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Source: BT
Title: Modifications to the H.323 AdmissionRequest set of messages
Purpose: Proposal

1. INTRODUCTION

This contribution contains text relating to admission control, bitrate request and address translation for inclusion H.323. The introduction, goals and discussion sections are not intended to be included in the standard. These are presented to give further background to the material presented in the Contribution section. Text in italics in the contribution is intended to be optional for inclusion.. Once again, this is extra text intended to describe the rationale for a particular mechanism being adopted. It should be noted that where the author has a doubt whether a feature should or should not be included, the feature has been included. This is based on the rationale that it will be easier to remove text at a later date than it will be to add it. This should also ensure that any 'augmented' text is consistent with the rest of the contribution.

2. GOALS

This contribution defines PDUs and messages to be used for:

- Admission Control
- Bitrate Allocation
- Address Translation

In order to operate satisfactorily in the H.323 LAN environment these PDUs must support the following features:

- Both gatekeeper centred and terminal centred call setup,
- Multicast bitrate allocation,
- Bitrate changes,
- Successful bitrate allocation based only on the calling terminals requests, based only on the called terminals requests, and based on both the calling and called terminals requests,
- Allow a terminal (possibly the call originating terminal) to leave a call/conference while the other terminals continue the call,
- Allow gatekeeper to request a bitrate reduction,
- Support asymmetric send and receive bitrates,
- Specify the desired capabilities of possible intermediary entities such as gateways,
- Reserving bitrate for the future.

3. DISCUSSION

This section attempts to explain the philosophy behind the decisions that have been taken.

The main structure of this contribution arises from recognising that the AdmissionRequest is basically built from a BitRateRequest and an AddressRequest.

A bitrate allocation, and hence an admission request, needs a unique id by which to identify it. Otherwise a gatekeeper has no way of knowing whether it has already allocated bitrate to a particular admission request (as you might be getting a call from an unbound terminal). Even in the Figure 8/H.323 type call setup (call setup messages via gatekeepers) with both terminals bound there is no mechanism for associating a setup message being sent from a gatekeeper and the resulting ARQ message being sent back. Likewise, the gatekeeper will not be able to associate a new bitrate allocation with a previous allocation when the bitrate change message is used. I would suggest an ID

based on the LAN address of the calling terminal and a unique number generated by the terminal (to allow multiple gateways in the same unit). An alternative is to have the terminal assigned an id via the registration request message. This ID also needs to be known by the called terminal. One way of transferring this from end to end would be in the Q.931 setup call reference field.

I have included the ability to specify send and receive bitrate asymmetrically. I believe this is the only way that a good idea of bitrate requirements can be built up by the gatekeeper cloud in a multicast conference. If this is not supported, then it will probably be impossible to allocate bitrate to a multicast conference which negates the purpose of the gatekeeper. Consequently, some organisations may disallow multicast conferences which would be undesirable. However, for terminals that do not support multicast, the impact of this is minimal.

I have added some capability fields to the address translation messages. These are mainly intended to help selecting a gateway when it is found that a call is on the SCN. Without this information an end point on the LAN and an end point on the SCN could both be 6B capable, but might be allocated a 2B gateway by the gatekeeper. This is obviously undesirable. I have included in the same field bits to indicate whether the terminal wishes to be connected to an MC or MCU.

In the admission request message I have allowed the terminal to specify whether it wants Q.931 routing via the gateway, or direct to the remote terminal. I have said that the gatekeeper can override this. Manufacturers of terminals can then support features that are not necessarily supported by their gatekeepers.

I have also added a bit for Q.931 keep alive in the AdmissionRequest message as it seems reasonable that a terminal should be able to ask for this.

I have added the ability of the address translation service to return multiple addresses to be used in various conditions. This is important if direct terminal Q.931 signalling is to be used.

I have said that terminals and gateways can also respond to AddressRequest messages. This allows the gatekeeper cloud to forward address request messages to a particular terminal. The terminal then has the chance to keep track of its owner, perhaps using a diary system, better than the gatekeeper cloud can. Perhaps the RegistrationRequest messages should be augmented to indicate whether the gatekeeper and terminals support this feature.

I have re-invented the status message. The previous status message seemed to contain elements that a terminal would not necessarily know about, and elements that of no real use to a gatekeeper. I have made the passing of bandwidth information consistent with the rest of the contribution. Most significantly, I have added the capability for the terminal to indicate what bitrate it has requested, but not yet had confirmed, and also to indicate for what bitrate it has had confirmation. This allows the status messages to be asynchronous to the BitRateRequest messages generated by the terminal. I have also modified the structure of this message so that a gatekeeper can recover state after it has crashed, if required.

