EUROPEAN TELECOMMUNICATION STANDARD

ETS 300 171

December 1992

Source: ETSI TC-ECMA

Reference: ECMA-142

ICS: 33.080

Key words: PTN, BCSD, ECMA-142

Private Telecommunication Network (PTN); Specification, functional models and information flows Control aspects of circuit mode basic services

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

Contents

Blank page

Foreword

This European Telecommunication Standard (ETS) has been produced by the European Computer Manufacturers Association (ECMA) on behalf of its members and those of the European Telecommunications Standards Institute (ETSI).

This ETS is one of a series of Standards defining services and signalling protocols applicable to Private Telecommunication Networks (PTNs) incorporating one or more interconnected exchanges. The series uses the ISDN concepts as developed by CCITT and is also within the framework of standards for open systems interconnection as defined by ISO.

This particular ETS contains specifications of basic services.

Service specifications are produced in three stages, according to the method described in ENV 41005, which is based on the method used by CCITT Recommendation I.130 and Recommendation Q.65 and ETSI. This Standard contains the Stage 1 and Stage 2 specifications of the services. Stage 1 (clauses 5 to 11) describes the services as seen by users of PTNs. Clauses 9,10 and 11 describe the common aspects of the services and clauses 5,6,7 and 8 describe those aspects which are service dependent. Stage 2 (clauses 12 to 16) identifies the functional entities involved in the basic services and the information flows between them. Stage 3, the definition of the networking and access signalling protocols to support the basic services, will appear in separate ETSs.

This ETS was produced by ECMA using the ECMA guidelines for the production of ETSs and using the ECMA stylesheet. In order to avoid undue delays in the publication of this ETS it has been agreed that this ETS will not be converted to the ETSI stylesheet.

Blank page

1 Scope

This Standard specifies control aspects of standardized circuit mode services which may be supported by Private Telecommunication Networks (PTNs). This Standard contains the Stage 1 and Stage 2 specifications of these services.

Definition of signalling protocols at Stage 3 is guided and constrained by the Stage 1 and Stage 2 specifications , and therefore this Standard is concerned mainly with the control aspects of services. The properties of the user information are described for the different basic services which have to be controlled. Detailed requirements of user information protocols and switching functions are outside the scope of this Standard.

NOTE 1:
The services specified are compatible with the equivalent services specified by CCITT and ETSI for public ISDNs. CCITT specifications of these services are to be found in Recommendations I.220, I.230, I.231 (Stage 1), Q.71 (Stage 2), I.240, and I.241.

This Standard applies to the following bearer services:

- Circuit Mode 64 kbit/s Unrestricted 8 kHz Structured Bearer Service Category;

- Circuit Mode 64 kbit/s 8 kHz Structured Bearer Service Category Usable for Speech Information Transfer;

- Circuit Mode 64 kbit/s 8 kHz Structured Bearer Service Category Usable for 3,1 kHz Audio Information Transfer.

The following Teleservices are supported by these bearer services:

- Telephony Teleservice;

- Teletex Teleservice;

- Telefax 4 Teleservice;

- Videotex Teleservice.

This Standard specifies the dynamic procedures for the support of these Teleservices within a PTN. The definition of these Teleservices is beyond the scope of this Standard.

Negotiation of service at call establishment time and change of service during a call are outside the scope of this Standard.

A Stage 3 Standard shall be in conformance with the Stage 1 and Stage 2 specifications contained in this Standard, if the signalling protocols and equipment behaviour specified in the Stage 3 Standard are capable of being used in a PTN which supports any or all of the basic services specified in this Standard. In particular, the Stage 3 Standards shall be adequate for the support of:

- common aspects of the control of basic services, as seen by the PTN user and the interworking with the ISDN, as specified in clauses 9 and 10;

- the control of the individual basic services specified in clauses 5, 6, 7 and 8;

- the functional entities, functional entity allocations and information flows identified in clauses 12, 13, 14 and 16.

2 References

ETS 300 189 (1992) Private Telecommunication Network (PTN); Addressing.

ENV 41005 (1992) Method for the specification of basic and supplementary services of private telecommunication networks.

ENV 41007-1 (1991) Definition of terms in private telecommunication networks, Part 1: definition of general terms.

ETS 300 089 (1991) Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) supplementary service, Service description.

ETS 300 062 (1991) Integrated Services Digital Network (ISDN); Direct Dialling In (DDI) supplementary service, Service description.

ETS 300 094 (1991) Integrated Services Digital Network (ISDN); Connected Line Identification Presentation (COLP) supplementary service, Service description.

CCITT Recommendation I.112 Vocabulary of terms for ISDNs.

3 Definitions and acronyms

The special terminology defined in ENV 41007-1 and CCITT Recommendation I.112 applies. If there is conflict, the definitions in ENV 41007-1 shall take precedence. For the purpose of this Standard the following further definitions apply.

3.1 Definitions

3.1.1 Service

Unless otherwise stated, the term "service" shall mean "basic telecommunication service".

3.1.2 Call

The instance of the use of a service.

3.1.3 Network call control entity

The collection of network functions concerned with the control of services, as opposed to functions concerned with the transfer of user information.

3.1.4 User

An entity which uses telecommunication services offered by a network, and which therefore directly or indirectly uses the services of the Network Layer.

3.1.5 PTN user

An entity which uses telecommunication services offered by a PTN, and which therefore directly or indirectly uses the services of the Network Layer.

3.2 Acronyms

CC	Clearing Cause
CC	Call Control generic functional entity
CCA	Call Control Agent generic functional entity
CH	Call History
CI	Channel Identifier
CN	Connected Number

CS	Connected Subaddress
CT	Connection Type
DC	Destination Category
DN	Destination Number
DS	Destination Subaddress
DT	Date/Time
FE	functional entity
ISDN	Integrated Services Digital Network
ISO	International Organisation for Standardization
NC	Number complete indication
OC	Originating Category
ON	Originating Number
OS	Originating Subaddress
OSI	Open Systems Interconnection
PSTN	Public Switched Telephone Network
PTN	Private Telecommunication Network
PTNX	Private Telecommunication Network Exchange
RT	Report Type
SDL	Specification and Description Language
TE	Terminal Equipment

4 PTN Service Provision

Basic services within a PTN consist of bearer services and teleservices. A bearer service is defined only up to a certain layer, in any case no higher than Layer 3. The definition of a teleservice also encompasses the higher layers up to Layer 7 (although some of the layers may be empty or not specified, as with Telephony, for example).

The basic services defined in this document correspond to the circuit mode basic services defined by ETSI.

4.1 Bearer Services

PTN circuit mode bearer services provide a means of transferring information between users at Physical Layer level. Layers above Layer 3 are not defined. The provision of bearer services involves only low layer functions and so a bearer service can support a variety of high layer protocols.

A circuit mode bearer service provides a connection (at the Physical Layer) for the conveyance of user information. Each switching point intervenes only at the Physical Layer. This gives a constant bit rate and fixed delays, which are very close to the inherent delays of the transmission media.

4.2 Teleservices

The provision of a teleservice involves high layer functions, generally using the underlying low layer capabilities of bearer services. A PTN can support a teleservice by supporting a bearer service having the same capabilities as those required by the teleservice and by satisfying any special control requirements of the teleservice. The provision of high layer functions in support of a teleservice is not a necessary part of a PTN and is beyond the scope of this Standard.

When requesting a teleservice from a PTN, the user has to explicitly indicate the bearer capabilities required in the same way as when a bearer service is requested. In addition, an indication of the teleservice required is provided by the PTN user, primarily for passing the indication through the network to the called PTN user in order to allow compatibility checking. A PTN may optionally make use of this information for purposes such as barring certain teleservices to certain PTN users, or for the provision or activation of supplementary services on a per teleservice basis, e.g., call forwarding. Any use of this information by a PTN is outside the scope of, but is not precluded by, this Standard.

4.3 Control and signalling

In order for information transfer to take place, an information connection must exist between the PTN users concerned. A demand service involves the establishment and release of information connections according to the demands of users. From the point of view of users, calls have to be established and released, and this involves call control functions. Call control requires knowledge of the properties of the user information to be transferred in order to provide appropriate capabilities.

In general, more than one network element (e.g., PTNX, terminal) is involved in a call, and therefore call control is distributed. Therefore call control information needs to be conveyed between network elements. The conveyance of this information is a function of signalling (see ECMA TR/44).

PTN services use signalling, information which is carried over a dedicated logical connection, separate from the connection established for conveying user information. In the case of circuit mode bearer services, the signalling connection is by necessity carried on a separate physical channel from the information channel (out-of-band signalling).

NOTE 2:
The possible use of the signalling connection also to provide user-to-user information transfer is the function of the User-to-User Signalling supplementary service, which is outside the scope of this Standard.

4.4 Interworking Considerations

In general, interworking between a PTN bearer service and a bearer service provided by another network requires interworking functions, both for information transfer and for signalling.

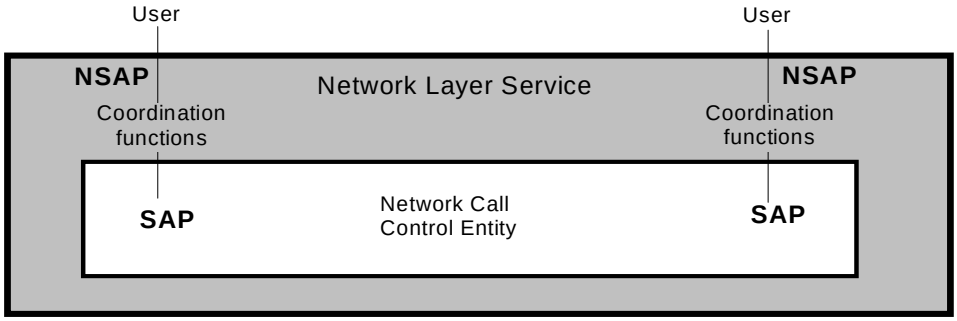
When interworking with the same service in a public ISDN, the interworking function for information transfer is null. However, interworking has an impact on signalling.

