

15 May 1995

SOURCE: Stuart Dunstan, Siemens Ltd
TITLE: Explanation of current H.222.1 acknowledged signalling procedures
PURPOSE: Discussion and Proposal

1. Introduction

This document provides an explanation of the current H.222.1 acknowledged signalling procedures. A number of features are identified.

2. Model

A model of signalling in H.310 is shown in Figure 1.

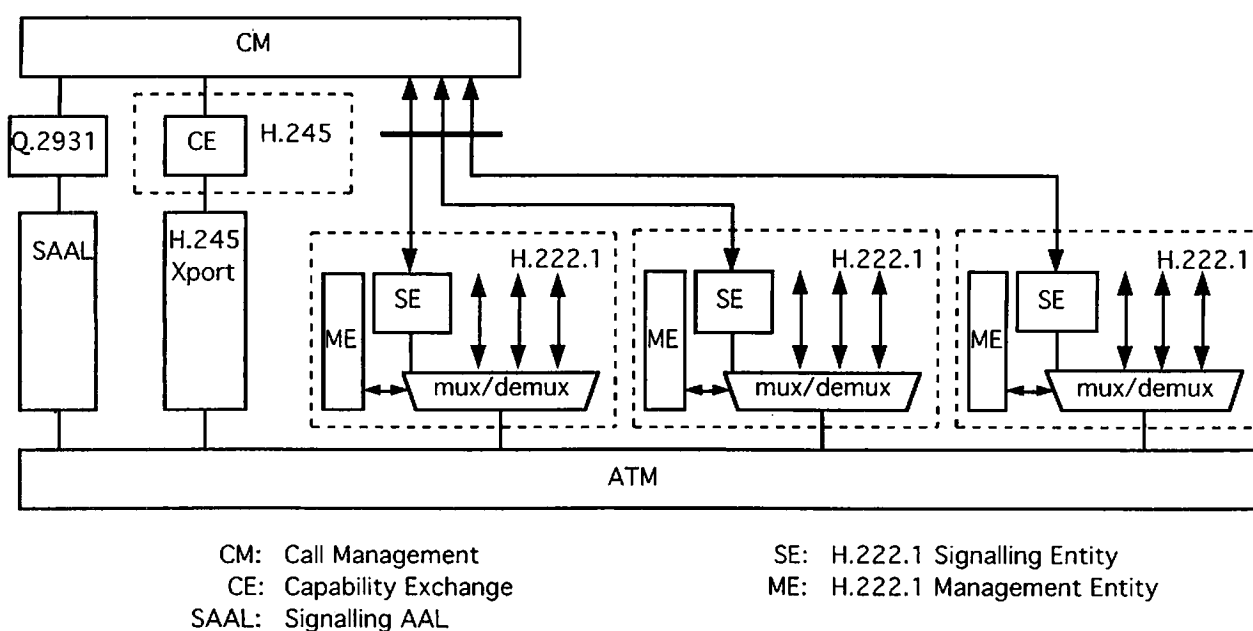


Figure 1. Current H.310 signalling model.

Figure 1 illustrates that;

- Call Management controls call phases and the required configuration
- there are multiple logical channels in multiple ATM Virtual Channels
- H.245 performs the capability exchange
- each H.222.1 Signalling Entity performs signalling within its own ATM Virtual Channel

The interaction between Call Management and the H.222.1 Signalling Entity is as follows;

send side

- requests the establishment and release of logical channels for transfer of elementary stream data to the peer end H.222.1 entity

receive side

- accepts or rejects requests to establish logical channels for the transfer of elementary stream data from the peer H.222.1 entity.

The incoming H.222.1 maintains a map of current multiplexing identifiers values for that one ATM Virtual Channel. This map is known to the incoming H.222.1 demultiplexer (H.222.1 User Plane) so that illegal incoming multiplexing identifiers values (those for which no logical channel has been established) can be detected and a management message generated.

3. Terminology

In Rec. H.222.1 the term subchannel is currently used to describe the logical channel formed from packets having the same multiplex identifier field value. A graphical representation of a subchannel in relation to ATM is shown in Figure 2.