4. PDU CONTRIBUTION (H.225)

4.1. Terminal to Gatekeeper Admission Messages

When operating with a gatekeeper, a terminal must request admission before it makes a call. This section describes the PDUs that are needed to make such requests. The calling terminal must seek admission using the AdmissionRequest message for each terminal it wishes to connect to a call/conference. Likewise, the called terminal must seek admission using the AdmissionRequest before answering any incoming calls.

AdmissionRequest ::= SEQUENCE --**(ARQ)**
{

```
        versionID               INTEGER(0..65535),          --These have been removed in
--                                                          --the new text. Was this
--                                                          --intentional?
        requestSeqNum           INTEGER (0..65535),
        conferenceID            OCTET STRING(SIZE(10)),     --Requires discussion
        H323Identifier          OCTET STRING (SIZE(128)), -- may be E.164 number
        callModel               BOOLEAN,    --(0 call signaling to gatekeeper,
                                            --1 call signaling directly to terminal)
        Q931KeepAlive           BOOLEAN,
        bitRateRequest          BitRateControl,
        addressRequest          OPTIONAL AddressControl,
--      replyAddress            NetworkAddress. --Mark Reid suggests we don't need
--                                                  --this...
        propExtension           To be provided,
        ...
}
```

requestSeqNum - This is a monotonically increasing number unique to the caller. It should be returned by the called in any PDUs associated with this specific PDU.
ConferenceID - A number unique to the H.323 zone over which a call is being setup. This allows all entities to identify the conference to which admission and bitrate allocation messages relate. *We need to decide how this value is chosen. One method is to used the calling terminal address and a unique value generated by the calling terminal (see discussion above).*
H323Identifier - This is a terminal/user specific string used to identify the terminal making the request. It is presumed that application software has made appropriate authentication and this can be 'trusted'. ***{Editor's Note: This requires further discussion}***
callModel - Indicates the terminal's preference for Q.931 signalling. This can be either via the gatekeeper or direct to the remote terminal. The gatekeeper can choose to override this field.
Q931KeepAlive - Allows the terminal to specify whether it wishes the Q.931 path to be kept alive once call setup has been completed. The gatekeeper can override this request.
bitRateRequest - Specifies the initial bitrate that the terminal needs to make or enter a call. If the addressRequest field is present, the address fields in this element are ignored.
addressRequest - If the terminal a call or conference does not know the network address of the remote terminal, a non-network address, such as the H323ID should be placed in this field. This element should not be included in the message when answering an incoming call.

AdmissionConfirmation ::=SEQUENCE --**(ACF)**

```
{
        requestSeqNum           INTEGER (0..65535),
        bitRate                 INTEGER (0..4294967295)  -- measured in 100 bit increments
        callModel               BOOLEAN,    --(0 call signaling to gatekeeper,
                                            --1 call signaling directly to terminal)
        Q931KeepAlive           BOOLEAN,
        signalAddress           SEQUENCE OF RemoteAddress,
                                --Mark Reid made a comment in Ptel14 refering to a previous posting
of his. I have not be able to locate this, and so it is probably not supported here.
        propExtension           To be provided,
        ...
}
```

requestSeqNum - This shall be the same value that was passed in the **ARQ** by the caller.
bitRate - the maximum that *might* be offered with a **BRQ**.
callModel - tells terminal whether call signaling sent on signalAddress goes to a gatekeeper or to a terminal.

Q931KeepAlive - If Q.931 signalling is routed via the gatekeeper cloud, this field indicates whether the gatekeeper intends to leave the Q.931 signalling channel active once call setup has been completed.
signalAddress - the address and TSAP to send Q.931 call signalling. This may be the terminal or the gatekeeper address.

```
AdmissionReject                 ::=SEQUENCE --(ARJ)
{
        requestSeqNum           INTEGER (0..65535),
        rejectReason            AdmissionRejectReason,
        propExtension           To be provided,
        ...
}
```