4.5 Service Model

This Standard uses the following model in order to specify services.

The Network Layer provides the bearer capabilities necessary for the support of bearer services and teleservices. A PTN user accesses the Network Layer service through Network Service Access Points (NSAP) and requests the Network Layer to provide the bearer capabilities necessary for the support of the bearer services or teleservices. An NSAP is identifiable by an address, which in a PTN is generally in the form of a PTN number, or of the concatenation of a PTN number and a subaddress. For addressing requirements see ETS 300 189.

The Network Layer incorporates functions for the control of calls and functions for the transfer of user information. This Standard views control functions as services being provided by a Network Call Control entity, which are accessible through service access points. Co-ordination functions use the services of the Network Call Control entity when coordinating call control with the transfer of user information, thereby providing a complete Network Layer service to PTN users. Unless explicitly stated the terms " network" and "Network Call Control entity" are used interchangeably hereafter. See figure 1.



SAP = Service Access Point
NSAP = Network Service Access Point

Figure 1 - Service Model

The mapping mechanism between NSAPs and Network Call Control service access points is beyond the scope of this Standard. An address which identifies an NSAP also identifies a Network Call Control service access point by implication.

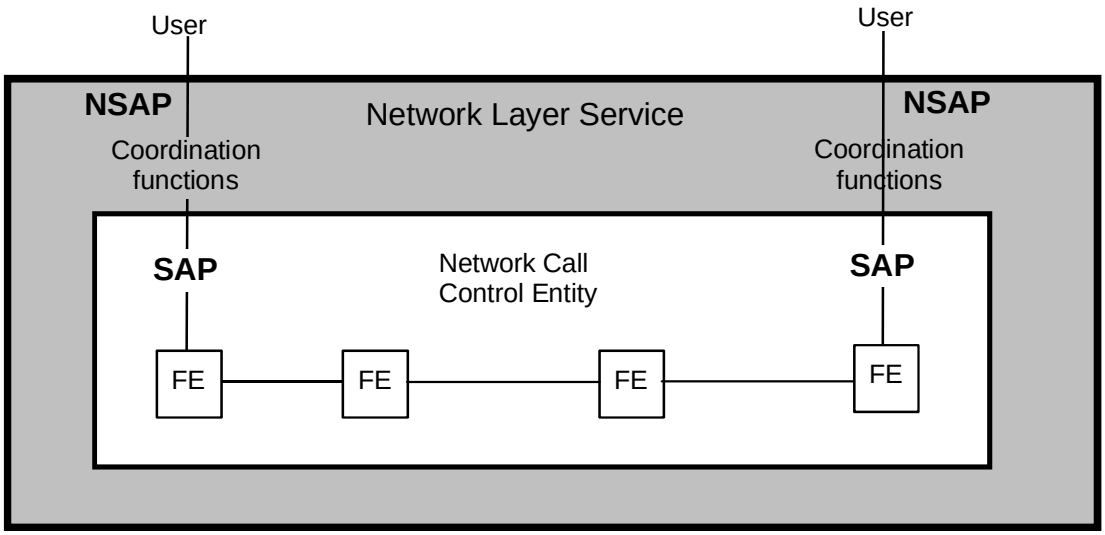
The primitives used across Network Call Control service access points are as follows.

- SETUP_request/indication/response/confirmation; used for call establishment.
- RELEASE_request/indication/response/confirmation; used for call rejection and release.
- REPORT_request/indication; used for reporting that the called PTN user is being alerted, interworking situations, and the presence of in-band tones or announcements.
- INFORMATION_request; used for providing additional destination addressing information not provided with the SETUP_request.

The above primitives are mappable on to the primitives at an NSAP, e.g., N-CONNECT_request/indication/response/confirmation. NSAP primitives relating to the transfer of user information do not have equivalents at the Network Call Control service access point.

At Stage 1, the control aspects of services are specified in terms of the primitives listed above at the Network Call Control service access points. The entire Network Call Control is treated as a single entity.

At Stage 2, the internal behaviour of Network Call Control is specified by breaking it down into a number of Functional Entities (FE) and specifying the information flows between them. The result is a model of the form shown in figure 2. The particular model used for the basic call is specified in clauses 12, 13, 14, 15 and 16. Other models based on this generic model are used for supplementary services. These are specified in other Standards.



SAP = Service Access Point
NSAP = Network Service Access Point

Figure 2 - Generic Model for Stage 2.

4.6 Service Attributes

For each specific service category described in clauses 5 to 8, the attributes, as described in CCITT Recommendations I.140 and I.210, are given. Bearer services are described by low layer attributes. Teleservices are described by both low layer attributes and high layer attributes. High layer attributes are outside the scope of this Standard.

The low layer attributes described in CCITT Recommendation I.210 consist of information transfer attributes, access attributes and general attributes. The information transfer attributes define the network capabilities for transferring information between PTN users of the service. The access attributes define the way in which PTN functions are accessed at the S reference point. Access attributes may differ for different PTN users in a call. General attributes are not used in this Standard.

Information transfer attributes are subdivided into dominant attributes, defining bearer service categories, and secondary attributes, defining individual bearer services within a category.

The dominant information transfer attributes are:

i) Information transfer mode;

ii) Information transfer rate;

iii) Information transfer capability;

iv) Structure.

The secondary information transfer attributes are:

v) Establishment of communication (Note 3);

vi) Symmetry (Note 4);

vii) Communication configuration (Note 5).

The access attributes are:

viii) Access channel and rate (Note 6);

ix) Access protocols (Note 6).

NOTE 3:
Only demand services are specified in this Standard. Reserved and permanent services may be the subject of future Standards.

NOTE 4:
Only bidirectional symmetric services are specified in this Standard. Unidirectional services may be the subject of future Standards.

NOTE 5:
Only point-to-point services are specified in this Standard. Multi-point basic services may be the subject of future Standards. Multi-point may, however, be provided in conjunction with some bearer service categories by means of conference call supplementary services.

NOTE 6:
The access attributes refer only to the user information, not the signalling information.

5. Circuit mode 64 kbit/s unrestricted 8 kHz structured bearer service category

5.1 Description

This bearer service category provides information transfer at 64 kbit/s without alteration between PTN users. It may, therefore, be used to support various PTN user applications. Examples include:

- speech (Note 7);

- 3,1 kHz audio (Note 7);

- multiple subrate information streams multiplexed into 64 kbit/s by the PTN user;

- transparent access to a public or private X.25 network (X.31 case A for access to a public X.25 network).

NOTE 7:
Whilst speech and 3,1 kHz audio have been given as applications for this bearer service, it is recognised that it is the responsibility of PTN users to ensure that a compatible encoding scheme is in operation. PTN users should also recognise that no network provision can be made for the control of such items as echo and loss, as the network is unaware of the application in use. Furthermore, the quality of service attribute value for information transfer delay indicates the suitability of a particular version of this bearer service for speech.

This circuit mode bearer service category allows:

- two PTN users to communicate in a point to point configuration via the network using 64 kbit/s digital signals, in both directions continuously and simultaneously for the duration of a call;

- in conjunction with a conference call supplementary service, three or more PTN users to communicate in a multi-point configuration

Once the information channel connection has been established according to the procedures described in clauses 9 to 11, it is available for the transmission of 64 kbit/s digital signals in both directions continuously and simultaneously, without alteration by the network. No restriction is placed by the network on the content of the digital signals.

5.2 Interworking Considerations

5.2.1 Interworking with a public ISDN

Services in this category are able to interwork with the same services in a public ISDN. The interworking function for user information transfer is null.

5.2.2 Interworking with networks supporting only a restricted digital information transfer capability

During an interim period, some other networks may only support restricted 64 kbit/s digital information transfer capability, i.e., information transfer capability solely restricted by the requirement that the all-zero octet is not allowed. Interworking can be achieved according to the rules given in Appendix I of Recommendation I.520 (the PTN being treated as an ISDN with unrestricted 64 kbit/s capability). The interworking functions are assumed to be provided in the other network. The PTN is not affected by this interworking, other than by conveying the appropriate signalling indication to and from the user.

5.2.3 Interworking with analogue networks

Optionally, the PTN may support calls between data terminals and an analogue network. In this case the following procedures apply.

A V-series terminal connected to the PTN via a terminal adaptor and using a 64 kbit/s unrestricted bearer service requires the use of an interworking function (including a modem) in the PTN for calls to or from users of analogue networks, e.g., PSTNs, private analogue networks. To effect the connection a 64 kbit/s unrestricted connection would need to be used to the interworking function, and a 3,1 kHz audio or equivalent connection would then need to be used to the user of the analogue network.

NOTE 8:
Such an interworking function can be introduced only if additional information concerning layer 1 protocols is available.

In general, when a call originates in an analogue network, the analogue network is unable to indicate to the PTN the service required. If this is the case, the called PTN user is offered a 3,1 kHz audio bearer service.

NOTE 9:
If at the called PTN user there is a terminal adaptor which is unable to accept an incoming 3,1 kHz audio call but is able to accept an incoming 64 kbit/s unrestricted call, the introduction of an interworking function in the PTN can be achieved only if there is service negotiation between the PTN and the called terminal adaptor. This capability is outside the scope of this Standard.

5.3 Service attributes

5.3.1 Dominant information transfer attributes

The dominant information transfer attributes for this service category are:

i) Information transfer mode: circuit;

ii) Information transfer rate: 64 kbit/s;

iii) Information transfer capability: unrestricted;

iv) Structure: 8 kHz integrity.

5.3.2 Secondary information transfer attributes

The secondary information transfer attribute possibilities for this service category are:

v) Establishment of communication: demand / reserved / permanent (Note 10);

vi) Symmetry: bidirectional symmetric / unidirectional (Note 11);

vii) Communication configuration: point-to-point / multi-point (Note 12).

NOTE 10:
Only demand services are specified in this Standard.