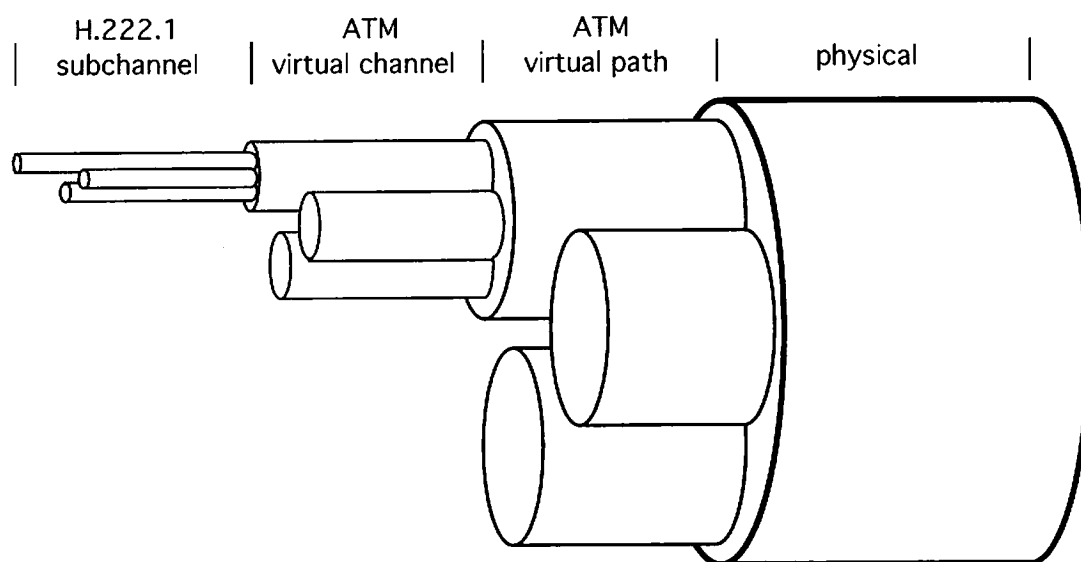


Figure 2. A Rec. H.222.1 subchannel and relationship to ATM.

If desired the term "subchannel" may be changed to align with H.245/6 and the H.32P series of recommendations. The following have been proposed,

- logical channel
- virtual channel

The latter term is not appropriate because of the ambiguity with an ATM virtual channel in H.310. The term "logical channel" is appropriate.

A logical channel is defined as being unidirectional.

4. Direction of PDUs

The signalling procedures in Annex A/H.222.1 relate to one logical channel, which is defined as being unidirectional. The procedures require a return signalling channel. A graphical representation, and the direction in which Protocol Data Units (PDUs) are used, is shown in Figure 3.

Two way audiovisual communications require the procedures to be performed twice; once in the forward calling direction and once in the backward calling direction.

There is no connection between the incoming subchannel procedures and the outgoing subchannel procedures at one side, other than via signals to and from the higher layer signalling entity. Multiplexing field values i.e PID/stream_ids values are chosen independently in each direction of transmission.

PDUs are coded using PSM/PSI tables. When a PSM/PSI table is received in a bi directional

audiovisual call, the pdu_type field in the scse_pdu_type_descriptor() must be examined to determine whether the table is destined for the outgoing or the incoming subchannel signalling entity e.g, the BGN PDU for the audiovisual communication direction A-> B, travels in the same direction as the BGAK PDU for audiovisual communication direction B-> A

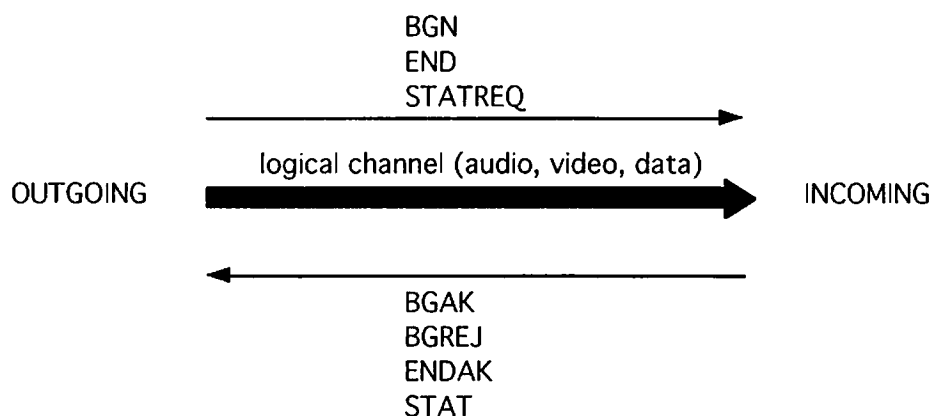


Figure 3. Uni directional AV communications and direction of PDUs.