I have put all reject reasons within this element. This makes interpreting the error codes more consistent.

```
        AdmissionRejectReason           ENUMERATED {Editor's Note: requires revision}
        {
                NoFault_Reserved            (0),
                NotBound                    (1),
                InvalidConferenceID         (2),
                InvalidPermission           (3),
                RequestDenied               (4),
                InvalidRevision             (5),
                InsufficientBitRate         (101),
                MulticastNotAllowed         (102),
                UnableToForwardRes          (103),
                NoGatekeeperResources       (104),
                InsufficientAddressingInfo  (201),      --Try again when more
                                                        --addressing info available
                AddressNotFound             (202),      --Do not try with more
                                                        --addressing info
                CapsNotFound                (203),
                UnsupportedRelationship     (204),
                ProprietaryReason           (10000..65534),
                UndefinedReason             (65535)
        }
```

This was new! It tells the gatekeeper cloud that it has exited the conference. It has been renamed in line with Jim Toga's contribution. I still feel that the message ought to be acknowledged.

```
DisconnectRequest               ::=  SEQUENCE --(CRQ)
{
        versionID               INTEGER(0..65535),
        requestSeqNum           INTEGER (0..65535),
        conferenceID            OCTET STRING(SIZE(10)),         --Requires discussion
        H323Identifier          OCTET STRING (SIZE(128)), -- may be E.164 number
        propExtension           To be provided,
        ...
}
```

requestSeqNum - This is a monotonically increasing number unique to the caller. It should be returned by the called in any PDUs associated with this specific PDU.
ConferenceID - A number unique to the H.323 zone over which a call is being setup. This allows all entities to identify the conference to which admission and bitrate allocation messages relate.

We need to decide how this value is chosen. One method is to used the calling terminal address and a unique value generated by the calling terminal (see discussion above).

H323Identifier - This is a terminal/user specific string used to identify the terminal making the request. It is presumed that application software has made appropriate authentication and this can be 'trusted'. ***{Editor's Note: This requires further discussion}***

DisconnectConfirmation ::=SEQUENCE **--(CCF)**

```
{
        requestSeqNum           INTEGER (0..65535),
        ...
}
```

requestSeqNum - This shall be the same value that was passed in the **CRQ** by the caller.

4.2. Terminal to Gatekeeper Requests for Changes in Bitrate

{Editor's Note: Issues related to ensuring that all terminals in a conference coordinate their requests for more bitrate need to be addressed at Ipswich}

BitRateRequest ::=SEQUENCE **--(BRQ)**

```
{
        versionID               INTEGER(0..65536),
        requestSeqNum           INTEGER (0..65535),
        conferenceID            OCTET STRING(SIZE(10)),     --Requires discussion
        H323Identifier          OCTET STRING (SIZE(128)),
        bitRate                 BitRateControl,
        replyAddress            NetworkAddress, --Do we need this still
        propExtension           ToBeAdded,
        ...

}
```

versionID - The ITU-T specified version of this PDU
requestSeqNum - this is a monotonically increasing number unique to the caller. It should be returned by the called in any PDUs associated with this specific PDU.
ConferenceID - A number unique to the H.323 zone over which a call is being setup. This allows all entities to identify the conference to which admission and bitrate allocation messages relate.
We need to decide how this value is chosen. One method is to used the calling terminal address and a unique value generated by the calling terminal (see discussion above).
H323Identifier - this is a terminal/user specific string used to identify the caller/called. It is presumed that application software has made appropriate authentication and this can be 'trusted'.
bitRate - Describes the new bitrate for a part of a call. This is described further below.
replyAddress - this is the transport address to which the **BCF**, or **BRJ** is to be sent.

```
BitRateControl ::=      SEQUENCE
{
        initiator           BOOLEAN,
        sendAllocation      BWAllocation,
        recvAllocation      SEQUENCE OF BWAllocation,
        when                INTEGER(0..4294967295)  OPTIONAL,
```

```
        till            INTEGER(0..4294967295)  OPTIONAL,
--      callType        CallType,       --I am not sure that this parameter
--                                      --allows the
--                                      --gatekeeper to successfully allocate
--                                      --bitrate in
--                                      --multicast situations. I have therefore
--                                      --deleted it!!!
--      CallMedia       CallMedia       --I can not find where this has been
--                                      --declared so
--                                      --I have marked it for deletion.
--      reserveRequest  BOOLEAN(0 - terminal is asking the Gatekeeper to make
--                                      make a bitrate reservation request for it.
--                                      1  terminal is asking the gatekeeperto NOT make
--                                      any bitrate reservation for it; such a reservation
--                                      may have
--                                      already been made.
        ...
}
```

Initiator - Set to TRUE if the message is from the initiator of a bitrate change, and FALSE if the message is being sent to confirm bitrate previously allocated by an initiator. *This field allows a gatekeeper to determine whether it should already have an allocation in place for the stated bitrate.*

When - When the reservation is required in seconds from Jan 1 1970. This allows forward booking. If not present, the bitrate is required immediately. If this field is present, then the Till field must be included.

