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SERIES Q: SWITCHING AND SIGNALLING

Broadband ISDN – B-ISDN application protocols for access signalling

Broadband Integrated Services Digital Network (B-ISDN) and Broadband Private Integrated Services Network (B-PISN) – Prenegotiation

ITU-T Recommendation Q.2984

(Formerly CCITT Recommendation)

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ITU-T RECOMMENDATION Q.2984

BROADBAND INTEGRATED SERVICES DIGITAL NETWORK (B-ISDN) AND BROADBAND PRIVATE INTEGRATED SERVICES NETWORK (B-PISN) – PRENEGOTIATION

Summary

This Recommendation specifies the signalling protocol for the purpose of prenegotiation at the Q_B, S_B, T_B and co-incident S_B/T_B reference points within, between and at the access to Broadband Private Integrated Services Networks and within, between and at the access to public Broadband Integrated Services Digital Networks. The protocol operates between two adjacent call control entities. The protocol is applicable in a separated call and bearer (connection) control environment for the support of calls having none, one or multiple bearers.

The purpose of prenegotiation is to allow a user to check compatibility and availability at the remote user with regard to one or more connections the user intends to establish during the lifetime of the call, without reserving connection-oriented resources in the network.

Source

ITU-T Recommendation Q.2984 was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 3 December 1999.

Keywords

Bearer control, call control, prenegotiation, separation.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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ITU-T Recommendation Q.2984

BROADBAND INTEGRATED SERVICES DIGITAL NETWORK (B-ISDN) AND BROADBAND PRIVATE INTEGRATED SERVICES NETWORK (B-PISN) – PRENEGOTIATION

(Geneva, 1999)

1 Scope

This Recommendation specifies the signalling protocol for the purpose of prenegotiation at the Q_B, S_B ,T_B and co-incident S_B/T_B reference points within, between and at the access to Broadband Private Integrated Services Networks and within, between and at the access to public Broadband Integrated Services Digital Networks. The protocol operates between two adjacent call control entities. The protocol is applicable in a separated call and bearer (connection) control environment for the support of calls having none, one or multiple bearers. The protocol is applicable to a two-party call or a multi-party call. However, prenegotiation is performed between two parties. In the case of multi-party connections (point-to-multipoint connections), prenegotiation may be performed between the root and the first party.

This Recommendation is based on the transport capabilities as defined in ITU-T Recommendation Q.2932.1 and is closely related to the call control protocol specification as defined in ITU-T Recommendation Q.2981.

The purpose of prenegotiation as specified in this Recommendation is to allow a user to check compatibility and availability at the remote user with regard to one or more connections the user intends to establish during the lifetime of the call, without reserving connection-oriented resources in the network. Reservation of connection-oriented resources at the remote user is outside the scope of this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T Recommendation Q.2931 (1995), *Digital Subscriber Signalling System No. 2 (DSS2) – User-Network Interface (UNI) – Layer 3 specification for basic call/connection control*.

[2] ITU-T Recommendation Q.2932.1 (1996), *Digital Subscriber Signalling System No. 2 (DSS2); Generic functional protocol – Core functions*.

[3] ITU-T Recommendation Q.2981 (1999), *Broadband Integrated Services Digital Network (B-ISDN) and Broadband Private Integrated Services Network (B-PISN) – Call control protocol*.

[4] ITU-T Recommendation Q.2982 (1999), *Broadband Integrated Services Digital Network (B-ISDN) – Digital Subscriber Signalling System No. 2 (DSS2) – Q.2931-based separated call control protocol*.

[5] ITU-T Recommendation Q.2983 (1999), *Broadband Integrated Services Digital Network (B-ISDN) – Digital Subscriber Signalling System No. 2 (DSS2) – Bearer control protocol.*

[6] ITU-T Recommendation X.680 (1997) | ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.

[7] ITU-T Recommendation X.690 (1997) | ISO/IEC 8825-1:1998, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rues (CER) and Distinguished Encoding Rules (DER)*.

[8] ITU-T Recommendation X.880 (1994) | ISO/IEC 13712-1:1995, *Information technology – Remote operations: Concepts, model and notation*.

[9] ITU-T Recommendation Z.100 (1993), *Specification and Description Language*.

3 Definitions

This Recommendation defines the following terms:

3.1 External definitions

The definitions used in ITU-T Recommendations Q.2931, Q.2932.1, Q.2981 and Q.2982 apply.

3.2 Additional definitions

3.2.1 prenegotiation: A method allowing a user to check compatibility and availability at the remote user with regard to one or more bearer connections the user intends to establish during the lifetime of the call, without already reserving bearer connection-oriented resources in the network.

4 Abbreviations

For the purposes of this Recommendation, the abbreviations used in [1], [2], [3], [4] apply. In addition, this Recommendation uses the following abbreviations:

CC Call Control

mp modification possible (9.2.1.3, Figure 2)

PRN Prenegotiation

T/F True/False (9.2.1.3, Figure 2)

UM User mandatory (9.2.1.3, Figure 2)

UO User optional (9.2.1.3, Figure 2)

5 Description

5.1 Overview

This Recommendation specifies the procedures, messages, information elements and components needed for the support of prenegotiation.

Prenegotiation is an optional procedure which may be invoked by either the calling or called user at either the S_B or the co-incident S_B/T_B reference point. In both cases, it can only be invoked in conjunction with or after call establishment. Prenegotiation does not establish connections.

Prenegotiation is performed between two users. In the case of point-to-multipoint connections, it may be performed between the root and the first party.

The prenegotiation protocol operates between two adjacent call control entities (points of call and bearer coordination).

It is not required that the network interprets and processes the contents of the prenegotiation operation, except that incoming call segment identifier and bearer identifiers have to be mapped to the corresponding values on the outgoing side. The network may either relay the related information, or call control entities in the network(s) may also be involved in looking at various parameters of network relevance and may take action/possibly intervene in the prenegotiation procedure. Possible actions/interventions of network nodes based on the interpretation of the contents of the prenegotiation operation are outside the scope of this Recommendation.

In general, all connection related parameters for any number of connections can be prenegotiated.

The purpose of prenegotiation is to check compatibility and availability between the users without already reserving connection-related resources in the network. The response of a user to a prenegotiation request may be:

– positive, if a user is fully compatible with the parameters proposed by the remote party – in this case, the connections may be established with the parameters as proposed by the remote party;
– positive, if a user is not fully compatible with the parameters proposed by the remote party, but supports a compatible alternative/subset – in this case, the connections may be established with those parameters which were proposed as an alternative;
– negative, if a user is not compatible with the parameters proposed by the remote party;
– negative, if a user is compatible with the parameters proposed by the remote party, but the negotiated resources are currently unavailable.

NOTE – If prenegotiation is performed in combination with Call Establishment, i.e. if no connections are existing/pending, the call might be released if the result of the prenegotiation is negative.

The prenegotiation procedures allow a user to return either only one or several alternative acceptable parameter sets per connection.

5.2 Protocol model for prenegotiation

For prenegotiation, the basic protocol model outlined in Figure I.1 of ITU-T Recommendation Q.2932.1 applies. Figure 1 shows how prenegotiation fits into this basic model. It should be noted that Figure 1 only shows those ASEs which are directly related to prenegotiation.