NOTE 11:
Only bidirectional symmetric services are specified in this Standard.

NOTE 12:
Only point-to-point services are specified in this Standard. Multi-point configurations can be achieved using conference call supplementary services.

5.3.3 Access attributes

The access attributes (note 13) for this service category are:

viii) Access channel: B;

ix) Access protocol: Not defined.

NOTE 13:
The access attributes refer only to the user information not the signalling information.

6 Circuit mode 64 kbit/s 8 kHz structured bearer service category Usable for speech information transfer

6.1 Description

This bearer service category is intended to support speech.

User information shall conform to CCITT Recommendation G.711 (A-law or μ-law). The network may use processing techniques appropriate for speech such as analogue transmission, echo cancellation and low

bit rate voice encoding. Hence, bit integrity is not assured. This bearer service category is not intended to support modem derived voice band data.

NOTE 14:
A-law encoding is used by public ISDNs in Europe.

This circuit mode bearer service category allows:

- two PTN users in a point-to-point configuration to communicate in a point to point configuration via the network using speech encoded into 64 kbit/s digital signals, in both directions continuously and simultaneously for the duration of a call;

- in conjunction with a conference call supplementary service, three or more PTN users to communicate in a multi-point configuration

Once the information channel connection has been established according to the procedures described in clauses 9 to 11, it is available for the transmission of speech encoded into 64 kbit/s digital signals in both directions continuously and simultaneously. Bit integrity is not assured. The network may use analogue transmission.

Tones and announcements to indicate the progress or otherwise of a call are provided by the network.

6.2 Interworking Considerations

6.2.1 Interworking with a public ISDN

Services in this category are able to interwork with the same services in a public ISDN. The interworking function for information transfer is null.

6.2.2 Interworking with analogue networks

This bearer service category is able to interwork with PSTNs and private analogue networks when calls originate in the PTN. For calls from an analogue network to the PTN, the analogue network is generally unable to indicate the service required, and in this case the PTN provides a 3,1 kHz audio bearer service rather than a speech bearer service, in order to allow for the possibility of voice band data. Calls from the PSTN are always 3,1 kHz audio.

6.2.3 Encoding law conversion

The PTN can, as an option, provide A-law/µ-law conversion (see CCITT Recommendation G.711) to permit interworking between terminals and interfaces to other networks which do not all conform to the same encoding law (A-law or µ-law).

NOTE 15:
Although in general a network which uses µ-law encoding should provide A-law/µ-law conversion when interworking with networks which use A-law, this may not apply in the case of a private network using A-law and a public network using µ-law. Therefore even if the PTN uses A-law and expects its terminals and other private networks to use A-law, it may need to provide A-law/µ-law conversion when interworking with public networks which use µ-law.

6.3 Service attributes

6.3.1 Dominant information transfer attributes

The dominant information transfer attributes for this service category are:

i) Information transfer mode: circuit;

ii) Information transfer rate: 64 kbit/s;

iii) Information transfer capability: speech (encoded)

iv) Structure: 8 kHz integrity.

6.3.2 Secondary information transfer attributes

The secondary information transfer attribute possibilities for this service category are:

v) Establishment of communication: demand / reserved / permanent (Note 16);

vi) Symmetry: bidirectional symmetric / unidirectional (Note 17);

vii) Communication configuration: point-to-point / multi-point (Note 18).

NOTE 16:
Only demand services are specified in this Standard.

NOTE 17:
Only bidirectional symmetric services are specified in this Standard.

NOTE 18:
Only point-to-point services are specified in this Standard. Multi-point configurations can be achieved using conference call supplementary services.

6.3.3 Access attributes

The access attributes for this service category are:

viii) Access channel: B;

ix) Access protocol: CCITT Recommendation G.711 (A-law or µ-law).

NOTE 19:
The access attributes refer only to the user information, not the signalling information.

7 Circuit mode 64 kbit/s 8 kHz structured bearer service category usable for 3,1 kHz audio information transfer

7.1 Description

This bearer service category corresponds to the service which is currently offered in the PSTN. It provides for the transfer of speech and of 3,1 kHz bandwidth audio information such as voice band data via modems and facsimile groups 1, 2 and 3 information.

NOTE 20:
The maximum modem bit rate that can be used by PTN users in applications of this bearer service category depends on the modulation standard employed and on the transmission performance of the networks involved.

User information shall conform to CCITT Recommendation G.711 (A-law or µ-law). The network may use processing techniques appropriate for speech, provided they are appropriately modified or functionally removed prior to non-speech information transfer. The control of echo control devices, speech processing devices, is made by the use of disabling tones.

NOTE 21:
A-law encoding is used by public ISDNs in Europe.

This circuit mode bearer service category allows:

- two PTN users in a point-to-point configuration to communicate via the network using 3,1 kHz audio information encoded into 64 kbit/s digital signals, in both directions continuously and simultaneously for the duration of a call;
- three or more PTN users to communicate in a multi-point configuration in conjunction with a conference supplementary service.

Once the information channel connection has been established according to the procedures described in clauses 9 to 11, it is available for the transmission of 3,1 kHz audio information encoded into 64 kbit/s digital signals in both directions continuously and simultaneously. Bit integrity is not assured. The network may use analogue transmission.

Tones and announcements to indicate the progress or otherwise of a call are provided by the network.

7.2 Interworking Considerations

7.2.1 Interworking with a public ISDN

Services in this category are able to interwork with the same services in a public ISDN. The interworking function for information transfer is null.

7.2.2 Interworking with analogue networks

This bearer service category is able to interwork with PSTNs and private analogue networks. For calls from an analogue network to the PTN, the analogue network is generally unable to indicate the service required, and in this case the PTN always provides a 3,1 kHz audio bearer service.

7.2.3 Encoding law conversion

The PTN can, as an option, provide A-law/μ-law conversion (see CCITT Recommendation G.711) to permit interworking between terminals and interfaces to other networks which do not all conform to the same encoding law (A-law or μ-law).

NOTE 22:
Although in general a network which uses μ-law encoding should provide A-law/μ-law conversion when interworking with networks which use A-law, this may not apply in the case of a private network using A-law and a public network using μ-law. Therefore even if the PTN uses A-law and expects its terminals and other private networks to use A-law, it may need to provide A-law/μ-law conversion when interworking with public networks which use μ-law.

7.3 Service attributes

7.3.1 Dominant information transfer attributes

The dominant information transfer attributes for this service category are:

i) Information transfer mode: circuit;

ii) Information transfer rate: 64 kbit/s;

iii) Information transfer capability: 3,1 kHz audio (encoded);

iv) Structure: 8 kHz integrity.

7.3.2 Secondary information transfer attributes

The secondary information transfer attribute possibilities for this service category are:

v) Establishment of communication: demand / reserved / permanent (Note 23);

vi) Symmetry: bidirectional symmetric / unidirectional (Note 24);

vii) Communication configuration: point-to-point / multi-point (Note 25).

NOTE 23:
Only demand services are specified in this Standard.

NOTE 24:
Only bidirectional symmetric services are specified in this Standard.

NOTE 25:
Only point-to-point services are specified in this Standard. Multi-point configurations can be achieved using conference call supplementary services.

7.3.3 Access attributes

The access attributes (note 26) for this service category are:

viii) Access channel: B;

ix) Access protocol: G.711 (A-law or µ-law).

NOTE 26:
The access attributes refer only to the user information not the signalling information.

8 Teleservices

The teleservices supported by the procedures in clauses 9 to 11, are those which use the same bearer capabilities as the bearer services specified in this Standard. The use of alternative bearer capabilities (eg packet mode) is outside the scope of this Standard. The bearer capabilities used to support each teleservice are specified here in terms of their attributes. Any special requirements for the control of a teleservice which do not apply to the corresponding bearer services are also specified. Otherwise the impact of each teleservice on the network is the same as for the corresponding bearer service.

Indications of the teleservices shall be able to be conveyed from the calling PTN user to the called PTN user as High Layer Compatibility information. Use of these indications by the PTN is optional.

A PTN may reject a request for a teleservice if the requested bearer capabilities are not those specified in this clause for that teleservice.

NOTE 27:
Additional information on the teleservices below can be found in CCITT Recommendation I.241.

High layer functions for interworking between teleservices listed hereafter, and non-ISDNs, are beyond the scope of this Standard.

8.1 Telephony Teleservice

The bearer capability required is defined by the following low layer attributes:

i) Information transfer mode: circuit;

ii) Information transfer rate: 64 kbit/s;

iii) Information transfer capability: speech (Note 28);

iv) Structure: 8 kHz integrity;

v) Establishment of communication: demand;

vi) Symmetry: bidirectional symmetric;

vii) Communication configuration: point-to-point;

viii) Access channel (Note 29): B;

ix) Access protocol (Note 29): CCITT Recommendation G.711 (A-law or µ-law).

NOTE 28:

In interworking situations the information transfer capability can default to 3,1 kHz Audio.

NOTE 29:

The access attributes refer only to the user information not the signalling information.

8.2 Teletex Teleservice

The bearer capability required is defined by the following low layer attributes;

i) Information transfer mode: circuit;

ii) Information transfer rate: 64 kbit/s;

iii) Information transfer capability: unrestricted;

iv) Structure: unstructured (Note 30);

v) Establishment of communication: demand;

vi) Symmetry: bidirectional symmetric;

vii) Communication configuration: point-to-point;

viii) Access channel (Note 32): B;

NOTE 30:
Even if no structure is required, the network may provide 8 kHz integrity.

NOTE 31:
The use of a packet mode bearer capability to support this teleservice is outside the scope of this edition of this Standard.

NOTE 32:
The access attributes refer only to the user information not the signalling information.

The SETUP_confirmation shall be accompanied by an indication of the local date and time.