5. Elementary stream type and the BGN PDU

Figure 4 illustrates the normal logical channel establishment and release procedures.

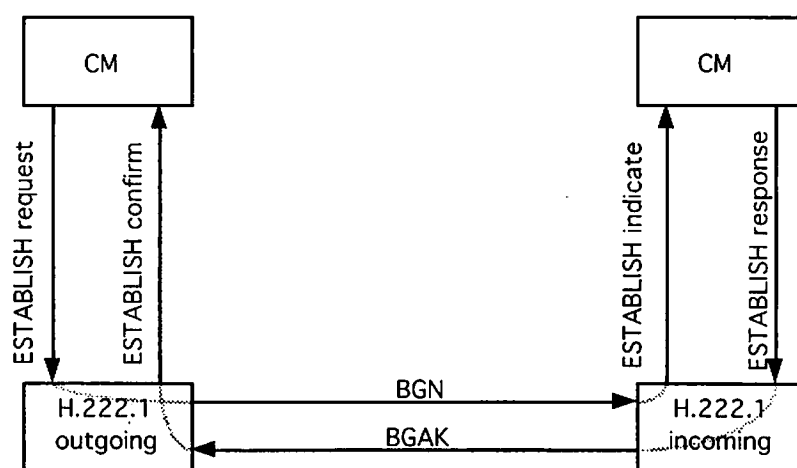


Figure 4a. Normal logical channel establishment procedures.

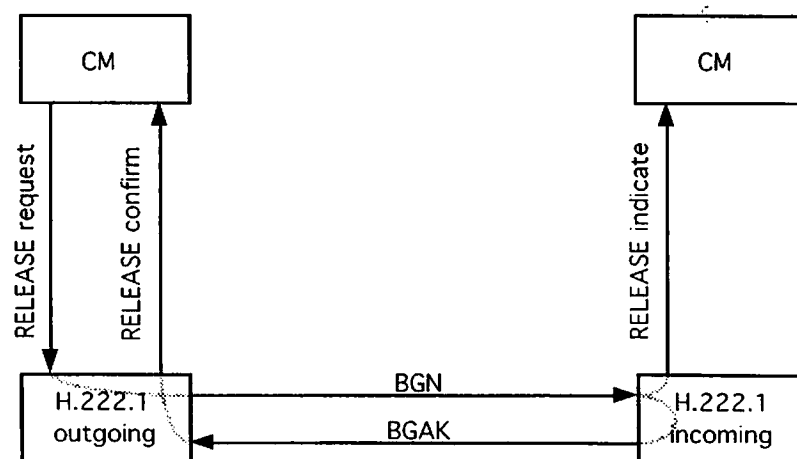


Figure 4b. Normal logical channel release procedures

The Call Management at the receive side can only accept the call when it knows what resources are required to decode the signal. Thus;

- it is necessary that a description of the elementary stream type, for which the logical channel is to be used, is contained in the BGN PDU.
- the incoming H.222.1 SE is not responsible for the decision to accept or reject the logical channel establishment request, except for multiplexer identifier value management.

6. Service

The assumption regarding the lower layer service required to support the signalling PDUs (PSM/PSI tables) is one of *guaranteed data integrity* i.e signalling tables delivered to the H.222.1 Signalling Entity are guaranteed to be correct. This is achieved using the CRC32 field on each PDU. Tables with CRC32 errors are discarded at the receiver. The rules must be written into Annex A/H.222.1.

This is contrasted with the transport protocol for H.245, which will provide H.245 with a *guaranteed data delivery*. This is achieved through re transmission of errored data.

