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

Document AVC-751
Version 1
15-18 May, Haninge

Source: BT
Title: Harmonisation of H.245 and H.246
Purpose: Discussion and Proposal

At the recent meeting of ITU-T SG15 WP1, harmonisation of H.245 and H.246 (previously known as H.24x and H.24p) was requested. This contribution, which describes some of the differences in the documents input to WP1 and suggests how they could be harmonised, was presented to the SG15-LBC group at their meeting in Geneva in March 1995, where it was agreed to proceed with a single, harmonised recommendation, H.245.

Comparison of ASN.1 and H.246 encoding procedures

The messages of H.245 have been defined using ASN.1 notation, an abstract syntax notation which allows generic syntax to be written down clearly, and without concern for how the messages will be encoded into bits and bytes. A number of 'rules' have been standardised for the encoding of ASN.1 syntax: basic encoding and packed encoding to name two. In particular, the packed encoding rules, defined in X.691, achieve very high efficiency, perhaps very close to that which could be achieved by careful manual definition of code tables.

The messages defined in H.246 could very easily be converted to ASN.1 notation. No change to the meaning of these messages would result, although the bits transmitted would of course be different, but not necessarily very different in number.

The use of ASN.1 in H.246 would make H.246 bit-wise compatible with H.245, as well as make both documents look the same.

Lower layer protocols

H.245 currently does not make reference directly to lower layer protocols, but is to be carried by X.224 class 0, which provides a class of service defined in X.214.

H.246 makes use of a subset of LAPM (V.42) as a lower layer, tightly coupling its mechanisms into the procedures of H.246. XID frames are used to transport messages because they define a hierarchical structure of messages that is well matched to the type of message to be transported; and XID response frames are used to acknowledge the understanding of H.246 messages. This use of XID frames is not as specified by V.42 where they are used to set up the parameters for communication, and not to carry the data itself.

If H.246 were to make use of ASN.1 notation for the description of messages, there would no longer be a need for XID frames to carry message data: any frame type defined in V.42 could be used, such as (numbered) information frames. The choice of lower layer protocol, and how it is used is not relevant to the harmonisation of H.245 and H.246 provided that procedures and message structure within the protocol are not dependent on lower layer features.

H.245 needs a new section on lower layer protocols, what they are, and which flavours of them are to be used and how.

H.246 already contains description of lower layer protocols. In the interest of harmonisation, and respecting the principles of layering, the use of acknowledgements within the procedures

could be reviewed, with the aim of keeping acknowledgements within the same layer as the message being acknowledged. In particular, it would be beneficial to distinguish acknowledgement of receipt of data and acknowledgement of understanding of that data. H.245 currently defines messages to acknowledge understanding of CapSet and RequestMode messages.

Mode indication
H.246 has a mode indicator message that states what the terminal would like to send, and defines the relationship between virtual channel number and the contents of the channel; this is absolutely necessary for demultiplexing. H.245 does not specify such a mechanism, as this is provided by the PSI/PSM tables defined in H.222.0.

H.246 requires that a mode indicator message shall be acknowledged before that mode can be transmitted. Acknowledgement is currently by sending response frames: it is not clear whether this acknowledges receipt of data and/or ability to receive and decode the indicated mode. H.245 has no analogous procedure. H.222.1 specifies an optional procedure for the acknowledged set-up of sub-channels (analogous to virtual channels in H.246), but is not clear whether this relates simply to setting up a sub-channel or whether it implies anything about being able to receive and decode the data that will be sent in that sub-channel.

The following is proposed in the interests of harmonisation and respect of the principles of layering. The mode indicator message defined in H.246 be converted to ASN.1 notation and included in the common ASN.1 description. A message is also defined to acknowledge whether the indicated mode can be received and decoded; and would be used in addition to delivery acknowledgement provided by the LAP layer of H.246. Whether these messages and procedures could be beneficially added to H.245 requires further study, but a message that indicates that the current incoming message is not decodable would appear advantageous in both H.245 and H.246: currently, in this case, the capsets are sent again, and the far end terminal is expected to deduce from this that it is sending data that can not be decoded.

Indication of capability
The concept of independent and dependent capability sets in H.245 allows great flexibility in the statement of capabilities, including simultaneous capability (e.g. two simultaneous video decodes) and the variation in allocation of resources (e.g. G.728 and QCIF, or G.711 and CIF, but not G.728 and CIF). H.246 has limited ability to signal simultaneous capability, and no means to indicate 'dependent' capabilities. Note: H.245 is not inefficient in the use of bandwidth because it allows this flexibility: terminals that can not (or do not wish to state that they can) vary the allocation of resources can send one single 'independent' capability message.

Considering that this flexibility in H.245 does not incur the cost of extra bits to transmit, its inclusion into H.246 has more than harmonisation in its favour. The syntactic flexibility could be limited by semantic constraints, but there appears to be no great benefit in doing so.

Control and indication
H.245 does not currently have any control and indication messages, whereas H.246 does.

It has been agreed that these are needed in the H.32x terminal. In the interests of harmonisation these should be added to H.245.

Messages
Although the basic message structure is the same for H.245 and H.246, in some places the details are slightly different. This is not the time for the details, but it should be possible to

achieve harmony in this respect. Something that is present in only one Recommendation could probably be added to the other, and differences in units, ranges and names should be easily resolved.

Document structure

If both H.245 and H.246 are to specify messages using ASN.1, then this should be done so that bit-wise compatibility is achieved. However, there is still a question about whether the ASN.1 listed in each Recommendation need be identical, that is, should the bits that are not relevant to a recommendation be included within it? Examples include H.262 capability definitions in H.246 and H.263 in H.245.

Considering that both H.245 and H.246 are being standardised on identical timescales and that their editors work in the same company, it should be possible to keep identical ASN.1 syntax in both documents. Irrelevance of parts of that syntax could be handled in semantic definitions, where no description need be included for these elements, and a statement stating that the element shall not be present could be included instead.

Conclusions and Proposal

Despite their different appearances, H.245 and H.246 are very similar. The messages, although described in different ways and having different bit representations, have the same content. The procedures are also very similar.

It is proposed that the harmonisation of the two Recommendations is taken very seriously. Although the target bit rates are different, the functionality specified in the two Recommendations is the same: capability exchange etc.. There is no reason at all for inventing the same Recommendation twice, even if the work is being done in different groups.

H.242 caused many implementors to spend many hours investigating why their implementation didn't quite interwork with another. Experience will prevent the same problems occurring in H.245 and H.246, but problems are still likely to occur. It must be better to have only one set of 'problems' with a single harmonised Recommendation, rather than two separate sets of 'problems' with two independent Recommendations.

A companion contribution is a harmonised Draft Recommendation, made in alignment with the ideas expressed in this document. It includes all the content of the original two Recommendations, modified only as necessary for harmonisation. In addition the PSTN-based parts have been developed to fill the gaps that were present in H.246, such as flow control and H.223 specific functions.

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