8.3 Telefax 4 Teleservice

The bearer capability required is defined by the following low layer attributes:

i) Information transfer mode: circuit;

ii) Information transfer rate: 64 kbit/s;

iii) Information transfer capability: unrestricted;

iv) Structure: unstructured (Note 33);

v) Establishment of communication: demand;

vi) Symmetry: bidirectional symmetric;

vii) Communication configuration: point-to-point;

viii) Access channel (Note 35): B;

ix) Access protocol (Note 35): X.75 layer 2; ISO 8208 layer 3 (Note 42).

NOTE 33:
Even if no structure is required, the network may provide 8 kHz integrity.

NOTE 34:
The use of a packet mode bearer capability to support this teleservice is outside the scope of this edition of this Standard.

NOTE 35:
The access attributes refer only to the user information not the signalling information.

The SETUP_confirmation shall be accompanied by an indication of the local date and time.

8.4 Videotex Teleservice

The bearer capability required is defined by the following low layer attributes:

i) Information transfer mode: circuit;

ii) Information transfer rate: 64 kbit/s;

iii) Information transfer capability: unrestricted;

iv) Structure: unstructured (Note 36);

v) Establishment of communication: demand;

vi) Symmetry: bidirectional symmetric;

vii) Communication configuration: point-to-point;

viii) Access channel (Note 38): B;

NOTE 36:
Even if no structure is required, the network may provide 8 kHz integrity.

NOTE 37:
The use of a packet mode bearer capability to support this teleservice is outside the scope of this edition of this Standard.

NOTE 38:
The access attributes refer only to the user information not the signalling information.

9 Demand service procedures for services within a PTN

The procedures of this clause shall apply when the users concerned are users of a PTN.

9.1 Provision of Services

As a PTN option, a basic service available in a PTN can be generally available, or can be available by specific arrangement, for an individual PTN user.

9.2 Normal Procedures

9.2.1 Call establishment at the calling PTN user

A call is originated by the calling PTN user, by transferring across a service access point a request for call establishment (SETUP_request). This request includes the following information:

i) Bearer Capability information defining the bearer capabilities required of the network;
The Bearer Capability consists of a list of the low layer attributes for the bearer or teleservice required. It can optionally include additional low layer protocol information which is not required in

order to indicate the service but which could be of use to the network in potential interworking situations.

ii) a number identifying the called PTN user (Destination Number);
The Destination Number consists of the number digits, the identification of the numbering plan and the type of number, in accordance with ETS 300 189. The PTN user can give the Destination Number to the PTN either en-bloc (at the same time as all the other information) or in the overlap mode (in stages). In the latter case, any Destination Number information not supplied in the SETUP_request is supplied in one or more INFORMATION_requests.

iii) optionally, the called PTN user's subaddress, to further identify the called PTN user (Destination Subaddress);
The Destination Subaddress, if supplied consists of the "type of subaddress" indicator and the actual subaddress, in accordance with ETS 300 189.

iv) optionally, information describing user information transfer protocols for layers up to layer 3 (Low Layer Compatibility information);
The Low Layer Compatibility information, if supplied, is additional to the Bearer Capability information, and is not for use by the network, except for passing on to the called PTN user where it can be used for compatibility checking.

v) optionally, indication of a teleservice or of a non-standardized application by means of High Layer Compatibility information;
The High Layer Compatibility information, if supplied, is passed to the called PTN user where it can be used for compatibility checking.

vi) optionally, indication of the PTN user's own subaddress (Originating Subaddress) to identify itself to the called PTN user;
The Originating Subaddress, if supplied, consists of the "type of subaddress" indicator and the actual subaddress, in accordance with ETS 300 189.

vii) optionally, the calling PTN user can provide a number to the network (Originating Number) with the SETUP_request (to be used when multiple numbers have been assigned to the calling PTN user's access).
If the Originating number is provided the PTN shall screen it. If the Originating Number is determined to be one of the numbers assigned to that access, the PTN shall use this Originating Number and classify it "USER PROVIDED, VERIFIED AND PASSED". If no Originating Number is provided or it is determined not to be part of the set of multiple numbers assigned to that access, the PTN shall provide a prearranged default Originating Number classified as "NETWORK PROVIDED". For the format and type of number see Standard ETS 300 189.

NOTE 39:
For the presentation of the Originating Number and the screening results to the called PTN user see ETS 300 173.

Depending on the behaviour of the called PTN user, the calling PTN user will be given an indication that the called PTN user is being alerted (REPORT_indication).

When the called PTN user has answered, confirmation of the call establishment request shall be given to the calling PTN user (SETUP_confirmation), accompanied by the following items of information:

i) Low Layer Compatibility information, if sent by the called PTN user, indicating low layer protocol(s) which the called PTN user is prepared to use (depending on the calling PTN user's capability, the PTN user can now continue the established call or release it);

ii) optional user category information indicating the type of connected PTN user, e.g., ordinary user of a PTN, PTN operator.

iii) Date and Time information which is mandatory for certain basic services and optional for others.

For certain service categories the network shall also provide in-band tones and announcements to the calling PTN user during call establishment, see clauses 5 to 8. The PTN user shall be given an indication of the presence of an in-band tone or announcement (REPORT_indication).

9.2.2 Call establishment at the called PTN user

If the network is able to route the call to the requested destination, taking account of other relevant information in the service request, an incoming call indication (SETUP_indication) shall be transferred across the service access point to the called PTN user. The incoming call indication shall include the following items of information:

i) Bearer Capability information;

ii) Low Layer Compatibility information, if provided by the calling PTN user;

iii) High Layer Compatibility information, if provided by the calling PTN user;

iv) the Destination Subaddress, if provided by the calling PTN user.;

v) optional user category information indicating the type of calling PTN user, e.g., ordinary user of a PTN, PTN operator.

vi) the Destination Number, if multiple numbers have been arranged for the access of the called PTN user. For the format and type of number see ETS 300 189.

If the called PTN user enters an alerting phase, the PTN user will transfer a REPORT_request across the service access point to the PTN.

In order to accept the call, the called PTN user transfers, across the service access point, a response to the incoming call indication (SETUP_response). The network shall then complete the connection for user information between the calling and called PTN users, in accordance with the service requested.

If multiple numbers have been assigned to the called PTN user's PTN access, the number of the PTN user accepting the call can be provided to the network with the SETUP_response (Connected Number). If the Connected number is provided the PTN shall screen it. If the Connected Number is determined to be one of the numbers assigned to that access, the PTN shall use this Connected Number and classify it "USER PROVIDED, VERIFIED AND PASSED". If no Connected Number is provided or it is determined not to be part of the set of multiple numbers assigned to that access, the PTN shall provide a prearranged default Connected Number classified as "NETWORK PROVIDED". For the format and type of number see ETS 300 189.

NOTE 40:
For the presentation of the Connected Number and the screening results to the calling PTN user (see ETS 300 173).

The SETUP_response can, as PTN user options, include any of the following additional items of information:

i) Low Layer Compatibility information (either in the absence of or in contradiction to Low Layer Compatibility information supplied by the calling PTN user);

ii) the PTN user's own subaddress (Connected Subaddress) to the network.

NOTE 41:
For the presentation of the Connected Subaddress to the calling PTN user (see ETS 300 173).

Where there is more than one destination service access point which is compatible with the requirements of the call (Bearer Capability, Destination Number and, if supplied, Destination Subaddress, Low Layer Compatibility, High Layer Compatibility) the SETUP_indication shall be transferred across all compatible service access points. The first REPORT_request received shall result in a REPORT_indication being transferred to the calling PTN user. The call shall finally be awarded to the first service access point across which a SETUP_response is received from the PTN user. The network shall send a RELEASE_request across any other service access points across which the SETUP_indication was sent.

9.2.3 Terminating the service (call release)

The call can be released by either of the PTN users by transferring a request for release (RELEASE_request) across its service access point. The network shall transfer back across the same service access point a confirmation of release (RELEASE_confirmation), transfer an indication of release (RELEASE_indication) with an appropriate cause across the other PTN user's service access point, and expect to receive a RELEASE_response from that PTN user. For certain services an in-band tone or announcement may accompany the RELEASE_indication.

9.3 Exceptional Procedures / Unsuccessful Outcome

In the event that the network is unable to establish a call, it shall give an indication of release (RELEASE_indication) with an appropriate cause to the calling PTN user and cease call establishment. The cause shall be accompanied by an indication of the location at which the failure occurred, i.e., the network (PTN) or the remote PTN user's terminal equipment. The network shall be prepared to receive a RELEASE_response from the calling PTN user.

If the called PTN user is unable to accept a call, the PTN user can transfer a RELEASE_request with an appropriate cause to the network. The network shall transfer a RELEASE_confirmation back across the same service access point. If no SETUP_response is received across any service access point across which the SETUP_request was transferred, the network shall transfer a RELEASE_indication with an appropriate cause across the calling PTN user's service access point and shall be prepared to receive a RELEASE_response.

For certain services the network may also provide in-band tones and announcements in the event of failure. The PTN user shall be given an indication of the presence of an in-band tone or announcement (REPORT_indication).

The main categories of failure are as listed below.

9.3.1 Failure situations due to calling PTN user error

i) A PTN user inputs a network identifiable improper service request.

ii) A PTN user inputs a non-valid Destination Number (or fails to input a valid number in the time allowed).

iii) A PTN user requests a service in contradiction to the service profile of the service access point, e.g., particular basic service not allowed, outgoing calls barred.

9.3.2 Failure situations due to called PTN user state

i) There is no destination service access point which is compatible with the requirements of the call, i.e., the Bearer Capability and Destination Number.

ii) The incoming call is barred according to the service profile of the called service access point(s), e.g., particular basic service not allowed, incoming calls barred, interconnection of the calling and called service access points barred.

iii) There is a lack of resources at all compatible destination service access points.

9.3.3 Failure situations due to network conditions

i) The network is unable to comply with the call request because of temporary lack of resources, e.g., all information channels at the calling PTN user are busy, all suitable network paths are busy.

ii) The network is unable to comply with the call request because of medium term or long term conditions, e.g., no route to the required destination for the basic service concerned, equipment out of service.