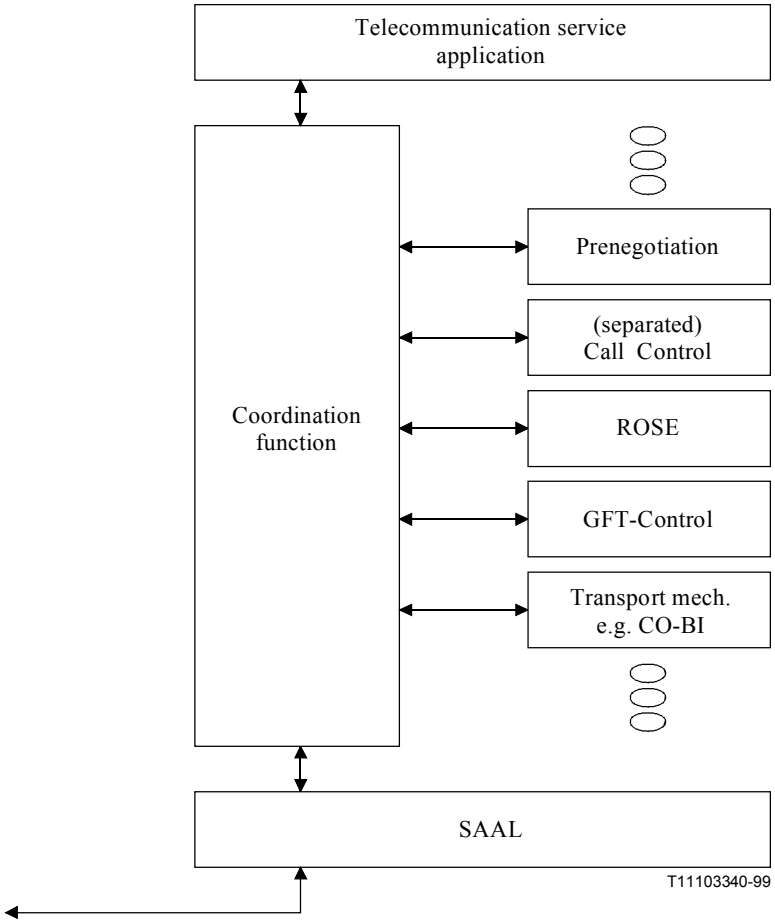


Figure 1/Q.2984 – Prenegotiation within the B-QSIG/DSS2 protocol model

6 Operational requirements

Prenegotiation may be used within an environment of multiconnection calls. In such an environment, no specific operational requirements exist and prenegotiation may be invoked according to the procedures of 9.2.1 below.

Prenegotiation is based on the transport capabilities as defined in ITU-T Recommendation Q.2932.1, and on the call establishment procedures as defined in ITU-T Recommendation Q.2981 or Q.2982.

7 Primitive definitions and state definitions

7.1 Service primitives

The following services for prenegotiation are defined:

Prenegotiate confirmed.

Prenegotiation-Alert unconfirmed.

Error indication.

7.2 Prenegotiation states

For the purpose of prenegotiation, the following additional states exist in a Call Control entity (CC entity):

7.2.1 PRN Idle

No prenegotiation procedure invoked.

7.2.2 PRN Initiated

This state exists at a preceding CC entity when a request for prenegotiation has been sent to the succeeding CC entity but no response has been received.

7.2.3 PRN Delivered

This state exists at a preceding CC entity when it has received an indication that prenegotiation alerting has been initiated.

7.2.4 PRN Present

This state exists at a succeeding CC entity that has not yet responded to a received request for prenegotiation.

7.2.5 PRN Received

This state exists at a succeeding CC entity when prenegotiation alerting has been initiated but the prenegotiation request has not yet been answered.

8 Coding requirements

8.1 Abstract definition of the prenegotiation operations

Table 1 shows the definition of the operations, errors and types required for prenegotiation using ASN.1 as defined in ITU-T Recommendation X.680 and using the OPERATION and ERROR object classes as defined in ITU-T Recommendation X.880.

APDUs based on these operations shall be of types invoke, returnResult, returnError and reject as defined in Table B.1/Q.2932.1. The Basic Encoding Rules (BER) as defined in ITU-T Recommendation X.690 shall be applied to the encoding of APDUs based on these operations and errors.

Table 1/Q.2984 – Prenegotiation operations and errors

```
Prenegotiation-Operations-and-Errors
 {itu-t recommendation q 2984  prenegotiation-operations-and-errors (1)}

DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
EXPORTS   preNegotiate, PrenegotiationProposal, prenegotiationAlert;
IMPORTS   OPERATION, ERROR FROM Remote-Operations-Information-Objects
            {joint-iso-itu-t remote-operations(4) informationObjects(5) version1(0)}
          CallSegmentId FROM CC-Operations
            {itu-t recommendation q 2982  cc-operations (1)}
          BearerId FROM Call-Object-Class-Definitions
            {itu-t recommendation q 2982  call-object-class-definitions (5)};

PrenegotiationOperations OPERATION  ::=  { preNegotiate | prenegotiationAlert }

preNegotiationOperationsDefinitions  OBJECT IDENTIFIER ::= {itu-t recommendation q 2984  prenegotiation-
operations-definitions (2)}

preNegotiate     OPERATION  ::=
 {
 ARGUMENT  SEQUENCE  {
```

```
                    prenegotiationProposal          PrenegotiationProposal,
                    callAssociation       CHOICE    { callSegmentId              CallSegmentId,
                                                      callId                       CallIdValue }
                    }
 RESULT         SEQUENCE  {
                    prenegotiationProposal          PrenegotiationProposal,
                    callAssociation       CHOICE    { callSegmentId              CallSegmentId,
                                                      callId                       CallIdValue }
                    }
 RETURN RESULT      TRUE
 ERRORS             { prenegotiateErrorSimple | prenegotiateErrorItemized }
 SYNCHRONOUS        FALSE
 ALWAYS RESPONDS    TRUE
 CODE               global :      { preNegotiationOperationsDefinitions 1 }
 }
CallIdValue ::=     OCTET STRING (SIZE (1..3))

PrenegotiationProposal  ::= SEQUENCE OF ConnectionProposal

ConnectionProposal      ::= SEQUENCE    {
      connectionSubject                 ConnectionSubject,
      connectionReference               ConnectionNumber,
      connectionCallRelation            UserMandatory   DEFAULT FALSE,
      bearerId                          BearerId   OPTIONAL   }

ConnectionSubject       ::= CHOICE  {
      connectionProposal      Proposal,
      connectionAccept        Accept        }

ConnectionNumber        ::=     INTEGER (1..127)

UserMandatory           ::=     BOOLEAN

Accept      ::= SEQUENCE  {
      accept                  BOOLEAN,
      alternativeNo           INTEGER OPTIONAL  }
   -- TRUE  if proposal is accepted and therefore no counterproposal necessary
   -- FALSE if proposal is rejected and no counterproposal is possible for UserOptional Connection
   -- alternativeNo specifies the accepted alternative

Proposal    ::= SEQUENCE  {
      bearerEstDirection      BearerEstDirection,
      mostPreferredProposal   MostPreferredProposal,
      alternatives            SEQUENCE OF Alternative    OPTIONAL  }

BearerEstDirection      ::=     ENUMERATED  {
      noSpecificRequirements                (0),
      exclusiveByPrenegInvokingEntity       (1),
      exclusiveByPrenegRemoteEntity         (2),
      preferablyByPrenegRemoteEntity        (3)   }

Alternative         ::= SEQUENCE  {
      alternativeProposal     SEQUENCE OF ProposedItem,
      alternativeNo           INTEGER (1..127)    }
      -- alternativeNo reflects the priority of the alternatives

MostPreferredProposal   ::= SEQUENCE OF ProposedItem
      -- specifies one connection with minimum proposal

ProposedItem        ::= SEQUENCE  {
      item                    InformationElement,
      modificationPossible    BOOLEAN OPTIONAL  }
```

```
InformationElement      ::= OCTET STRING (4..4095)   -- embedded DSS2 Information Elements
                                                     -- information elements are listed in 9.2.1.3
                                                     -- maximum value depends on information element

preNegotiationOperationsErrors OBJECT IDENTIFIER ::= {itu-t recommendation q 2984 prenegotiation-
operations-errors (3)}

prenegotiateErrorSimple         ERROR ::= {
        PARAMETER       CHOICE      { callSegmentId     CallSegmentId,
                                      callId            CallIdValue }
        CODE            global : { preNegotiationOperationsErrors 1 } }

prenegotiateErrorItemized       ERROR ::= {
        PARAMETER       PrenegotiateErrorItemizedParam
        CODE            global :    { preNegotiationOperationsErrors 2 } }

PrenegotiateErrorItemizedParam ::= SEQUENCE {
        callAssociation       CHOICE  { callSegmentId     CallSegmentId,
                                        callId            CallIdValue },
        listOfConnectionErrors        SEQUENCE OF ConnectionError }

ConnectionError   ::= SEQUENCE {
        connectionSubject       ENUMERATED {
                                        unspecified (0),
                                        compatibleAndCurrentlyUnavailable (1),
                                        incompatible (2),
                                        ...     },
        connectionReference     ConnectionNumber }

prenegotiationAlertOPERATION ::=
 {
 RETURN RESULT              FALSE
 SYNCHRONOUS                FALSE
 ALWAYS RESPONDS            FALSE
 CODE                       global :    { preNegotiationOperationsDefinitions 2 }
 }

END -- Prenegotiation-Operations-and-Errors
```

