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STUDY GROUP 15
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1.0 Introduction

This document defines the changes required to H.245 to support H.323 and H.22Z.

This document is divided into three sections which can be summarized as follows:

- 1.0 Introduction
- 2.0 H.245 Usage Options
- 3.0 Proposed H.245 Changes

1.2 References

[01] "Draft ITU-T Recommendation H.323" - Thom 5/18/95
[02] "Draft ITU-T Recommendation H.245" - Nielsen 7/95
[03] "Draft ITU-T Recommendation H.324" - Lindbergh 06/95
[04] "Draft ITU-T Recommendation H.22Z" - Skran 8/19/95
[05] "Conference Control in H.323" - Intel 9/29/95
[06] "Gatekeeper and Connection Setup in H.323" - Intel AVC-827
[07] "Mapping H.221/H.230 Commands to H.245" - AT&T 10/13/95

2.0 H.245 Usage Options

There have been two methods proposed describing how to use H.245 over H.22Z. Each method has its advantages and disadvantages as documented below. Our decision on ' which to use will effect the existence of a H.22Z header, our call setup PDU's and our use of RTP.

2.1 Open Logical Channel Procedures

2.1.1 Background

H.245 is built with the assumption that it owns logical channel numbering assignment. The transmitter selects a logical channel number, opens a logical channel, and then the underlying adaptation layer handles its mapping to a physical channel.

A site which wants to open a channel, selects a logical channel number and then includes it in an OpenLogicalChannelCommand which it sends to the remote site. The receiver, assuming it chooses to accept the open, sends an OpenLogicalChannel Ack to the transmitter.

2.1.2 Option One Proposal Summary

The current H.323/H.22Z does not have an adaptation layer for audio and video channels as they are carried using RTP. A different UDP port is opened for each logical channel. For this to work, the receiver needs to open a dynamic port for each logical channel opened by the transmitter and feed that UDP port number to the transmitter after the open command. It would be inappropriate, and not in the spirit of H.245 to link the logical channel number in the open command with a physical port that the receiver includes in the ACK.

Therefore, we should negotiate a single dynamic port for audio and a single dynamic port for video during call setup (Connect Request/Response) and extend the RTP header to include the logical channel number on these dynamic ports to distinguish each logical channel on those ports.

As H.245 opens additional audio and video channels, the RTP packets would be de-muxed based on the logical channel number in the RTP header. (Note: The same issues hold for audio and video control data channels using RTCP.)

2.1.3 Option Two Proposal Summary

This proposal places the multiplex of logical channels at the UDP level where each logical channel is running on a separate UDP port. By using UDP as the multiplex there is no need for a H.22Z multiplex and the logical channel

number becomes a control mechanism which does not need to be transmitted in each packet.

The advantage of the Intel proposal is that the audio and video packets do not need to have a header extension to tag which logical channel they belong to. The disadvantage is that logical channels would be actually tied to physical UDP ports. By the rules of H.245, a mode switch would require the closing and re-opening of the physical UDP port which in implementation would be very slow. (e.g. buffer clean up and reallocation via the system's network drivers.)

2.2.3 Summary

As stated, there are two proposals for H.245 logical channel signaling. Option One proposes the establishment of audio, video, control, and data ports for which H.22Z can multiplex the logical channels and the other proposes the multiplex of logical channels using UDP and having each logical channel running on a separate UDP port. If we chose the ladder proposal there is no H.22Z multiplex and the logical channel number becomes a control mechanism which does not need to be transmitted in packets.

Proposal	Advantages	Disadvantages
One	1) maintains logical channels as logical. 2) H.245 logical channel numbering assignment is owned by the transmitter	1) Adds complexity to H.323 and H.22Z (mux) design 2) Requires header extensions to RTP and RTCP
Two	1) cleaner design 2) less complex to implement, same funtionality 3) does not require RTP or RTCP header extensions.	1) ties physical UDP ports to logical channel numbers 2) transmitter does not own logical channel numbering space 3) slower mode switching

3.0 Proposed H.245 Changes

3.1 General Comments

1) In Section 1 Scope, change "H.222.0 and H.223" to "H.222.0, H.223, and H.22Z".
2) In Section 2 References, Add references to H.22Z and H.323.

3.2 Additions to Section 6: Messages: syntax

All proposed additions are in italics.