9.3.4 Rejection of the call by the called PTN user

i) The called PTN user is unable to comply with the call request attributes. This decision can be based on any of the following: Destination Number, Destination Subaddress, Bearer Capability

information, Low Layer Compatibility information, High Layer Compatibility information, or information received by means of user-to-user signalling (outside the scope of this Standard).

ii) The called PTN user is unable to comply with the call request because of temporary lack of resources.

9.3.5 Absence of response from called PTN user

i) The called PTN user fails to enter an alerting phase or answer within a defined period of time after being given an incoming call indication.

ii) The called PTN user fails to answer within a defined period of time after entering an alerting phase.

10 Interworking

Interworking occurs when the Network Layer spans across the PTN operators' and other network operators' domains.

10.1 General Interworking Considerations

10.1.1 Incoming Calls

An incoming call to a PTN occurs when a PTN User is the called user. An indication of interworking and the type of the other network (public or private, ISDN or non-ISDN) is included in the SETUP_indication to the called PTN user. Certain information can be missing from the SETUP_indication on account of it not being provided by the other network. The details of this information and the default mechanism required to cope with their non-availability are beyond the scope of this Standard.

NOTE 42:
In some situations, information provided by the connected user for delivery to the calling user can be discarded owing to the inability of the other network to handle it.

10.1.2 Outgoing Calls

An outgoing call from a PTN occurs when a PTN User is the calling user. An indication of interworking and the type of the other network (public or private, ISDN or non-ISDN) shall be given to the calling PTN user either in a REPORT_indication or in the SETUP_confirmation.

NOTE 43:
In some situations, information provided by the calling user for delivery to the called user can be discarded owing to the inability of the other network to handle it.

When a call is rejected by another network, depending on the capabilities of the other network, it can become necessary to send cause values other than those normally used within a PTN. The location of the failure in the cause shall indicate, as a minimum, that the failure occurred beyond the PTN.

Some other networks provide in-band tones and announcements during call establishment for certain services. Unless the PTN is able to provide alternative indications to the calling user, it shall establish at least a backward connection of information channels so that tones and announcements are conveyed to the calling PTN user.

The default mechanism required to cope with the non-availability of detailed information to the other network is beyond the scope of this Standard.

NOTE 14
Calls to a public network usually incur a charge.

10.1.3 PTN Transit Calls

A transit call occurs when neither user is a PTN user, but the call is routed through the PTN in order to get from the calling user's network to the called user's network.

10.2 Demand service interworking with a public ISDN

10.2.1 Receipt of service request from a public ISDN

Subclause 10.1.1 applies.

The details of the information which an incoming call request can indicate to the PTN are beyond the scope of this Standard. They can depend on the interworking situations and/or on the availability of certain capabilities in each public ISDN. The information that the PTN shall be prepared to accept is listed below:

(i) Bearer Capability information defining the bearer capabilities required by the PTN;

(ii) Low Layer Compatibility and High Layer Compatibility information from the calling user;

(iii) a number identifying the called PTN user (Destination Number), provided by the DDI supplementary service of a public ISDN;

(iv) the called PTN user's subaddress (Destination Subaddress), provided by the Subaddressing supplementary service of a public ISDN;

(v) the calling user's number (Originating Number) provided by the Calling Line Identification Presentation supplementary service of a public ISDN;

(vi) the calling user's subaddress (Originating Subaddress), provided by the Calling Line Identification Presentation supplementary service of a public ISDN.

The Bearer Capability will consist of a list of the low layer attributes for the bearer or teleservice required. It can optionally include additional low layer protocol information which is not required in order to indicate the service but which could be of use to the network in potential interworking situations. Due to the prevailing interworking situations, the Bearer Capability can be indicated as a default to the PTN, need not reflect the Bearer Capability originally requested by the calling user. In this case the Bearer Capability and the default indication shall be forwarded to the called PTN user.

The Destination Number will consist of the number digits, the identification of the numbering plan and the type of number, in accordance with ETS 300 062.

If the DDI supplementary service does not apply, the Destination Number will not be given, and the PTN shall attempt to establish the requested call to a default destination. The further treatment of such an incoming call request is a PTN option and beyond the scope of this Standard.

The Originating Number received from a public ISDN shall not be screened by the PTN. For the parameters received with the Originating Number see ETS 300 089.

NOTE 44:
For the presentation of the Originating Number and Originating Subaddress to the called PTN user, see ETS 300 173.

Low Layer Compatibility information, High Layer Compatibility information, and the Destination Subaddress, if provided, shall be passed to the called PTN user.

10.2.2 Sending a service request to a public ISDN

Subclause 10.1.2 applies. In addition, ETS 300 189 applies for sending the calling PTN user's identity to a public ISDN.

10.2.3 Receipt of a service response from public ISDN

The details of the information which an outgoing call response can indicate to the PTN are beyond the scope of this Standard. They can depend on the interworking situations and/or on the availability of certain capabilities from a public ISDN. The information that the PTN shall be prepared to accept is listed below:

(i) the connected user's number (Connected Number) provided by the Connected Line Identification Presentation supplementary service of a public ISDN;

(ii) the connected user's subaddress (Connected Subaddress), provided by the Connected Line Identification Presentation supplementary service of a public ISDN;

(iii) Low Layer Compatibility information from the connected user.

The Connected Number received from a public ISDN shall not be screened by the PTN. For the parameters received with the Connected Number see ETS 300 094.

NOTE 45:
For the presentation of the Connected Number and Connected Subaddress to the calling PTN user, see ETS 300 173.

Low Layer Compatibility information, if provided, shall be passed to the calling PTN user.

10.2.4 Sending a service response to a public ISDN

Subclause 10.2.3 applies. In addition, ETS 300 189 applies for sending the connected user's identity to a public ISDN.

11 Dynamic Description

Figure 3 contains the overall dynamic description, using SDL, of a basic call within a PTN. The SDL diagram should be interpreted as follows:

- The SDL process represents the behaviour of the Network Call Control entity.

- Input signals from the left and output signals to the left represent primitives from and to the calling PTN user.

- Input signals from the right and output signals to the right represent primitives from and to the called PTN user.

- The offering of a call to more than one destination service access point is not shown.

- Interworking with other networks is not shown.

- The following states are used:

  IDLE - no call in progress;

  AWAIT DESTINATION NUMBER - the network is awaiting further Destination Number information from the calling PTN user;

  AWAIT CALLED USER RESPONSE - an indication of the incoming call has been sent to the called PTN user but no response has been received;

  AWAIT ANSWER - a report of alerting has been received from the called PTN user but answer has not occurred;

  ACTIVE - the call has been answered;

  AWAIT CALLING USER RELEASE - an indication of release has been sent to the calling PTN user and a response is awaited;

  AWAIT CALLED USER RELEASE - an indication of release has been sent to the called PTN user and a response is awaited.

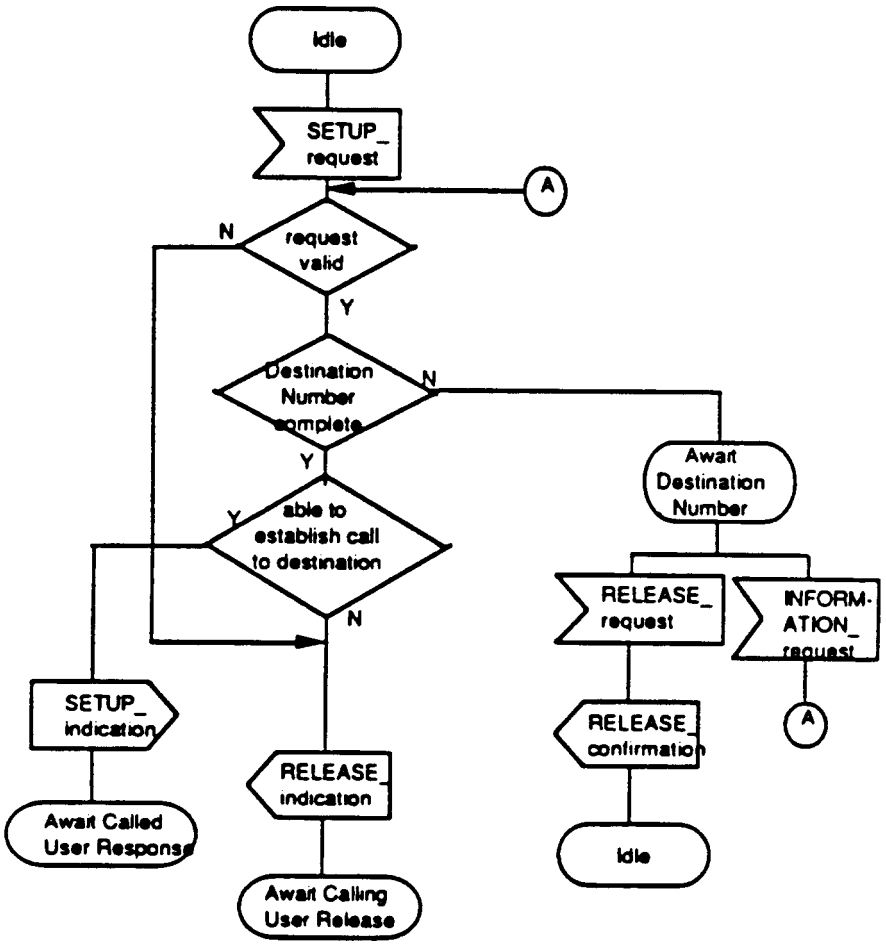


Figure 3 - Stage 1 SDL diagram (Part 1)