9 Prenegotiation procedures

9.1 General

Prenegotiation procedures are based on the transport procedures for signalling messages of ITU-T Recommendation Q.2932.1. The specification of this clause shows the specific procedures for prenegotiation that apply in addition to those specified for the underlying transport mechanism.

Prenegotiation is also closely related to call establishment as specified in ITU-T Recommendation Q.2981 (Call Control protocol) or ITU-T Recommendation Q.2982 (Q.2931-based Call Control protocol).

9.2 Procedures at an originating or terminating CC entity

9.2.1 Invoking the prenegotiation operation by the initiating CC entity

Prenegotiation is defined in a fully symmetric fashion and can be initiated either by the originating or terminating call control entity, depending on the service/application requirements.

Prenegotiation may be invoked either together with call establishment or at any time during the active phase of the call, independent of the number of active bearer connections.

After invoking prenegotiation, an application-dependent timer T1 may be started. Actions at the expiry of this timer are outside the scope of this Recommendation.

If the prenegotiation invoke is rejected, timer T1 shall be stopped (if running). Additional application-dependent actions on receipt of a reject APDU that is correlated to a preNegotiate invoke are outside the scope of this Recommendation.

9.2.1.1 Invocation of prenegotiation – Relation to call establishment

Prenegotiation may be invoked either:

a) by the originating CC entity concurrently with the call establishment; in this case the invoke component of the preNegotiate operation is transferred together with the invoke component of the call establish operation, the result of the preNegotiate operation may be transferred either together with the result of the call establish operation or at a later point in time (but not prior to the result of the call establish operation); the optional prenegotiationAlert operation may be transferred either together with the first end-to-end response of the call establish operation or at a later point in time; or

b) by the terminating CC entity concurrently with the first end-to-end response to call establishment; or

c) by either the originating or the terminating CC entity after the first end-to-end response to call establishment.

Prenegotiation shall not be invoked between the sending of the invoke component of the call establish operation and the first end-to-end response.

9.2.1.2 Invocation of prenegotiation – Relation to bearer connection establishment

Prenegotiation is initiated prior to the establishment of the related bearer connections. Prenegotiated bearer connections may or may not be established.

Prenegotiation related to further bearer connections may be invoked independently from the number of already existing bearer connections within a call.

Unless specified otherwise by call control procedures taking precedence, bearer connections may be established both from the user initiating the prenegotiation and by the remote user responding to prenegotiation.

In order to avoid a concurrent parallel establishment of bearer connections, an indication "BearerEstDirection" shall be used, where the initiating user shall indicate one of the following alternatives:

a) no specific requirements are specified with regard to the direction of the bearer connection establishment;

b) bearer connections shall only be established by the user invoking the prenegotiation;

c) bearer connections shall only be established by the remote user receiving the preNegotiate invoke (the remote user shall not accept the prenegotiation proposal if not possible);

d) the initiating user would prefer the remote user to establish the bearer connections (to be either accepted or denied in the return result APDU returned in response to the invoked preNegotiate operation).

9.2.1.3 Contents of the prenegotiation proposal

To initiate prenegotiation, the CC entity shall use the invoke component of the preNegotiate operation containing the prenegotiationProposal. The prenegotiationProposal shall consist of a set of connection proposals referring to the connections this user intends to establish within this call at a later point in time.

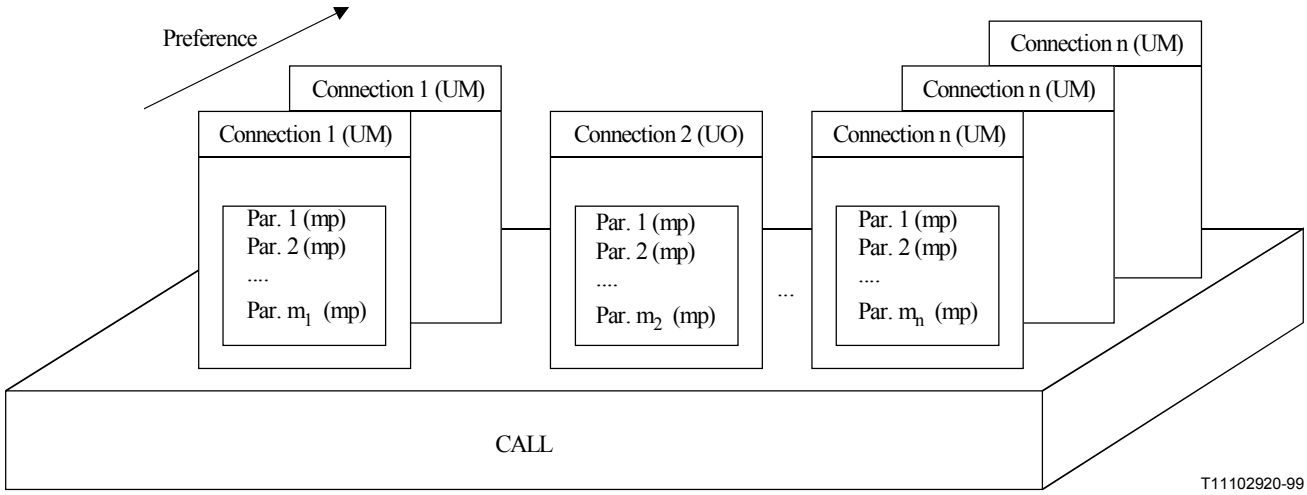
For each proposed connection, the initiating user may specify a parameter "user mandatory". By setting this parameter "true", this user indicates to the remote user to only respond positively to the preNegotiate invoke if the connection(s) marked as "user mandatory" can be accepted (possibly modified). If this parameter is absent for a proposed connection, or set to "false", the initiating user allows the remote user to respond positively to a preNegotiate invoke, even if the remote user cannot support this connection.

With regard to the "user mandatory" parameter, no specific action of the network is required. The network shall relay this information.

The initiating user may include the label "modificationPossible" for each parameter of the most preferred proposal. If this label is set to "false", or is not included, the responding user is not allowed to modify this parameter. If it is set to "true", the responding user is allowed to modify this parameter. For the parameters of the alternative proposals, this label shall not be used by the initiating user.