7. Coding of PDUs

The motivation for using PSI/PSM tables is that no new syntax is required, apart from the PDU type descriptor. The acknowledged signalling procedures are rules about *when* to transmit the tables, and *when* the logical channel being established is guaranteed to be ready for use. The procedures also define the semantics of PSI/PSM tables according to the PDU type.

8. Logical channel numbering and protocol layer independence

The following property is desirable;

- protocol layer independence

protocols above H.222.1 should not know about how for example PID values are allocated e.g. the fact that PID=0 is reserved for the PAT (Table 2.4/H.222.0) should not be known outside of H.222.1.

It is assumed that there is one H.222.1 entity per ATM Virtual Channel. Management of multiplex identifier values i.e PID/stream_ids values, is local to each H.222.1 entity. PID/stream_id values can be re used in different ATM Virtual Channels. They are only unique within one ATM Virtual Channel i.e. one TS/PS.

To uniquely identify one logical channel in the H.310 terminal the concept of a logical channel number is required. This allows independence of the underlying protocol i.e. independent in use of

- Program Stream, Transport Stream, null, or other multiplexing strategy
- number of H.222.1 entities i.e. number of ATM Virtual Channels

This is particularly true in the prospect of H.245 being a generic recommendation.

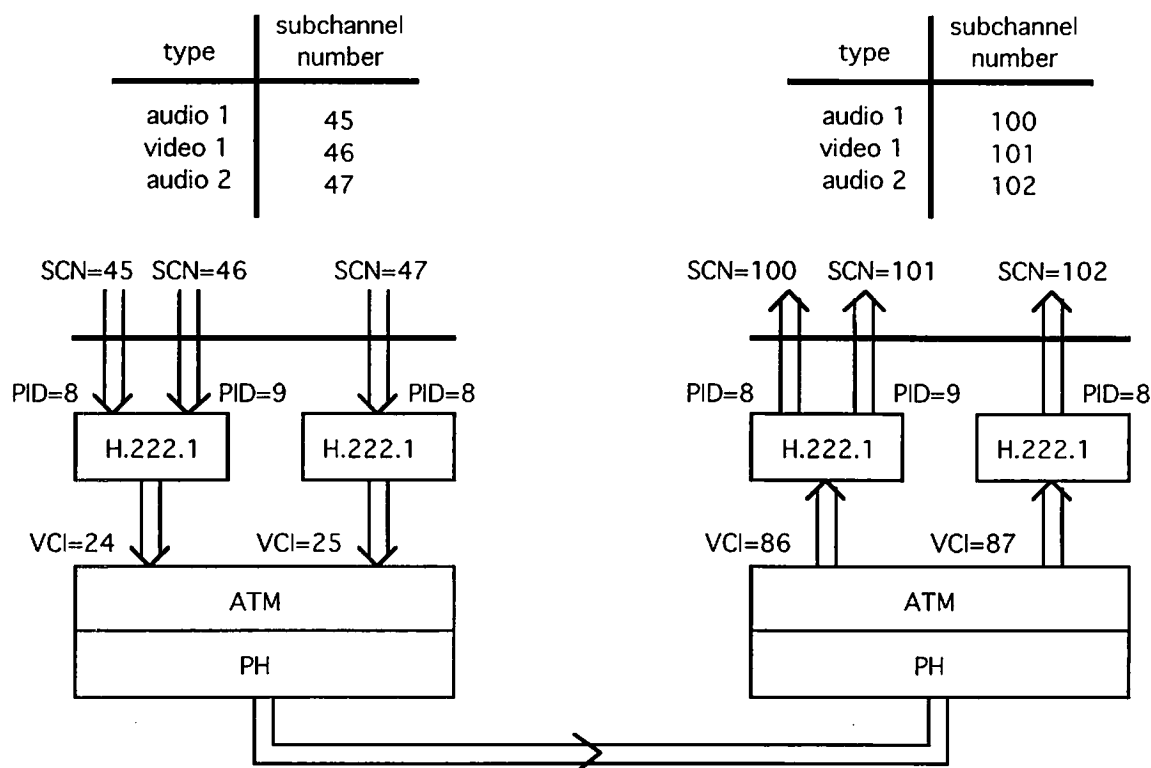
A logical channel number,

- is a unique number for a particular call which identifies one logical channel within that call.
- is mapped to a PID/stream_id value at the boundary between the higher layer entities, and the H.222.1 protocol entity.