Till - When the reservation is finished with in seconds from Jan 1 1970. If this field is included, then the When field must be included.

sendAllocation - Specifies the bitrate that the terminal sending the bitrate allocation will send to the network.

recvAllocation - Specifies the bitrate that the terminal sending the bitrate allocation intends to receive from the network. A terminal may receive streams from more than one remote terminal.

callType - Using this value, gatekeeper can make determine 'real' bitrate usage.

replyAddress - This is the transport address to which the **ACF**, or **ARJ** is to be sent. *I need to seek clarification on why this address might be needed. Perhaps there are networks that can not extract the address from which a message was sent, or perhaps an addmission request is being sent in from one entity on behalf of another entity.*

```
BWAllocation    SEQUENCE
{
remoteAddress           NetworkAddress,
bandRate                INTEGER (0..4294967295),        --units 100 bits/s
...
}
```

remoteAddress - For a sendAllocation element, this is either the transport address of the terminal to which the dat is being sent, or the multicast transport address that a sender is using. For a recvAllocation element, this is always the transport address of the terminal that is generating the data, irrespective of whether the stream is multicast.

bitRate - The bitrate to be reserved for the streams from/to the associated network address in 100bits/s units.

```
BitRateConfirmation     ::=SEQUENCE --(BCF)
{

        requestSeqNum           INTEGER (0..65535),
```

```
        bitRate                 INTEGER (0..4294967295),   -- measured in 100 bit increments
        propExtension           ToBeAdded,
        ...
}
```

requestSeqNum - This should be the same value that was passed in the **BRQ** by the caller.
bitRate - the maximum that *might* be offered with a new **BRQ**.

```
BitRateReject           ::=SEQUENCE --(BRJ)
{
        requestSeqNum           INTEGER (0..65535),
        rejectReason            AdmissionRejectReason,
        bitRate                 INTEGER (1..4294967295),   -- measured in 100 bit increments
        propExtension           ToBeAdded,
        ...
}
```

4.3. Terminal to Gatekeeper Requests for Address Translation

All H.323 entitities, including terminals, gatekeepers, and gateways can respond to AddressRequest messages.

```
AddressRequest          ::= SEQUENCE -- (ADRQ)
{
        versionID               INTEGER(0..65536),
        refNum                  INTEGER (0..65535),
        H323Identifier          OCTET STRING (SIZE(128)),
        addressSpec             AddressControl,
        replyAddress            NetworkAddress, --Do we need this still
        propExtension           ToBeAdded,
        ...
}
```

versionID - The ITU-T specified version of this PDU
refNum - This value is inserted by the requester so that it can associate a reply with a request. It only has significance to the requesting entity. It should be returned by the called in any PDUs associated with this specific PDU.
H323Identifier - this is a terminal/user specific string used to identify the caller/called. It is presumed that application software has made appropriate authentication and this can be 'trusted'.
addressSpec - Specifies the address to be translated.
replyAddress - this is the transport address to which the **BCF**, or **BRJ** is to be sent.

```
        AddressControl  SEQUENCE
        {
                address         SEQUENCE OF ExternalAddress,
                relationship    ENUMERATED
                                {
                                Address         (1),
                                E164AddressOf   (2),
                                GatekeeperOf            (3),
                                MailAddressOf   (4),
                                ReservedByITU   (5..15),
                                ForProprietaryUse       (16..31)
                                },
```

```
preferedCaps    SEQUENCE
                        {
                        DesiredBchannels        INTEGER(0..255),
                        MCU                     BOOLEAN,
                        MC                      BOOLEAN,
                        ...
                        },
        ...
    }
```