For each proposed connection, the initiating user shall specify a most preferred proposal and may specify alternative proposals for the same connections as well. These alternatives shall be ordered by a parameter "alternativeNo" indicating decreasing preference by increasing numbers starting with 1; i.e. alternative No. 1 is regarded as the second best proposal, alternative No. 2 as the third best proposal, etc. The alternative proposals shall only consist of those parameters which are different from the preferred proposal.

Figure 2 gives an example illustration of a prenegotiation proposal specified by the initiating user, where one alternative is offered for connection 1 and two alternatives are offered for connection n.



UM User Mandatory (T/F)
UO User Optional (T/F)
mp modification possible (T/F)

Figure 2/Q.2984 – Example illustration of a prenegotiation proposal

The negotiable parameters correspond to those service-related information elements which are specified in ITU-T Recommendation Q.2931 (DSS2 Basic Call). These are:

– ATM adaptation layer parameter;
– ATM traffic descriptor;
– OAM traffic descriptor;
– Quality of service parameter;

– Broadband bearer capability;
– Broadband low layer information;
– Broadband high layer information;
– End-to-end transit delay;
– Narrow-band bearer capability;
– Narrow-band low layer compatibility;
– Narrow-band high layer compatibility.

These information elements will be included in the SETUP message for establishment of the negotiated connection.

The Broadband repeat indicator information element shall not be used within the mostPreferredProposal, or within an alternativeProposal, in order to avoid possible ambiguities with the prenegotiation procedures as such.

Correspondingly, information elements within the mostPreferredProposal or within one alternativeProposal shall not be repeated.

9.2.2 Responding to the prenegotiation invocation

Receiving a prenegotiation proposal, the responding user shall evaluate the prenegotiation proposal, taking into account the modification restrictions and preference indications of the initiating user.

Depending on the proposed connections and the local configuration of the responding user, the terminal equipment may process and answer the request automatically or may present the request to the human user, e.g. in those cases where voice and video connections are involved. In the latter cases, the prenegotiationAlert operation shall be invoked and transferred towards the initiating user.

If the prenegotiationAlert invoke is rejected, actions on receipt of the reject APDU that is correlated to the prenegotiationAlert invoke are outside the scope of this Recommendation.

The local terminal equipment configuration related to prenegotiation is outside the scope of this Recommendation. Two examples of local terminal equipment configuration may be:

– instruction to present all prenegotiation requests to the human user;
– instruction to present those prenegotiation requests to the human user where at least one voice or video connection is included.

As a result of this evaluation, the responding user shall either accept the proposed values, or try to find modified descriptions, or completely reject the prenegotiation request. If the prenegotiation proposal is accepted by the responding user (possibly modified), the responding CC entity shall send back a preNegotiate return result, indicating for each connection proposed either:

– acceptance (set accept to "true");
– acceptance of a proposed alternative (set accept to "true" and indicate the alternative number accepted);
– a counterproposal (set accept to "true" and indicate the proposed modified parameters, if any);
– rejection (set accept to "false"; only possible for non-mandatory connections).

The responding user may send back more than one acceptable parameter set for each connection to indicate that all these sets would be acceptable.

For each indicated connection, the responding user shall also evaluate the BearerEstDirection indication (see 9.2.1.2 above). In case c) (bearer connection establishment exclusively by responding user), the responding user shall not accept a proposed connection, if this connection establishment is not possible. In case d) (bearer connection establishment preferably by responding user), it shall

indicate its acceptance or denial of the proposed bearer establishment direction in the return result of the preNegotiate operation, e.g. by selecting BearerEstDirection indications according to alternatives b) or c) in the preNegotiate return result APDU.

If the responding user cannot at all accept the proposed connection parameters and does not find acceptable modifications, or cannot at all accept the parameters for one connection marked as "user mandatory", then the responding CC entity shall send back a preNegotiate return error APDU.

NOTE – If prenegotiation is performed in combination with Call Establishment, i.e. if no connections are existing/pending, the call might be released if the result of the prenegotiation is negative.

The responding CC entity shall also send back a preNegotiate return error APDU in case the initiating user requests BearerEstDirection exclusively from the responding user for all connections, but the responding user cannot act accordingly.

The responding CC entity shall also send back a preNegotiate return error APDU in the case that the negotiated resources are currently unavailable.

Specific errors which may be used within the preNegotiate return error are:

– generic reject of the whole prenegotiation request (without further information);

– indications of incompatibility or temporary unavailability for specific connections.

9.2.3 Completion of prenegotiation

If the initiating user receives an indication of the invocation of a prenegotiationAlert operation, it may start an application dependent timer T2. Actions on the expiry of this timer are outside the scope of this Recommendation.

If the initiating user receives an indication (i.e. a preNegotiate return result APDU) that the responding user accepts the proposed connection(s), the initiating user may begin to establish these connections in accordance with ITU-T Recommendation Q.2983 (Bearer control protocol), unless specified otherwise by the BearerEstDirection indication.

If receiving a preNegotiate return result where one or more connections have been modified or have not been accepted, the initiating user may either accept the modifications and start establishing connections within this call based on the knowledge gained by the prenegotiation, or may decide not to be able to support the counterproposal of the responding user and may therefore either try to establish only a subset of the connections.

NOTE – If prenegotiation is performed in combination with Call Establishment, i.e. if no connections are existing/pending, the call might be released if the result of the prenegotiation is negative.

9.2.4 Error handling

The error handling mechanisms of ITU-T Recommendation Q.2932.1 apply. In addition, the following applies:

If a CC entity receives invalid parameters appearing in a prenegotiationProposal, it may ignore and discard these parameters and continue processing the prenegotiationProposal.

9.2.5 Crossing of bearer establishment messages with prenegotiation-related APDUs

In case of crossing of bearer establishment messages with messages containing prenegotiation-related APDUs, or in case of the crossing of two prenegotiation-related APDUs, both flows shall be further processed independently of each other.

A user having sent or received a bearer connection establishment message and then receiving a prenegotiation-related APDU may take the bearer establishment process into account for providing a prenegotiation-related response. However, this does not affect the formal protocol handling of the prenegotiation APDUs and is therefore outside the scope of this Recommendation.

9.3 Procedures at a transit CC entity

The contents of the prenegotiation operations and errors need not be interpreted by transit CC entities. Transit CC entities may either relay the contents of the prenegotiation operations and errors or transit CC entities may also be involved in looking at various parameters of network relevance and may take action/possibly intervene in the prenegotiation procedure. Possible actions of transit CC entities based on the interpretation of the contents of the prenegotiation operations and errors are outside the scope of this Recommendation.

10 Interactions

The specification of interactions with peer-to-peer call control are included in the specifications of 9.2.1.1 above. Interactions with bearer connection establishment are specified in 9.2.1.2 above.

11 Interworking with networks not supporting prenegotiation

11.1 Calls from other networks to a network supporting prenegotiation

The interworking unit between both networks may decide to invoke prenegotiation as specified above. The criteria to initiate prenegotiation are outside the scope of this Recommendation.

11.2 Calls to other networks not supporting prenegotiation

The interworking unit may accept or reject a prenegotiation request, depending on whether the capabilities being prenegotiated can be mapped on compatible services in the other network.

NOTE – It is assumed that the user is notified at call establishment level that an interworking situation has occurred. Therefore, no need has been identified to provide any additional specific indication at prenegotiation level beyond a generic reject.

12 SDL diagrams

The diagrams in this Recommendation use the Specification and Description Language defined in ITU-T Recommendation Z.100 (1993).

The diagrams represent the behaviour of a prenegotiation protocol entity within an originating or terminating call control entity. Possible actions on prenegotiation in a transit CC entity are outside the scope of this Recommendation.