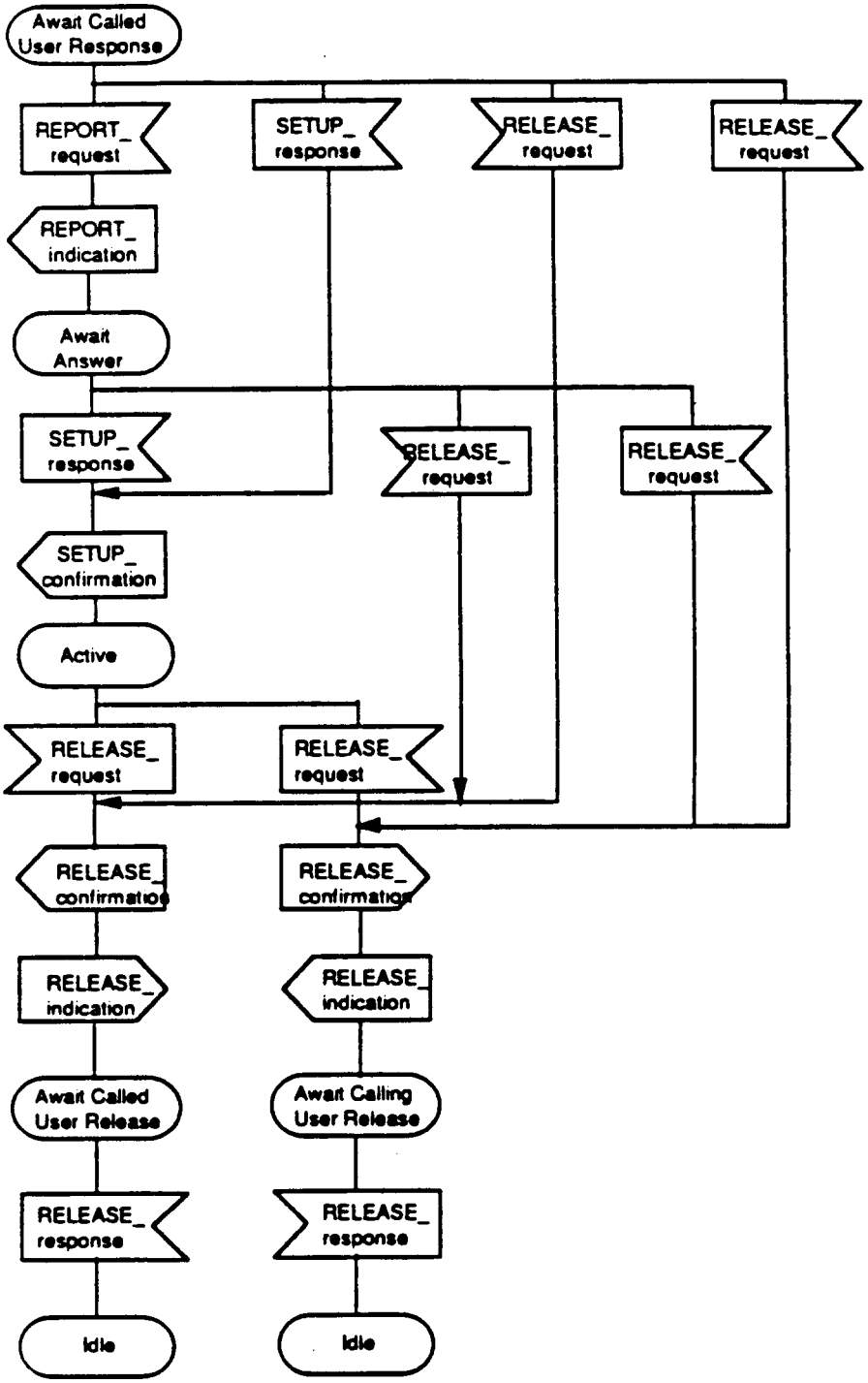


Figure 3 - Stage 1 SDL diagram (Part 2)

12 Functional model

12.1 Functional model description

The internal behaviour of the Network Call Control is specified by breaking it down into a number of functional entities, and specifying the information flows between them. This is described in general terms in clause 4.5.

The particular functional entities used in the Functional Model for the Basic Call are specified in this subclause.

The Basic Call model shall consist of two generic functional entities. The names of the generic functional entities are:

- the Call Control Agent (CCA) ; and,

- the Call Control (CC);

and two types of functional relationships:

- r1 - the access relationship between an Originating Call Control Agent functional entity and an Originating Call Control functional entity.

- r2 - the distributive relationship between a Call Control functional entity and another Call Control functional entity.

- r3 - the access relationship between a Destination Call Control Agent functional entity and a Destination Call Control functional entity.

An additional type of r2 is used in clause 15.

This additional type is called r2*, and is the r2 relationship between the Gateway CC functional entity of a PTN and the CC functional entity of a public ISDN.

NOTE 46:
The definition of r2 is beyond the scope of this Standard.*

The functional model is shown in figure 4. The arrows between the PTN users and the CCA represent PTN user primitives, the arrows between the CC functional entities and either CC functional entities or CCA functional entities represent information flows.

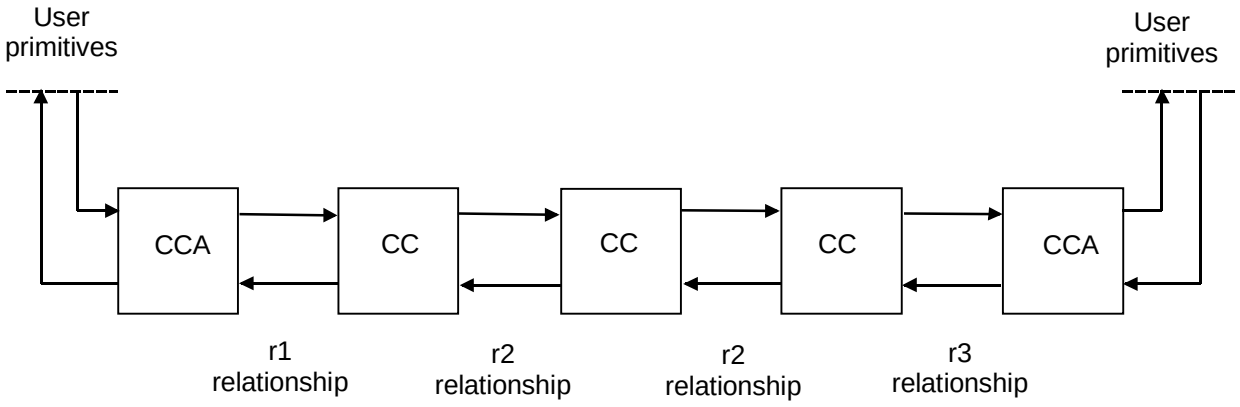


Figure 4 - Stage 2 model

12.2 Description of the functional entities

The allocation of the functional entities that are described in this subclause, is defined in clause 16. The allocation is done on a per call basis.

NOTE 47:
Examples of the use of these functional entities, in conjunction with the Stage 2 model (see figure 4) are shown in figures 6 to 15.

12.2.1 Call Control Agent functional entity

The Call Control Agent functional entity (CCA functional entity) is that part of the Network Call Control that serves the PTN user and is responsible for formulating Basic Service requests to the network that is providing the service.

Within this Standard the following types of CCA functional entity are described:

- Originating CCA functional entity; and,

- Destination CCA functional entity.

12.2.1.1 Originating CCA functional entity

An Originating CCA functional entity is a CCA functional entity which serves the PTN user that has initiated the original Basic Service request. Originating CCA functional entities shall have the following capabilities:

- ability to access the service-providing capabilities of the CC functional entities, using service requests for the establishment and release of a single call;

- ability to receive indications relating to the call from the CC functional entity and relay them to the PTN user;

- ability to maintain call state information as perceived from this functional end-point of the call (i.e. a single ended view of the call).

NOTE 48:
Other capabilities that the Originating CCA functional entity may have are beyond the scope of this Standard and are therefore not specified.

12.2.1.2 Destination CCA functional entity

A Destination CCA functional entity is a CCA functional entity which serves the PTN user at which a particular call terminates. Destination CCA functional entities shall have the following capabilities:

- ability to establish and release a single incoming call;

- ability to receive indications relating to the call from the CC functional entity and relay them to the PTN user;

- ability to maintain call state information as perceived from this functional end-point of the call (i.e a single ended view of the call).

NOTE 49:
Other capabilities that the Destination CCA functional entity may have are beyond the scope of this Standard and are therefore not specified.

12.2.2 Call Control functional entity

The Call Control functional entity (CC functional entity) is the functional entity within the network which co-operates with its peers to provide the Basic Service requested by the CCA functional entity. There are different types of CC functional entity with different functions. Within the scope of this Standard the following type of CC functional entity are described:

- Originating CC functional entity;

- Transit CC functional entity;

- Destination CC functional entity;

- Gateway CC functional entity;

  . Incoming Gateway CC functional entity;

  . Outgoing Gateway CC functional entity.

12.2.2.1 Originating CC functional entity

An Originating CC functional entity is the functional entity within the network that has a direct relationship with the Originating CCA functional entity. Originating CC functional entities shall have the following capabilities:

- the ability to establish, and release a single call, upon request of the Originating CCA functional entity;

- the ability to associate and mediate between the Originating CCA functional entity and the subsequent CC functional entity involved in a particular call.
  Originating CC functional entities can also have the following capabilities:
- the ability to provide tones and announcements.

The ability to process the Basic Service request can include the ability to validate any Basic Service request against any relevant service profile appertaining to the PTN user.

NOTE 50:
Other capabilities that Originating CC functional entities may have are beyond the scope of this Standard and are therefore not specified.

12.2.2.2 Destination CC functional entity

A Destination CC functional entity is the functional entity within the network that has a direct relationship with the Destination CCA functional entity. Destination CC functional entities shall have the following capabilities:

- the ability to establish, and release a single call to the Destination CCA functional entity, on behalf of the network;

- the ability to associate and mediate between the Destination CCA functional entity and the preceding CC functional entity involved in a particular call.

Destination CC functional entities can also have the following capabilities:

- the ability to provide tones and announcements.

The ability to process the Basic Service request can include the ability to validate any Basic Service request against any relevant service profile appertaining to the PTN user.

NOTE 51:
Other capabilities that the Destination CC functional entity may have are beyond the scope of this Standard and are therefore not specified.