Logical channel numbers do not need to be transmitted to the remote terminal. There is simply a

mapping between the logical channel number and the PID/stream_id value at the send side, and another mapping between the same PID/stream_id value and a different logical channel number, at the receive side. Logical channel numbers are assigned at logical channel establishment.

Figure 5 illustrates the use of logical channel numbering at the H.222.1/higher layer boundary, using an audio and video stream in one ATM virtual channel, and a second audio stream in another ATM virtual channel, as an example.



SCN: - subchannel number

Figure 5. Illustration of use of logical channel numbering at H.222.1/higher layer boundary.

9. Examples of acknowledged signalling of procedures

To illustrate the procedures defined by the SDLs in Annex A/H.222.1, a number of examples are shown in the following figures. It is proposed that these examples form an informative appendix in H.222.1.

Figure 6 provides an explanation to the figures following.

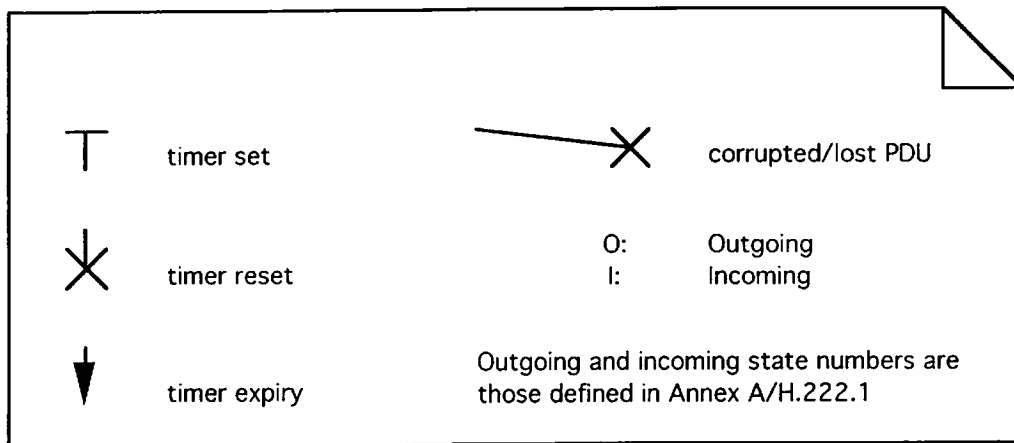


Figure 6. Key to examples.

Figure 7 and 8 show normal logical channel establishment and release procedures respectively, for error free operation.

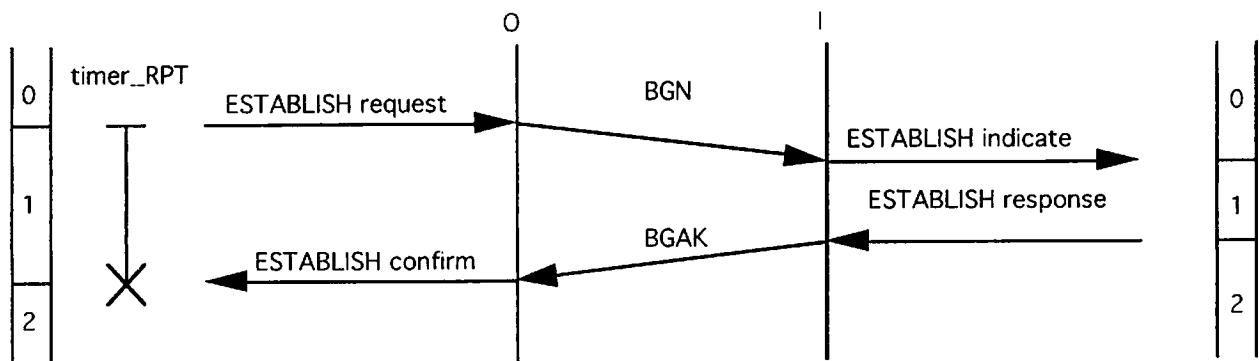


Figure 7. Error free logical channel establishment procedures.