Figures 12-2 to 12-7 show the behaviour of a prenegotiation protocol entity when prenegotiation is invoked during the active phase of a call. If prenegotiation is invoked in conjunction with call establishment, the same behaviour and states apply in conjunction with the appropriate call states.

Input signals from the left and output signals to the left represent primitives to and from the prenegotiation service user. Also timer expiry is indicated by an input signal from the left.

Input signals from the right and output signals to the right represent APDUs sent to and received from the peer call control entity.

The following abbreviations are used:

conf. confirm primitive

err. return error APDU

ind. indication primitive

inv. invoke APDU

PRN Prenegotiate

PRN-Alert	Prenegotiation-Alert
rej.	reject APDU
req.	request primitive
res.	return result APDU
resp.	response primitive
(-)	negative response/confirmation
(+)	positive response/confirmation

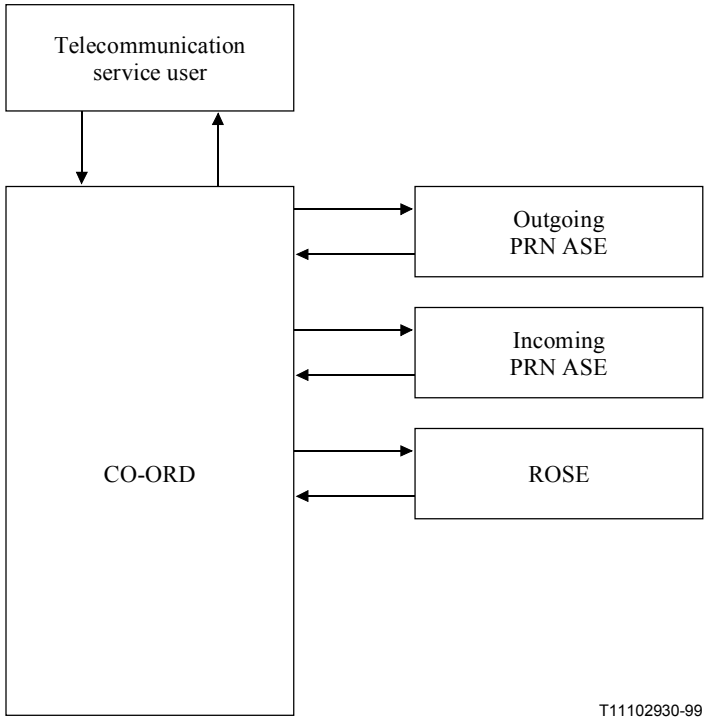


Figure 12-1/Q.2984 – Block diagram

Table 2/Q.2984 – Signal routes

CO-ORD_to_Outgoing-PRN-ASE	Incoming-PRN-ASE_to_CO-ORD
Primitives: PRN_request	Primitives: PRN_indication
APDUs: prenegotiationAlert_invoke preNegotiate_return_result preNegotiate_return_error preNegotiate_reject	APDUs: prenegotiationAlert_invoke preNegotiate_return_result preNegotiate_return_error
Outgoing-PRN-ASE_to_CO-ORD	CO-ORD_to_Incoming-PRN-ASE
Primitives: PRN_confirm PRN_ALERT_indication ERROR_indication	Primitives: PRN_response PRN_ALERT_request
APDUs: preNegotiate_invoke	APDUs: preNegotiate_invoke

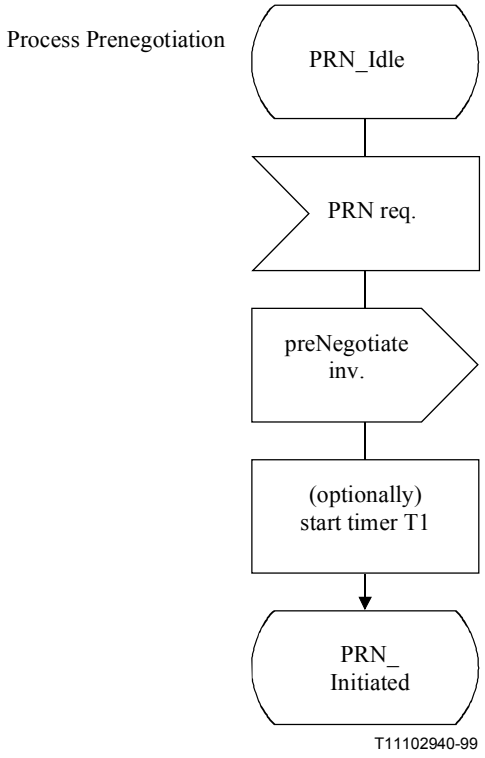
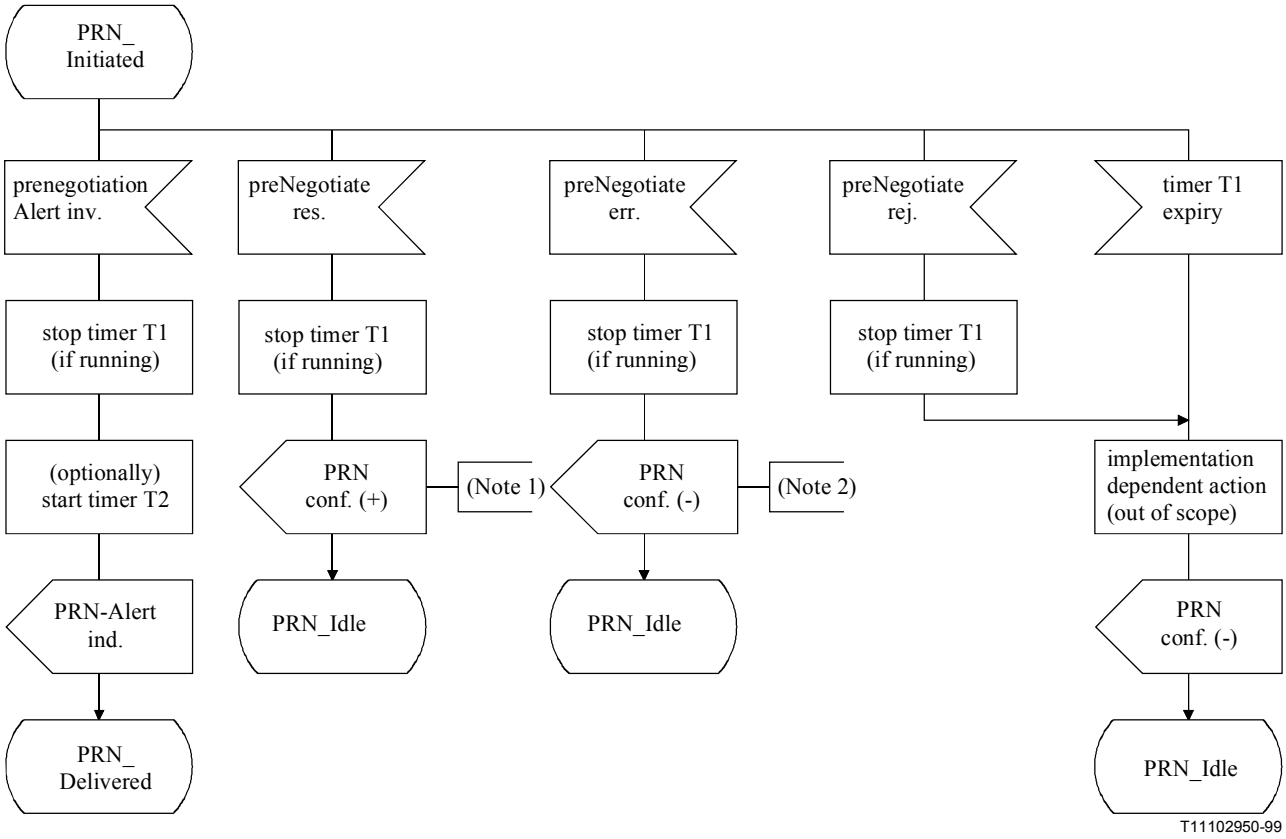