12.2.2.3 Transit CC functional entity

A Transit CC functional entity is a CC functional entity within the network that has no direct relationship with a CCA functional entity and is not connected to another network. Transit CC functional entities shall have the following capabilities:

- the ability to establish, and release a single call between two CC functional entities;

- the ability to associate and mediate between the CC functional entities involved in a particular call.

Transit CC functional entities can also have the following capabilities:

- the ability to provide tones and announcements.

NOTE 52:
Other capabilities that the Transit CC functional entity may have are beyond the scope of this Standard and are therefore not specified.

12.2.2.4 Incoming and Outgoing Gateway CC functional entities

A Gateway CC functional entity is the functional entity within the PTN that enables interworking with another network. Depending on whether the call originates in the PTN or in the other network, the gateway CC functional entity can either be an Incoming Gateway CC functional entity or an Outgoing Gateway CC functional entity.

Gateway CC functional entities shall have the capabilities of a transit CC functional entity.

NOTE 53:
Gateway CC functional entities can have other capabilities depending upon the type of network that is being interworked to. The particular capabilities of the Gateway CC will be determined by the level of signalling that is available for interworking to the other network. These additional capabilities are beyond the scope of this Standard.

NOTE 54:
In the scenario where the network that is being interworked with is a public ISDN, then a high level of interworking of the information flows can take place.

NOTE 55:
Other capabilities, not related to interworking, that the Gateway CC functional entity may have are also beyond the scope of this Standard and are therefore not specified.

13 Definition of information flows

13.1 Conventions used within the description of information flows

13.1.1 Convention for the description of mandatory or optional information

In this document the information flows that support the Basic Call service have been divided into 'service elements'. The service elements themselves have been divided where relevant into 'service parameters'. The information content of each service parameter has been listed when necessary.

In order to indicate the circumstances in which the various service elements and parameters are used, the following conventions are used.

- M - service element mandatory

  This service element shall be present in the information flows.

- O - service element optional.

  This service element can be present in the information flow.

Unless stated otherwise, a service element is passed on at a Transit CC functional entity if the information flow is passed on.

A similar convention is used for the parameters within the service elements.

- m - service parameter mandatory

  This service parameter shall be present in the service element.

- o - service parameter optional

  The service parameter can be present in the service element.

13.1.2 Convention for the naming of information flows

An unconfirmed information flow is regarded as a 'request' by the sending FE and an 'indication' by the receiving FE.

The requesting half of a confirmed information flow is regarded as a 'request' by the sending FE and an 'indication' by the receiving FE.

The responding half of a confirmed information flow is regarded as a 'response' by the sending FE and an 'confirmation' by the receiving FE.

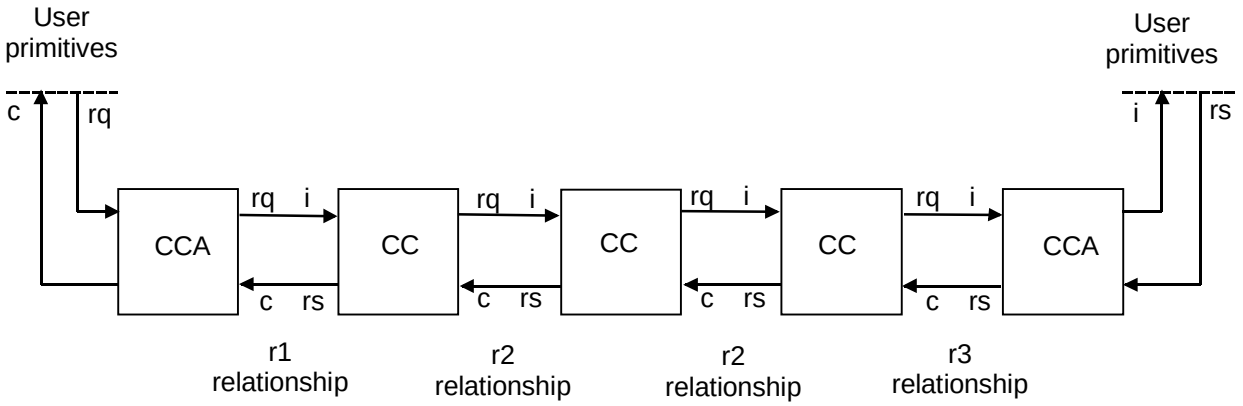
An information flow of name "ABCD" is represented as "ABCD_request" or "ABCD_response" from the perspective of the sending FE. The information flow is represented as "ABCD_indication" or "ABCD_confirmation" from the perspective of the receiving FE.

The information flow of name "ABCD" is represented as "ABCD_request/indication" or "ABCD_response/confirmation" when used in a context which is not from the perspective of a particular FE.

To show the use of an information flow across a particular relationship "rX" the name is preceded by "rX_" (e.g. r2_ABCD_request/indication).

In clause 14 the primitive and information flows are shortened: "request" to "rq"; "indication" to "i"; "response" to "rs"; and, "confirmation" to "c".

Figure 5 shows information flows used in conjunction with the functional model, with the specific example shown of a confirmed information flow being initiated by the PTN user on the "lefthand side".



Legend

In the diagram the following convention is used: "rq" represents the 'request'; "i" represents the 'indication'; "rs" represents the 'response'; and "c" represents the 'confirmation'.

Figure 5 - Example of a confirmed information flow

In clauses 13 and 14 the terms "backwards" and "forwards" are used. At a particular functional entity the direction towards the Originating PTN user is called the "Backwards" direction. The direction towards the Destination PTN user is called the "Forwards" direction.

13.2 SETUP

SETUP is used to request establishment of a connection. SETUP is a confirmed information flow which shall indicate to the functional entity that originates the information flow that the requested connection has been established. In place of the SETUP_response/confirmation, other information flows can be used in call failure situations e.g. RELEASE_request/indication. SETUP shall be applicable to relationships, r1, r2 and r3. The service elements that can be conveyed with SETUP are shown in table 1. The detailed contents of these service elements are shown in table 2.

Table 1. Information content of SETUP

Service element	Relationship	Request/ Indication	Response/ confirmation
DN Destination Number	r1, r2, r3 (Note 57)	M M	- -
CN Connected Number	r2, r3	-	M
ON Originating Number	r2, r1	M	-
CT Connection Type	r1, r2, r3	M	O
DS Destination Subaddress	r1, r2, r3	O	-
CS Connected Subaddress	r2, r3	-	O
OS Originating Subaddress	r2, r1	O	-
CI Channel Identifier	r1, r2, r3	M	O
CH Call History	r1, r2, r3	O	O
OC Originating Category	r2, r3	O	-
DC Destination Category	r2, r1	-	O
DT Date/Time	r1	-	O (Note 56)

Table 2. Detailed information content of SETUP (continued)

Service element	Request/Indication	Response/confirmation
DN Destination Number	M (Note 66) Number - M Numbering plan identifier - M Type of number - M Number complete indicator - O (Note 60)	-
CN Connected Number		M (Note 67) Number - M (Note 62) Numbering plan identifier - M Type of number - M Presentation restriction - M Screening indicator - M
ON Originating Number	M (Note 65) Number - M (Note 62) Numbering plan identifier - M Type of number - M Presentation restriction - M Screening indicator - M	-
CT Connection Type - Circuit Mode Bearer: 64 kbit/s Unrestricted (Note 58)	M (Note 68) Information transfer capacity 64 kbit/s unrestricted - M High layer compatibility - O Low layer compatibility - O Information transfer mode (circuit) - M Information transfer rate (64 kbit/s) - M Establishment - O (Note 59) Symmetry - O (Note 59) Configuration - O (Note 59) Low Layer information layer 1 information - O layer 2 information - O	O Low layer compatibility - O

Table 2. Detailed information content of SETUP (continued)

Service element	Request/Indication	Response/confirmation
CT Connection Type - Circuit Mode Bearer: Suitable for speech	M (Note 68) Information transfer capacity speech - M High layer compatibility - O Low layer compatibility - O Information transfer mode (circuit) - M Information transfer rate (64 kbit/s) - M Establishment - O (Note 59) Symmetry - O (Note 59) Configuration - O (Note 59) Encoding Law (mu/A) - M	O Low layer compatibility - O
CT Connection Type - Circuit Mode Bearer Usable for 3,1 kHz	M (Note 68) Information transfer capacity 3,1 kHz Audio - M High layer compatibility - O Low layer compatibility - O Information transfer mode (circuit) - M Information transfer rate (64 kbit/s) - M Establishment - O (Note 59) Symmetry - O (Note 59) Configuration - O (Note 59) Encoding law (mu/A) - M	O Low layer compatibility - O
DS Destination Subaddress	O Subaddress - M Type of subaddress - M	-
CS Connected Subaddress	-	- O Subaddress - M Type of subaddress - M
OS Originating Subaddress	O Subaddress - M Type of subaddress - M	-
CI Channel Identifier	M (Note 63)	- -
CH Call History	O (Note 61) Interworking encountered - O (Note 69) Signalling interworking trunk release conditions - O (Notes 64 and 70) Signalling interworking interworking with a non- common channel signalling system - O Transits Count - O	O (Note 61) Interworking encountered - O (Note 69) Signalling - interworking trunk release conditions - O (Notes 64 and 70) Signalling interworking - interworking with a non-common channel signalling system - O
OC Originating Category	O	- -
DC Destination Category	-	O -
DT Date/Time	-	O (Note 71)

NOTE 56:
Date/Time is mandatory for use with the teleservices Teletex and Telefax 4.

NOTE 57:
DN is only applicable at r3 if multiple numbers are assigned at the destination user's access.

NOTE 58:
During an interim period, some other networks may only support restricted 64 kbit/s digital information transfer capability. It shall be possible to indicate a restricted 64 kbit/s digital information transfer capability for interworking with such a network.

NOTE 59:
Only the default values of these service parameters are supported.

NOTE 60:
This parameter can optionally be present if the number is known to be complete.