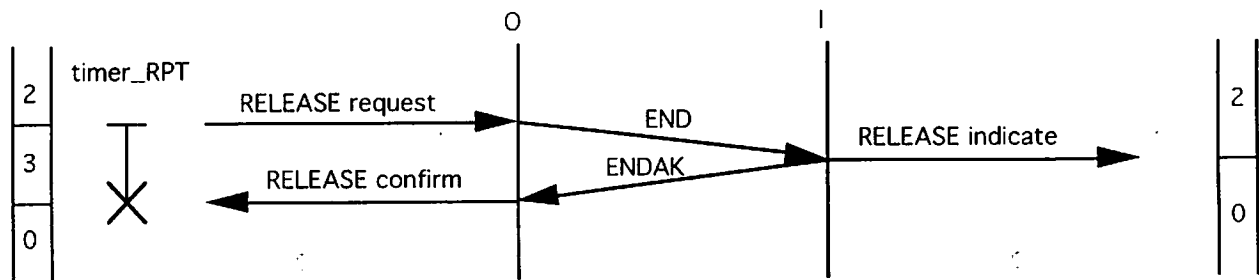


Figure 8. Error free logical channel release procedures.

Figure 9 shows logical channel release immediately followed by logical channel re establishment.

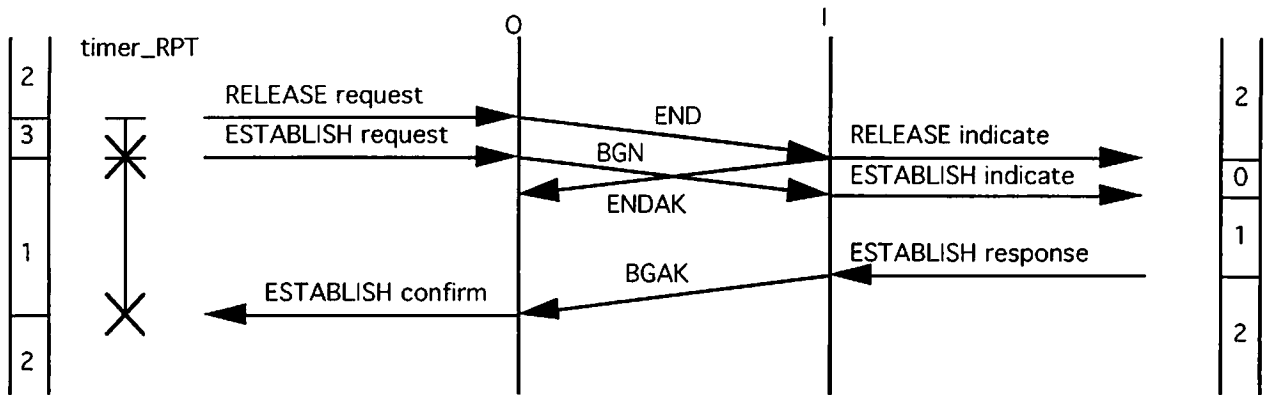


Figure 9. Logical channel release followed by immediate re establishment.

Figure 10 shows establishment procedures occurring when the incoming side is slow to respond to an establishment indication.