Figure 12-2/Q.2984 – SDL for prenegotiation, outgoing direction

Process Prenegociation

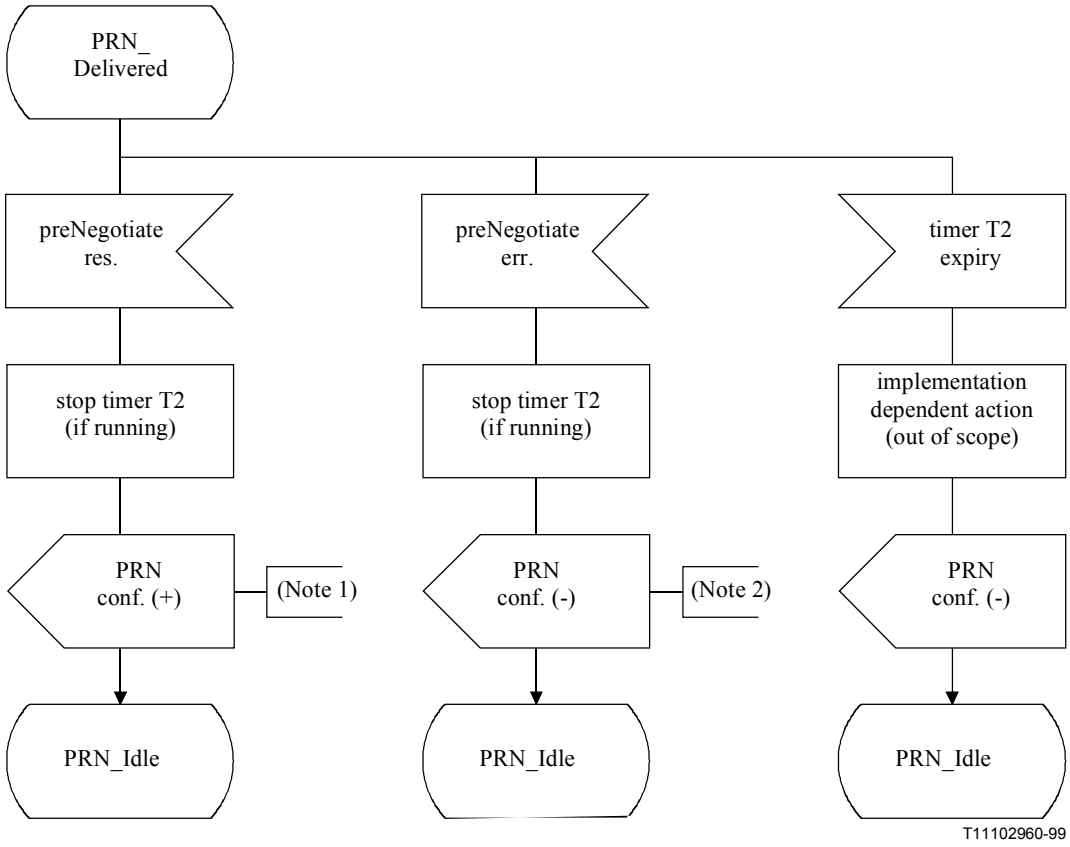


NOTE 1 – Connections may be established with the proposed parameters or with the alternative parameters proposed by the remote party.

NOTE 2 – Remote party incompatible or negotiated resources currently unavailable.

Figure 12-3/Q.2984 – SDL for prenegotiation, outgoing direction

Process Prenegotiation



NOTE 1 – Connections may be established with the proposed parameters or with the alternative parameters proposed by the remote party.

NOTE 2 – Remote party incompatible or negotiated resources currently unavailable.

Figure 12-4/Q.2984 – SDL for prenegotiation, outgoing direction

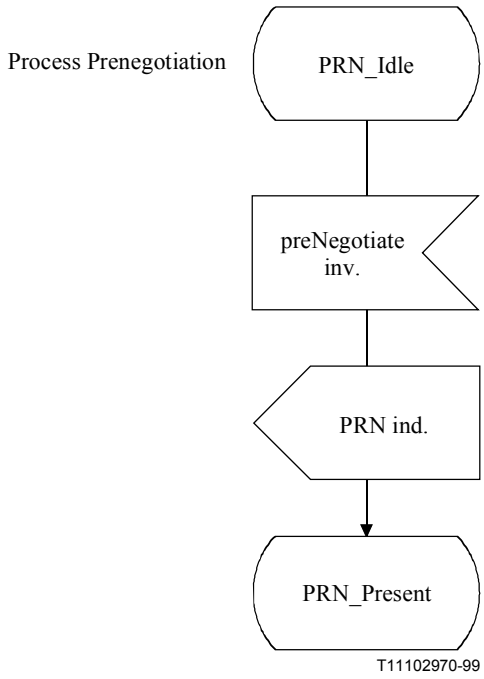
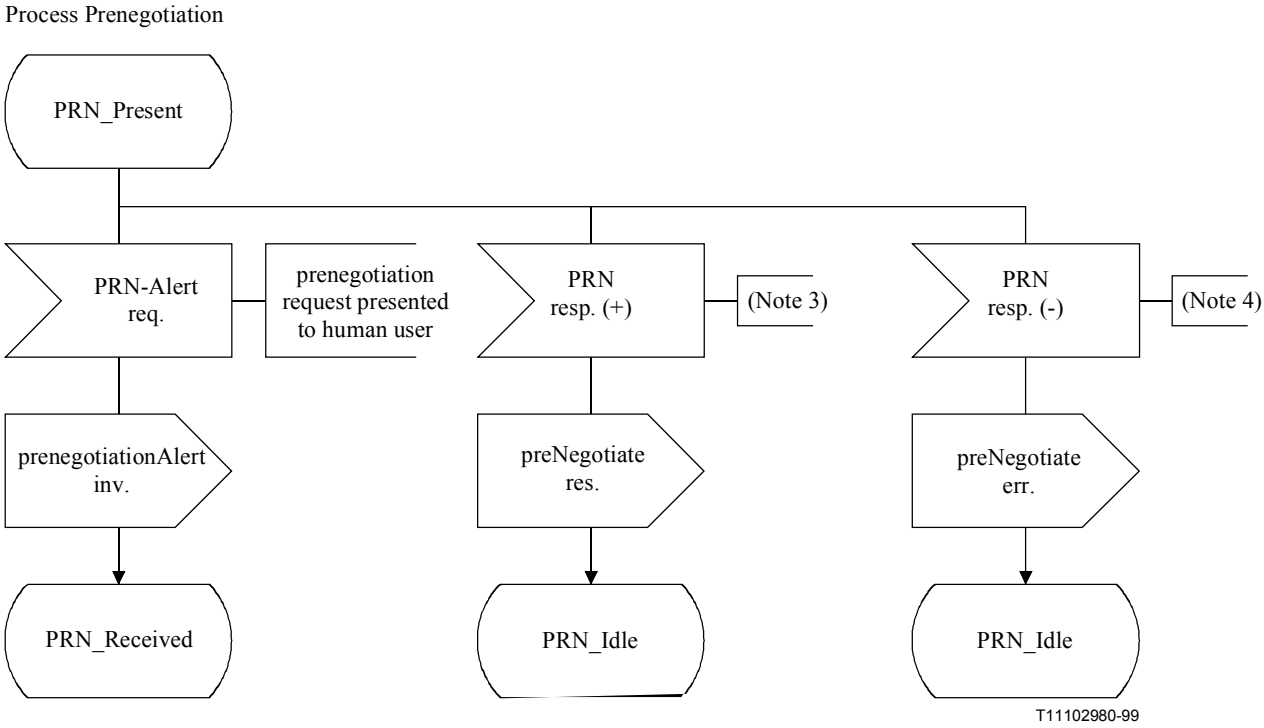