1) Add multicastCapability to the TerminalCapabilitySet

```
TerminalCapabilitySet ::=SEQUENCE
 {
  sequenceNumber          SequenceNumber,
  protocolIdentifier      OBJECT IDENTIFIER,
  multiplexCapability     MultiplexCapability OPTIONAL,
  capabilityTable         SET SIZE (1..256) OF CapabilityTableEntry OPTIONAL,
  capabilityDescriptor    SET SIZE (1..256) OF CapabilityDescriptor OPTIONAL,
  multicastCapability     MulticastCapability OPTIONAL
  ...
 }

MulticastCapabiltiy          ::=SEQUENCE
 {
  multicastConference                BOOLEAN,
  centralizedConferenceMC            BOOLEAN,
  multicastConferenceMC              BOOLEAN
  ...
 }
```

2) Add h22ZCapability to the MultiplexCapability

```
MultiplexCapability   :=CHOICE
 {
  nonStandard              NonStandardParameter,
  h222Capability      H222Capability,
  h223Capability      H223Capability,
  h22ZCapability      H22ZCapability,
  ...
 }
```

```
H22ZCapability        ::=SEQUENCE
 {
  TBD,
  ...
 }
```

3) In the comments before Audio Capability, add the following comment:

-- For an H.22Z multiplex, the integers indicate the maximum number of audio frames per packet

Note: To support this comment, H.323 needs to contain text similar to Section 6.7.3 of H.324.

4) Add videoControl and audioControl for RTCP in the DataType definition

```
DataType                        ::=CHOICE
 {
  nonStandard                   NonStandardParameter,
  nullData                      NULL,
  videoData                     videoCapability,
  audioData                     audioCapability,
  data                          DataApplicationCapability,
  encryptionData                encryptionMode,
  videoControlData              MediaControlCapability,
  audioControlData              MediaControlCapability,
  ...
 }

MediaControlCapability        ::=SEQUENCE
 {
  AssociatedLogicalChannel INTEGER(1..65535),
  ...
 }
```

5) In LogicalChannelMultiplexParameters, add H22ZLogicalChannelParameters.

```
LogicalChannelMultiplexParameters        ::=CHOICE
 {
  h222LogicalChannelParameters    H222LogicalChannelParameters,
  h223LogicalChannelParameters    H223LogicalChannelParameters,
  h22ZLogicalChannelParameters    H22ZLogicalChannelParameters,
  ...
 }
```

h22zLogicalChannelParameters ::=SEQUENCE
{
networkAddress OCTET STRING,
portNumber INTEGER (0..65535),
GuaranteedDelivery BOOLEAN
...
}

6) Add new reject reasons to OpenLogicalChannelReject

OpenLogicalChannelReject ::=SEQUENCE
{
logicalChannelNumber logicalChannelNumber
cause
{
unspecified NULL,
dataTypeNotSupported NULL,
dataTypeNotAvailable NULL,
unknownDataType NULL,
multicastAddressInvalid NULL,
portNumberNotAvailable INTEGER(0..65535)
}
}

7) Relevant H.230 commands should be added to H.245 as described in Dale Skran's "Mapping H.221/H.230 Commands to H.245".

3.3 Additions to Section 7: Message: semantic definitions

1) In Section 7.2.2 Terminal Capability Set

multicast Capability: indicates parameters specific to multicast.

MulticastConference: indicates a terminal is capable of sending and receiving multicast packets. (This capability does not guarantee an end-to-end multicast infrastructure)

CentralizedConferenceMC: indicates a terminal can become a MC in a centralized multipoint conference.

multicastConferenceMC: indicates a terminal can become a MC in a distributed multipoint conference.

2) In section 7.2.2.4 Multiplex Capabilities

Add the following section regarding the H22ZCapability:

H22ZCapability: indicates multiplexing and network adaptation capabilities that are specific to the multiplex defined in H.22Z

3) In Section 7.2.2.6 Audio Capabilities

Add "When a H.22Z multiplex is used, these numbers refer to the maximum number of audio frames per packet"

4) In Section 7.3.1

Add description of H22ZLogicalChannelParameters

Add the text "If it is videoControlData or audioControlData the logical channel will be used for RTCP control of an audio or video channel in the DataType section"

MediaControlCapability: is used to indicate parameters specific to video or audio control data.

AssociatedLogicalChannel: is used to indicate which logical channel contains the audio or video stream that this media control channel is referencing.

H22ZLogicalChannelParameters: is used to indicate parameters specific to H.22Z. It shall be present in forwardLogicalChannelParameters and reverseLogicalChannelParameters.

NetworkAddress: if this is a multipoint call, it indicates the multicast address of the logical channel, otherwise it is null.

PortNumber: UDP or IPX port number where the logical channel will reside.

GuaranteedDelivery: is used to indicate whether or not the Logical Channel being opened should be transported over a guaranteed delivery link or an unreliable link.

5) In Section 7.3.3. Open Logical Channel Reject

Add the following reject reasons to Table 6.

Multicast Address Invalid - Terminal was unable to open the logical channel due to the invalid multicast address passed in the OpenLogicalChannel command.

port Number NotAvailable - Terminal was unable to open the logical channel due to the port number already being used by another application.