address - The address to be translated. *I'm not sure why multiple addresses have been put in, but I have left them in.*
relationship - Allows a relationship to be specified for the query address and the target address. The Address relationship requests the NetworkAddress of the specified address. Support of the different relationships is optional.
preferedCaps - Specifies additional capabilities that a terminal requires at call setup. The DesriredBChannels field allows a suitable gateway to be selected if the remote terminal is on the SCN. The MCU and MC bits specify whether the terminal wishes to be routed via an MCU or MC.

```
AddressConfirmation    ::=SEQUENCE --(ADCF)
{
    refNum              INTEGER (0..65535),
    remoteAddress       SEQUENCE OF RemoteAddress,
    propExtension       To be provided,
    ...
}

RemoteAddress  SEQUENCE
        {
        type            AddressType,
        LANAddress      NetworkAddress OPTIONAL,
        otherAddress    OCTET STRING(SIZE(128)) OPTIONAL,
        ringPeriod      INTEGER(0..1024) OPTIONAL,
        viaGateway      BOOLEAN,
        timeToLive      INTEGER(0..4294967295),
        ...
        }
```

remoteAddress - the address and TSAP to send Q.931 call signalling and the conditions in which each address should be used. This may be the terminal or the gatekeeper address.
type - Specifies the type of address in this field and when it is to be used.
LANAddress - The transport address of the entity on the LAN.
otherAddress - An address in a format other than a LAN address. If a call goes via a gateway, then this address should be dialled rather than the address entered in the original request.
ringPeriod - The length of time in seconds a terminal should ring a terminal before selecting the next terminal address. If this field is not present, then the terminal can be rung indefinitely.
viaGateway - Tells the requesting terminal whether the destination is accessed via a gateway. This information is useful to know when supplementary services are invoked. It specifies whether a terminal must close or leave open its RTP streams when moving from call to call.
timeToLive - Period in seconds over which a terminal can use the translated address without seeking a new translation.

```
AddressType   :: =    ENUMERATED
{
    GatekeeperAddress       (0),    --The gatekeeper of the terminal. Support
                                    --of this is mandatory. Support of other types
```

```
                                                --is optional.
        PrimaryAddress          (1),    --The main address to call. Support of this is
                                        --mandatory. Support of other types is
                                        --optional.
        ForwardingAddress       (2),    --Not required in response message
        BusyAddress             (3),    --Address to be tried if called terminal busy
        NoReplyAddress          (4),    --Address to be used if no answer from remote
                                        --terminal
        HuntGroupAddress        (5),    --An address from a hunt group. Multiple
                                        --addresses of
                                        --this type might be returned in a response. If a
                                        --terminal
                                        --receives busy from this address it should try
                                        --the next
                                        --hunt group address.
        RingGroupAddress        (6),    --An address from a ring group. A terminal
                                        --can attempt to
                                        --contact all of these terminals simultaneously
                                        --or treat
                                        --the addresses as a hunt group.
        ReservedByITU           (7..15),
        ForProprietaryUse       (16..31)
    }

AddressReject           ::=SEQUENCE --(ADRJ)
{
    refNum                  INTEGER (0..65535),
    rejectReason            AdmissionRejectReason,
    propExtension           To be provided,
    ...
}
```

4.4. Gatekeeper to Terminal Requests to Change Bitrate

This message is sent by a gatekeeper to a terminal to request a reduction in the terminals bitrate usage. The terminal can ignore this message, or it can reduce its bitrate only partially if that is all it is able to do. If a terminal can reduce its bitrate requirements then it should reduce its bitrate in the standard way.

```
TerminalBitRateRequest ::=      SEQUENCE --(TBRQ)
{
    versionID               INTEGER(0..65536),
    refNum                  INTEGER (0..65535),
    conferenceID            OCTET STRING(SIZE(10)),     --Requires discussion
    bitRate                 INTEGER (1..4294967295),  -- measured in 100 bit increments
    propExtension           To be provided,
    ...
}
```

versionID - The ITU-T specified version of this PDU

refNum - This value is inserted by the requester so that it can associate a reply with a request. It only has significance to the requesting entity. It should be returned by the called in any PDUs associated with this specific PDU.

ConferenceID - A number unique to the H.323 zone over which a call is being setup. This allows all entities to identify the conference to which admission and bitrate allocation messages relate. *We need to decide how this value is chosen. One method is to used the calling terminal address and a unique value generated by the calling terminal (see discussion above).*

bitRate - the new bitrate at which the requesting gatekeeper wishes the responding end point to transmit.

```
TerminalBitRateConfirmation ::= SEQUENCE --(TBCF)
{
        refNum                  INTEGER (0..65535),
        targetBitRate           INTEGER (1..4294967295),  -- measured in 100 bit increments
        propExtension           To be provided,
        ...
}
```

refNum - The refNum field copied from the **TBRQ**.
targetBitRate - the bitrate at which the responding terminal will transmit once it has reconfigured its transmission multiplex.

```
TerminalBitRateReject  ::=      SEQUENCE --(TBRJ)
{
        refNum                  INTEGER (0..65535),
        propExtension           To be provided,
        ...
}
```

refNum - The refNum field copied from the **TBRQ**.