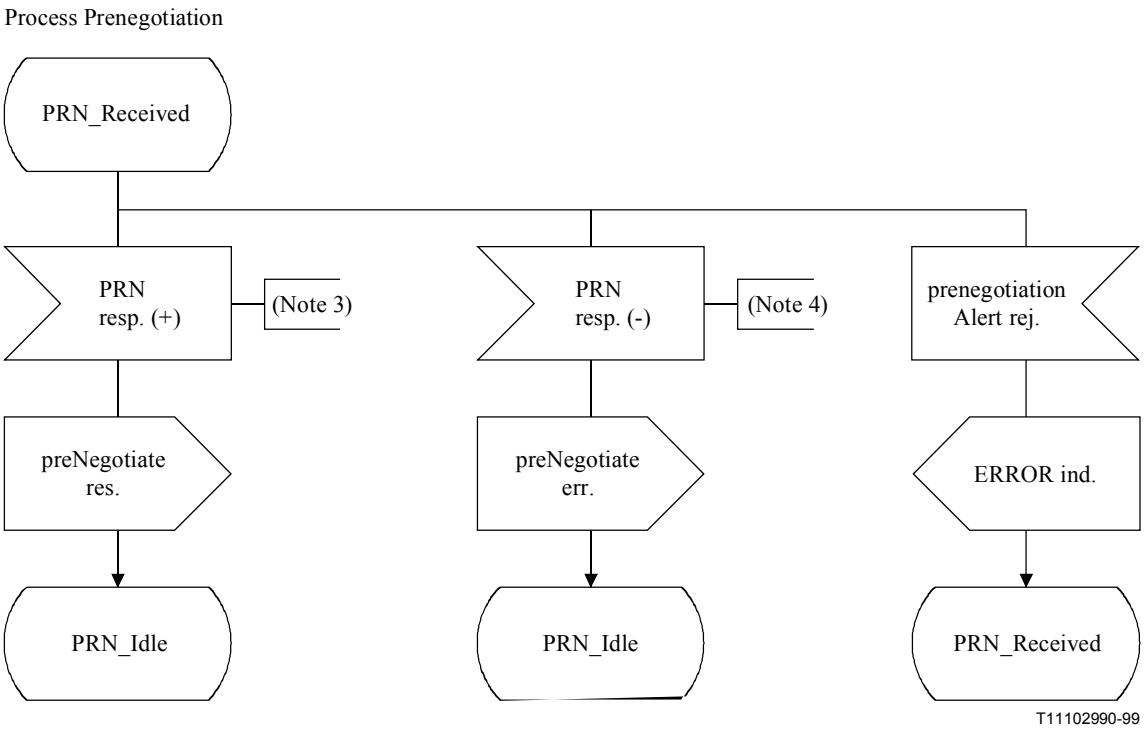
Figure 12-5/Q.2984 – SDL for prenegotiation, incoming direction



NOTE 3 – Prenegotiation request fully accepted, acceptance of a proposed alternative or counterproposal made.

NOTE 4 – Not compatible or resources currently unavailable.

Figure 12-6/Q.2984 – SDL for prenegotiation, incoming direction



NOTE 3 – Prenegotiation request fully accepted, acceptance of a proposed alternative or counterproposal made.

NOTE 4 – Not compatible or resources currently unavailable.

Figure 12-7/Q.2984 – SDL for prenegotiation, incoming direction

APPENDIX I

Information flow diagrams

This appendix shows typical information flows for prenegotiation. The following conventions are used in the figures of this appendix:

– The figures show APDUs exchanged between CC entities involved in prenegotiation. Only APDUs relevant to prenegotiation are shown.

– The figures show protocol states related to prenegotiation on the incoming and outgoing side of a CC entity.

– The figures show the primitives to and from the prenegotiation service user within the user CC which correspond to the exchanged APDUs.

I.1 Prenegotiation

See Figure I.1.

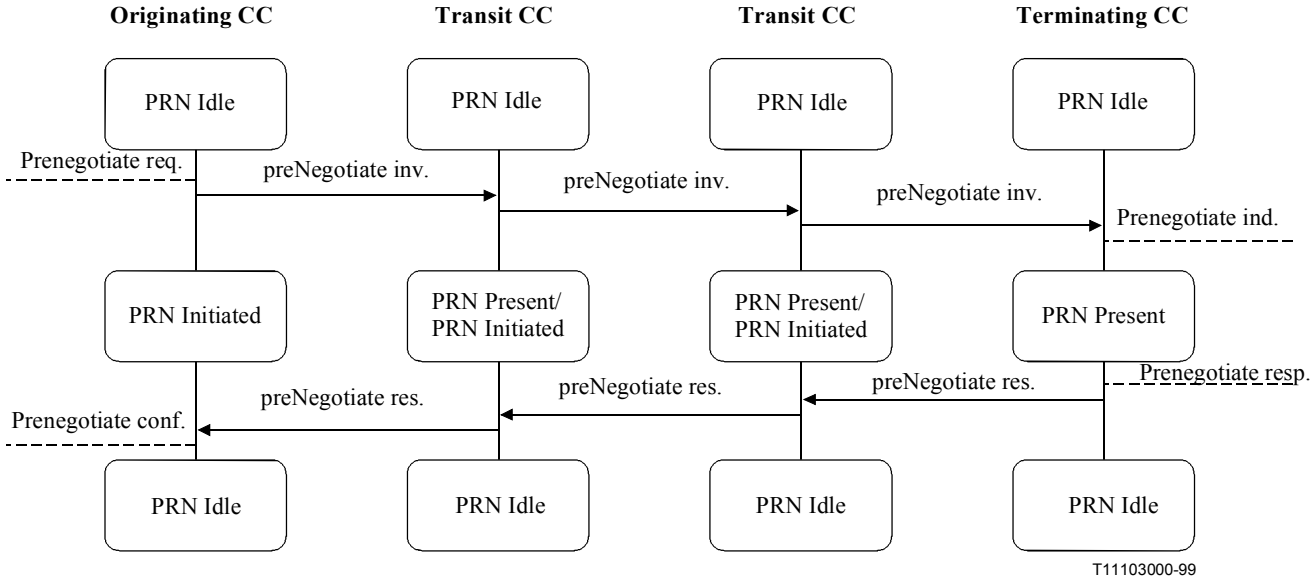


Figure I.1/Q.2984 – Example information flow for prenegotiation

I.2 Prenegotiation with optional prenegotiation-Alert

See Figure I.2.