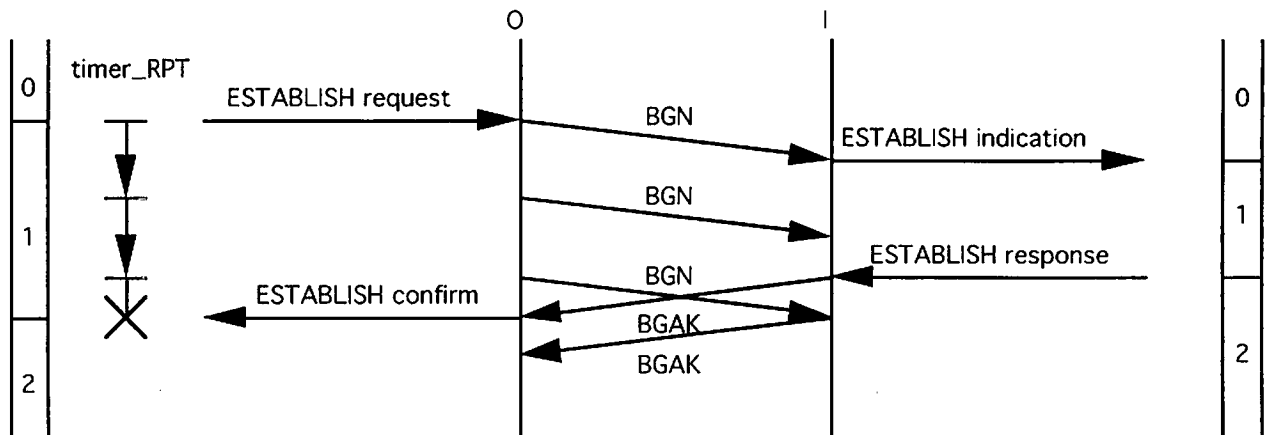


Figure 10. Logical channel establishment and slow incoming side establishment response.

Figure 11 shows a logical channel establishment request closely followed by logical channel release and establishment of another logical channel.

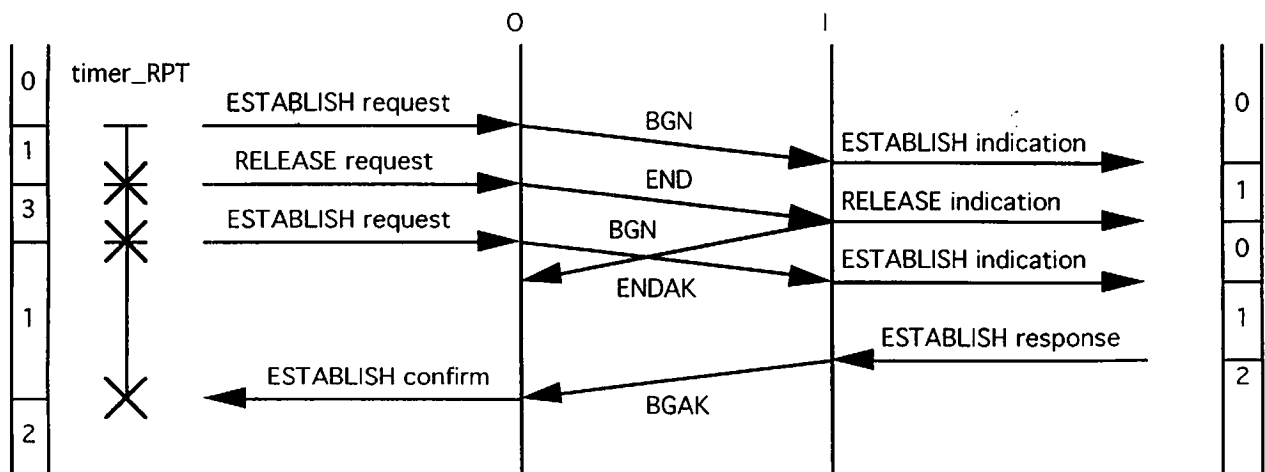


Figure 11. Logical channel establishment request closely followed release and establishment.

Figure 12 shows logical channel establishment failure due to errored or lost BGN PDUs.

