism for mode indication, and relies totally on the acknowledged procedures.

PAT and PMT/PSM are more important initially to establish the PMT PID and control channel PID. Solutions to this problem include having default PIDs for these logical channels and retransmissions.

4. Capability sets

This section lists some issues concerned with capability sets.

4.1. Video capability

H.261 video capability is necessary for PSTN systems. But why should H.261 not be allowed to be transported in a H.222 multiplex?

There is no mention of aspect ratio in the video capabilities. It may be beneficial to include this.

4.2. Audio capability

H.245 only includes capability messages for MPEG-1 audio. Should messages for MPEG-2 audio capability be added?

4.3. Data capability

The data capability message is probably incomplete. For example, the entry t120 does not indicate whether this is T.120 capability within the MPEG multiplex, or whether it is T.120 capability on a separate VC, or both.

It should be made clear that there are two modes of running T.120: within the MPEG multiplex and on a separate VC. Perhaps only one codepoint is necessary, and all receivers that declare T.120 capability should implement both modes. H.310 (or H.245?) should indicate which protocol stacks should be used in these cases. Commonality with decisions of SG8 (T.123), the PSTN terminal, and with protocol stacks that may be present in H.310 for other purposes is highly desirable. The protocol stack for use on the MPEG (and also H.223) multiplex could be the same as T.123 specifies to work on H.221 (Q.922 and X.224 class 0), which is also the protocol stack for H.245 running in the MPEG multiplex. Currently SG8 has not agreed a protocol stack for a single VC mode of operation. Perhaps this should have maximum compatibility with the other stack, and the single VC stack for H.245?

The same applies to DSM-CC as to T.120.

The semantics for V42/LAPM and V42bis should be extended to specify that these protocols will operate on top of PES packets, and there shall be no HDLC flags etc.. The code point for transparent data should be removed? Codepoints for T.84 and T.434 should not be added until complete protocol stacks have been proposed, and then should be restricted to use in PSTN-based systems.

4.4. Network capability

The ATMNetworkAdaptCap capability message may have some use in the multiple VC scenario. The choice of AAL and multiplex can then be made as part of the capability exchange and mode choice process.

However, the current messge has very limited capability: it does not specify bit rate limits or AAL capabilities for each VC. Another problem is that H222Multiplex is included, although this is not an ATM network capability. It is therefore proposed to split these capabilities into two messages, and to restructure the ATM network capability, as shown below.

```
H222Capability              ::=SEQUENCE
{
    h222Multiplex           BIT STRING
                            {
                                transportStream  (0),
                                programStream    (1),
                            },
    ...
}

ATMNetworkAdaptCap          ::=SEQUENCE
{
    numberOfVCs             INTEGER,
    vcCapability            SEQUENCE OF
    {
        aal                 BIT STRING
                            {
                                Aal1        (0),
                                Aal5        (1),
                            },
        bitRate             INTEGER,
        ...
    },
    ...
}
```

VC ön

AAL ön

bit rate

4.5. Encryption capability

Do we need messages to indicate the capability to transmit and receive encrypted signals?

5. Fast Mode Switching

It is not totally clear how fast mode switching operates. The basic principle is that many LCs are set up before they are needed, using the acknowledged procedures; and then to change mode, data transmission on one LC is stopped, and transmission of the new mode is started on another LC. However, having two LCs open at the same time implies the capability to receive data on both of them at the same time (dependent capabilities). Even if the transmitter complies with the spirit of this procedure, it is not clear to the decoder when it should switch between the LCs.

mode switching

Slow mode switching does not suffer these problems. Either the use of the LC is redefined, or within one message, the old LC is closed and another opened. This does, however, incur a round trip delay during which there is no data transmission on the old and new LCs.

As this problem exists in both ATM and PSTN based systems, a solution within H.245 is preferred.

6. Relationship between PID and I/O port

It has been suggested that messages may be needed to define relationships between PIDs and I/O ports, such as in the case of multi-lingual applications.

As PMT can be used to group related streams together in program definitions, and as descriptors exist to clarify the differences between streams (the language descriptor could be used in the above example), there appears to be no need for additional messages to address this issue.

7. Logical channel signalling syntax

The current ASN.1 syntax for logical channel signalling only allows one LC to be opened/redefined/closed within a single logical channel signalling message, and only allows one of these messages to be active at any one time, as the acknowledgement message does not identify which instance of logical channel signalling message it refers to.

It would be beneficial to allow multiple LCs to be mentioned within a single logical channel signalling message. This can be done by changing SEQUENCE to SEQUENCE OF in the ASN.1 representation of the logical channel signalling message.

8. PMT/PSM - Logical channel signalling duplication

The program tables do duplicate data that has been transmitted in logical channel signalling messages in H.245. This is not a problem. The tables allow descriptors to be included and provide compatibility with other MPEG equipment.

9. H.230 C&I

H.245 now allows all H.230 C&I messages to be transmitted. H.310 should specify which of these it is mandatory to support.

10. Flow control

A flow control message and procedure has been added to H.245 for PSTN-based systems. The idea is to use this in multipoint applications, including those with H.320 terminals, to control the bit rate produced by each connected terminal. This type of procedure may be useful in ATM-based systems and should be allowed.

11. Multiple VC operation

Multi-link operation in PSTN-based systems is currently being proposed. Multi-link (multiple VCs) operation in ATM-based systems has not been addressed, but should be: we have a protocol stack for the separate VC solution, but no messages or procedures to control the additional VCs. It should be possible to have a similar solution to that being proposed for PSTN. Section 4.4 of H.310 suggests that more VCs can be set up as a result of the capability exchange but no messages or procedures exist in H.245 to do this.

What is needed to do this? Messages to warn of the establishment and closing of VCs? Call association to associate new VC with existing communication? Should we require PIDs/stream_IDs to be unique over all VCs? Should all VCs carrying MPEG multiplexes carry valid MPEG streams, for example, all carry PCRs/SCRs?

Allowing PIDs/stream_IDs to be used for different streams on different VCs would seem to cause unnecessary difficulties, for example, if a single MPEG multiplex is to be created. It would seem unnecessary to transport PCRs/SCRs on each VC, and be preferable to do this on one VC - the one with lowest jitter.

12. Incomplete sections

There are still some incomplete and missing sections in H.245. They are as follows.

Section 6.2 on point to multipoint operation is possibly incomplete.

Text is needed for the FR-SSCS section of the protocol stack description.

Text is needed for Appendix I and II. Dan Helman, IIT, has offered to generate some for Appendix II.

The message and procedure for measuring round trip delay are incomplete. These originated in PSTN-based systems to determine whether it is appropriate to use retransmission of video. There is no reason why this simple procedure should be disallowed in ATM systems.

END