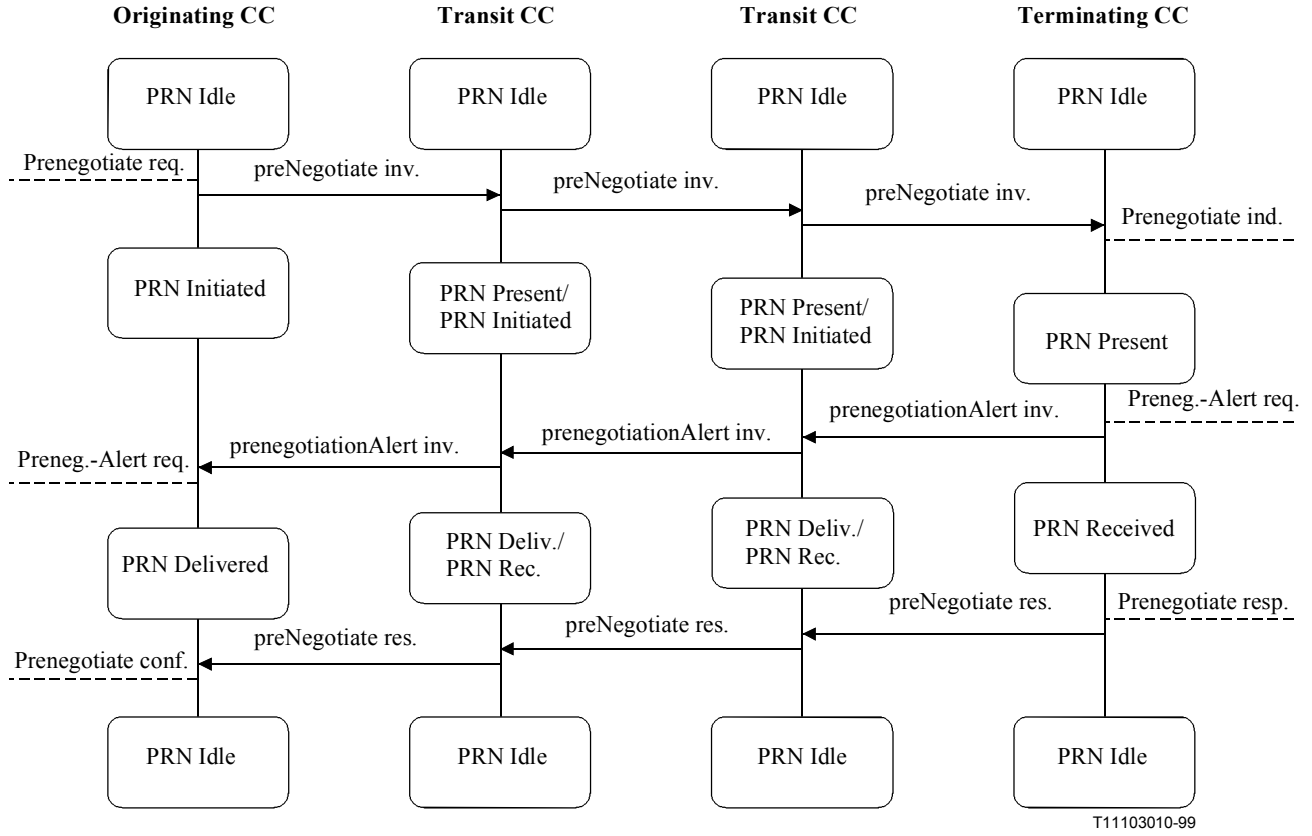


Figure I.2/Q.2984 – Example information flow for prenegotiation with optional prenegotiation-Alert

APPENDIX II

Object identifiers defined in this Recommendation

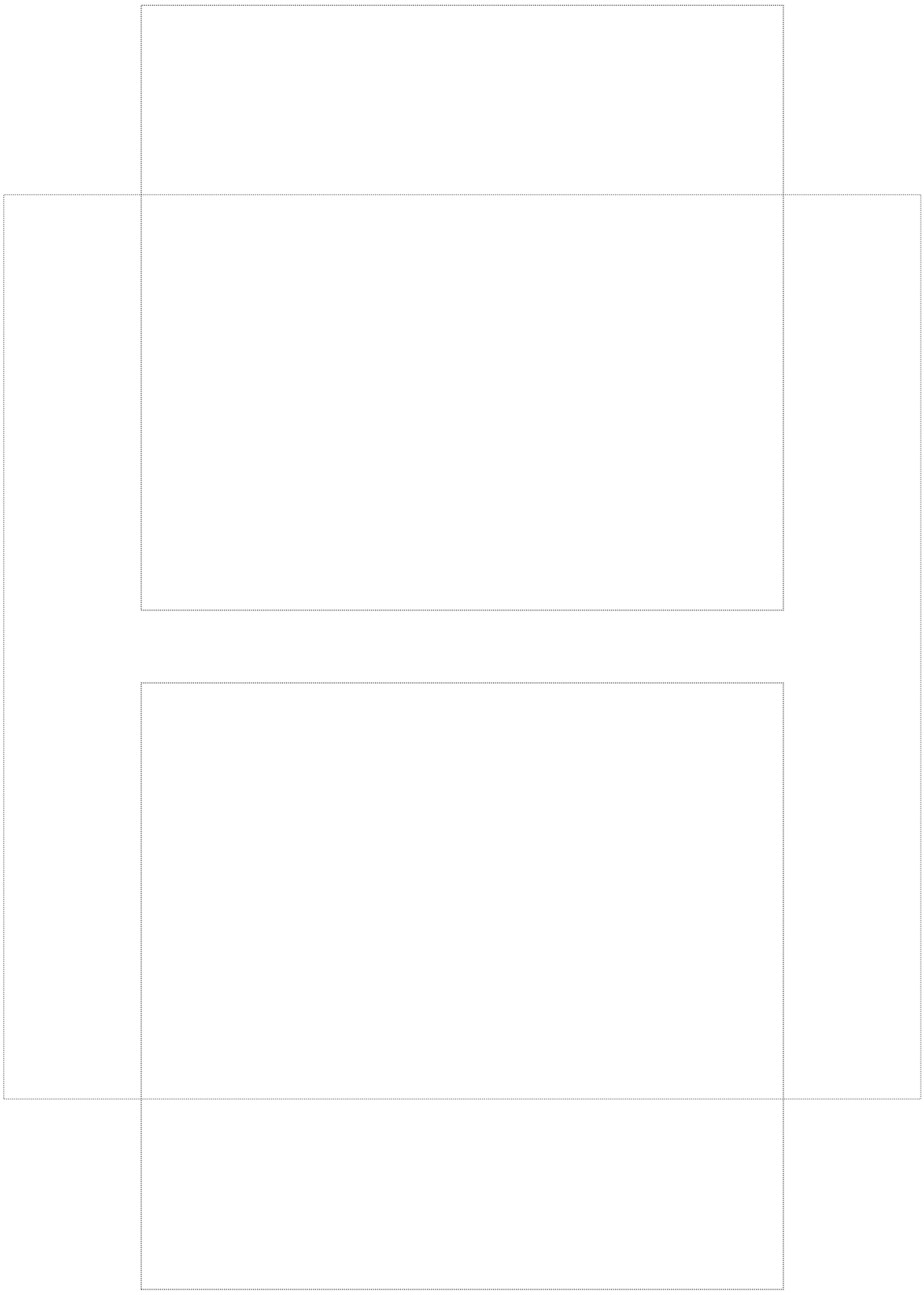
This appendix lists the object identifier values assigned in this Recommendation and data types, values and macros that are exported from any modules identified by those values. All the object identifiers in this Recommendation are defined using the ITU-T object identifier tree. This means that each object identifier value is assigned in the tree:

prnObjectIdTree ::= itu-t recommendation q 2984

Table II.1 lists the module number values and the data types, values and Macros which are exported from these modules.

Table II.1/Q.2984 – ASN.1 module object identifiers used in this Recommendation

Object Identifier	Reference	Notes
{ prnObjectIdTree prenegotiation-operations-and-errors (1) }	Table 1	Exports: preNegotiate, prenegotiationProposal, prenegotiationAlert
{ prnObjectIdTree prenegotiation-operations-definitions (2) }	Table 1	
{ prnObjectIdTree prenegotiation-operations-errors (3) }	Table 1	



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