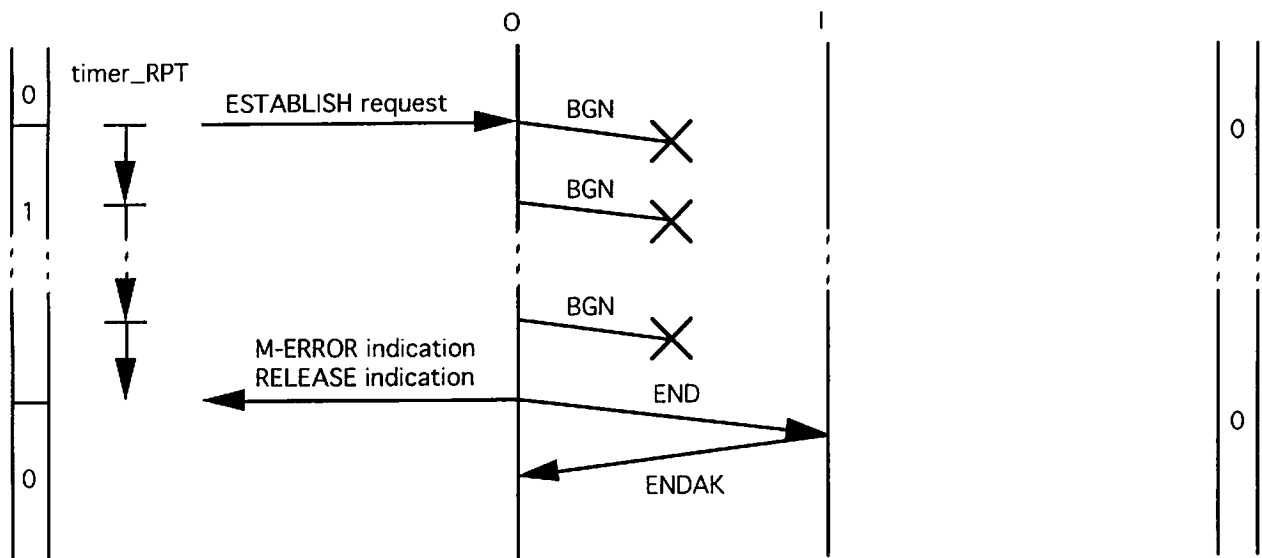


Figure 12. Logical channel establishment failure due to errored or lost BGN PDUs.

Figure 13 shows logical channel establishment failure due to errored or lost BGN and BGAK PDUs.

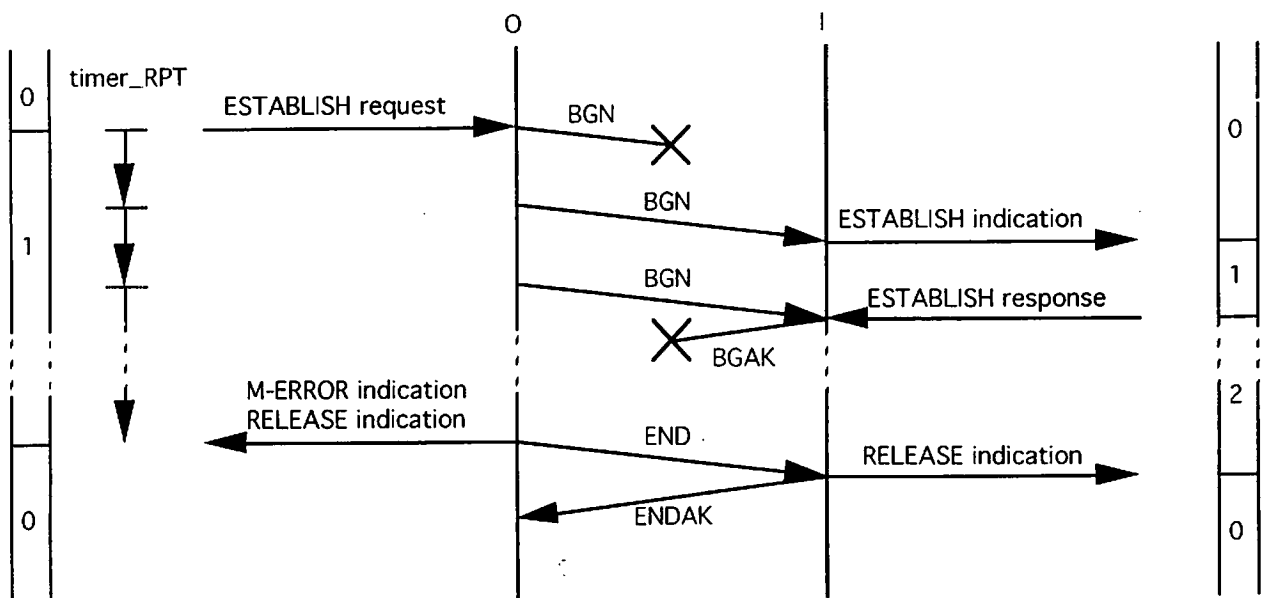


Figure 13. Logical channel establishment failure due to lost or errored BGN and BGAK PDUs.

10. References

- [1] ITU-T Draft Recommendation, "Multimedia multiplex and synchronization for audiovisual communication in ATM environments", 31 January 1995.

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