4.5. Gatekeeper to Terminal Requests for Status

These PDUs allow a gatekeeper to query a terminal to see whether a reservation is still needed. StatusReject is sent when a terminal is no longer involved in any of the conferences indicated in the request message. The gatekeeper should also remove reservations if it does not get a response to this message after, say, five re-tries.

```
StatusRequest  ::=              SEQUENCE --(SRQ)
{
        versionID               INTEGER(0..65536),
        refNum                  INTEGER (0..65535),
        scope                   CHOICE
        {
                conferenceID    OCTET STRING(SIZE(10)),     --Requires discussion
                all             NULL
        },
        propExtension           To be provided,
        ...
}
```

versionID - The ITU-T specified version of this PDU
refNum - This value is inserted by the requester so that it can associate a reply with a request. It only has significance to the requesting entity. It should be returned by the called in any PDUs associated with this specific PDU.
scope - Allows a gatekeeper to specify whether it wants status information on a particular conference, or information on all conferences in which the endpoint is participating.
ConferenceID - A number unique to the H.323 zone over which a call is being setup. This allows all entities to identify the conference to which admission and bitrate allocation messages relate.

We need to decide how this value is chosen. One method is to used the calling terminal address and a unique value generated by the calling terminal (see discussion above).

```
StatusConfirmation      ::=     SEQUENCE --(SCF)
{
        refNum                  INTEGER (0..65535),
        status                  SEQUENCE OF StatusInfo,
        propExtension           To be provided,
        ...
}

        StatusInfo      ::=     SEQUENCE
        {
                conferenceID            OCTET STRING(SIZE(10)),     --Requires discussion
                H323Identifier          OCTET STRING (SIZE(128)),
                lastRequestedSeqNum     INTEGER (0..65535) OPTIONAL,
                lastConfirmedSeqNum     INTEGER (0..65535),
                requestedBitRate        BitRateControl OPTIONAL,
                confirmedBitRate        BitRateControl,
                ...
        }
```

refNum - The refNum field copied from the **SRQ**.
status - Contains information describing the bandwidth requirements of each conference in which the endpoint is involved.
ConferenceID - A number unique to the H.323 zone over which a call is being setup. This allows all entities to identify the conference to which admission and bitrate allocation messages relate.
We need to decide how this value is chosen. One method is to used the calling terminal address and a unique value generated by the calling terminal (see discussion above).
H323Identifier - this is a terminal/user specific string used to identify the caller/called. It is presumed that application software has made appropriate authentication and this can be 'trusted'.
lastRequestedSeqNum - The last sequence number that has been used in a request for bitrate that has not been confirmed.
lastConfirmedSeqNum - The last sequence number that has been used in a BitRateRequest that has been confirmed.
requestedBitRate - this describes bit rate information that the endpoint has requested from the gatekeeper, but has not yet had confirmed.
confirmedBitRate - this is the bit rate that the endpoint has received confirmation for from the gatekeeper. *Having both a requested and a confirmed bit rate field allows the status requesting process to be decoupled from the standard bitrate requesting method without losing consistency of the data.*

```
StatusReject            ::=     SEQUENCE --(SRJ)
{
        refNum                  INTEGER (0..65535),
        propExtension           To be provided,
        ...
}
```

refNum - The refNum field copied from the **SRQ**.

We also need a PDU to say that I don't understand the last message.

5. COMMENTS ON CALL SETUP PROCESS

The NULL ARQ message loops should be removed from the diagrams where no gatekeeper is contacted. As they do not appear outside the terminal blackbox, then they need not appear on the diagram.

I am not sure it is good for the first gatekeeper to send call proceeding at any time. The call may end up at a gateway, and have insufficient dialling information. The result of this would be to get Setup Acknowledge from the network. Hence the gatekeeper sending call proceeding will upset the Q.931 operation. We could consider using Q.931 symmetrical signalling as described in Annex D of Q.931.

Note that it may be advantageous for a terminal to know if a call is connected to a gateway. In this situation, the aggregate of all streams must be a fixed number. In a purely LAN conference, such a constraint does not exist.