NOTE 61:
Out of the Call History Information, only 'interworking encountered' is relevant over r1 or r3 : in SETUP_response over r1 , and in SETUP_request over r3.

NOTE 62:
The number may not be available due to interworking.

NOTE 63:
When used within SETUP_request/indication there are four values are allowed for the 'Channel Identifier' service element: 'preferred channel'; 'exclusive channel'; 'no channel' and, 'any free channel'. Only the last two values are used over r3.

NOTE 64:
If this information is present but not supported, the call should be cleared.

NOTE 65:
Where there is more than one PTN number associated with the calling PTN user's access, ON is mandatory in the SETUP request/indication across r1 , otherwise it is optional. ON is mandatory in the SETUP request/indication across r2 except in the cases of interworking where it is not available.

NOTE 66:
Where there is more than one PTN number associated with the called PTN user's access, DN is mandatory in the SETUP request/indication across r3, otherwise it is optional.

NOTE 67:
Where there is more than one PTN number associated with the called user's access, and the connected number differs from the destination number, CN shall be mandatory in the SETUP response/confirmation across r3, otherwise it is optional. CN is mandatory in the SETUP response/confirmation across r2 except in the cases of interworking where it is not available.

NOTE 68:
The support of individual Bearer Capabilities is a network option.

NOTE 69:
There are two values for the 'interworking encountered' parameter: 'public network interworking'; and 'private network interworking'.

NOTE 70:
There are three values for the 'Signalling interworking - trunk release conditions' parameter: 'no release'; 'no release before answer'; and, 'no release after answer'.

NOTE 71:
Date/Time is mandatory for use with Teletex and Telefax 4.

13.3 REPORT

REPORT returns information relating to the progress of a call through the network. This information flow is not confirmed and is used within relationships r1, r2 and r3. The service elements that can be conveyed with REPORT are shown in table 3. The detailed contents of these service elements are shown in table 4.

Table 3. Information content of REPORT

Service element	Relationship	Request/Indication
RT Report Type	r1, r2, r3	M (Note 72)
CH Call History	r1, r2, r3	O
DC Destination Category	r1 , r2	O
CC Clearing Cause	r1 , r2	O (Note 72)

NOTE 72:
Clearing Cause is only used in conjunction with the RT (Report Type) 'Call Rejection', and is then mandatory.

Table 4. Detailed information content of REPORT

Service element	Request/Indication
RT Report Type	M (Note 77)
CH Call History	O (Note 78) In-Band Information - o Interworking encountered - o (Note 75) Signalling interworking - trunk release conditions - o (Notes 74 and 76) Signalling interworking - interworking with a non-common channel signalling system - o
DC Destination Category	O
CC Clearing Cause	O (Note 73)

NOTE 73:
Call rejection is only ever used over r1 and r2. The service element CC is only used in conjunction with 'call rejection'.

NOTE 74:
If this information is present but not supported, the call should be cleared.

NOTE 75:
Two values are allowed for the 'interworking encountered' parameter: 'public network interworking'; and 'private network interworking'.

NOTE 76:
Three values are allowed for the 'Signalling interworking - trunk release conditions' parameter: 'no release'; 'no release before answer'; and, 'no release after answer'.

NOTE 77:
Three values are allowed for RT (Report Type): 'User being alerted'; 'interworking encountered'; and, 'call rejection'.

NOTE 78:
Out of the Call History information, only "interworking encountered" is relevant over r1 . Call History is not relevant over r3.

13.4 CHANNEL_ACKNOWLEDGE

CHANNEL_ACKNOWLEDGE provides the confirmation to the channel allocation request in the SETUP req/ind and appears within relationships r1, r2 and r3. The service element that shall be conveyed with CHANNEL_ACKNOWLEDGE is shown in table 5.

Table 5. Information content of CHANNEL_ACKNOWLEDGE

Service element	Relationship	Request/Indication
CI Channel Identifier	r1, r2, r3	M (Note 79)

NOTE 79:
When used within CHANNEL_ACKNOWLEDGE_request/indication there are two values for the 'Channel Identifier' service element: 'allocated channel' and, 'no channel'. The latter is only used over r3.

13.5 CHANNEL_CONNECT

CHANNEL_CONNECT provides the indication to a terminal competing for an incoming call that it has been awarded the call and can connect to the agreed channel. No additional information needs to be carried with the CHANNEL_CONNECT information flow. CHANNEL_CONNECT is used only over r3.

13.6 DISCONNECT

The DISCONNECT provides an invitation to clear across relationships r1 and r3. The service element that shall be conveyed with DISCONNECT is shown in table 6.

Table 6. Information content of DISCONNECT

Service element	Relationship	Request/Indication
CC Clearing Cause	r1, r3	M

13.7 RELEASE

RELEASE is used to free the resources associated with the call/connection, such as call references and channels. This is a confirmed service whose confirmation indicates that all resources previously associated with the connection have been freed. It is used within relationship r1, r2 and r3. The service element that shall be conveyed with RELEASE is shown in table 7.

Table 7. Information content of RELEASE

Service element	Relationship	Request/Indication	Response/ confirmatiom
CC Clearing Cause	r1, r2, r3	O (Note 80)	-

NOTE 80:
Mandatory, if no previous DISCONNECT, otherwise optional.

13.8 INFORMATION

INFORMATION is used to transfer additional address information over r1 and r2 after the SETUP has been sent. It is an unconfirmed information flow. The service elements that shall or can be conveyed with INFORMATION_request/indication are shown in table 8.

Table 8. Information content of INFORMATION

Service element	Relationship	Request/Indication
DN Destination Number	r1 , r2	M
NC Number complete indication	r1 , r2	O (Note 81)

NOTE 81:
Only sent with what is known to be the last digit of the DN.

13.9 SETUP_REJECT

SETUP_REJECT is sent by a CC functional entity or a CCA functional entity over one r1, r2 or r3 relationship to reject a SETUP_indication that it has received, but for some reason can not successfully process. It is an unconfirmed information flow. The service element that shall be conveyed with SETUP_REJECT is shown in table 9.

Table 9. Information content of SETUP_REJECT

Service element	Relationship	Request/Indication
CC Clearing Cause	r1, r2, r3	M

14 Information flow sequences

Below are information flow sequences that shall be taken into account during the detailed specification of Stage 3. These sequences constrain the Stage 3 to the extent that is required in order to guarantee inter-operability between different implementations.

Information flows shown across relationship r2* are informative.

NOTE 82:
In this clause, the terms "backwards" and "forwards" are used. At a particular functional entity the direction towards the Originating PTN user is called the "Backwards" direction. The direction towards the Destination PTN user is called the "Forwards" direction.

14.1 Functional Entity Actions

The capabilities of the functional entities that are applicable to these particular information flow sequences in this clause are described below. The particular information in the primitives between the CCA functional entities and the PTN users is beyond the scope of this Standard.

14.1.1 Originating CCA functional entity

- Function 000 - The SETUP_request primitive from the Originating PTN user's request for service is processed, and the r1_SETUP_request is formulated and sent to the Originating CC functional entity.

- Function 001 - The r1_CHANNEL_ACKNOWLEDGE_indication is processed and the allocated channel indicated is connected and cut-through to the PTN user, at least in the backward direction.

- Function 002 - The r1_REPORT_indication is processed. Because the incoming RT (Report Type) is 'alerting', a REPORT_indication primitive, marked as alerting is sent to the Originating PTN user. The allocated channel should then be connected and cut-through to the PTN user at least in the backward direction, if not already done.

- Function 003 - The r1_SETUP_confirmation is processed and the allocated channel is connected and cut through to the PTN user in both directions, if not already done. A SETUP_confirmation primitive is sent to the Originating PTN user.

- Function 006 - The r1_REPORT_indication is processed. As the incoming Report Type is Report Type 'Call Rejection' and it contains a Call History : In-Band Information, a REPORT_indication primitive, marked as 'call rejection' is sent to the Originating PTN user. The allocated channel is then connected and cut-through to the PTN user in the backward direction, if not already done.

- Function 007 - The r1_REPORT_indication is processed. As the incoming Report Type is Report Type 'interworking encountered' and it contains a Call History 'In-Band Information', a REPORT_indication primitive, marked as 'interworking' is sent to the Originating PTN user. The allocated channel is then connected and cut-through to the PTN user in the backward direction, if not already done.

- Function 010 - The r1_DISCONNECT_indication is processed; and a RELEASE_indication primitive is formulated and sent to the Originating PTN user.

- Function 011 - The RELEASE_response primitive from the Originating PTN user is processed; and, an r1_RELEASE_request is formulated and sent to the Originating CC functional entity.

- Function 012 - The r1_RELEASE_confirmation is processed and, the resources are released.

- Function 015 - The INFORMATION_request primitive is processed and an r1_INFORMATION_request is sent to the Originating CC functional entity.

14.1.2 Originating CC functional entity

- Function 100

  . The r1_SETUP_indication is processed.

  . The incoming information channel is reserved and an r1_CHANNEL_ACKNOWLEDGE_request is sent to the Originating CCA functional entity.

  . An outgoing information channel is reserved, based on the Destination Number and Connection Type information in the r1_SETUP_indication . The selection may also be dependant upon other information beyond the scope of this Standard.

  . The r2_SETUP_request is generated and sent. The Originating Subaddress, the Destination Subaddress, or the Connection Type parameters, Low Layer Compatibility and High Layer Compatibility contained in the r1_SETUP_request , are carried in the r2_SETUP_request unchanged. The Originating Number in the r1_SETUP_request is screened at the CC functional entity. If the Originating Number is determined to be one of the numbers assigned to r1, the CC functional entity uses this Originating Number and classifies it "USER PROVIDED, VERIFIED AND PASSED". If no Originating Number is provided or it is determined not to be part of the set of multiple numbers assigned to that access, the CC functional entity provides a prearranged default Originating Number classified as "NETWORK PROVIDED". For the format and type of number see ETS 300 189.

- Function 101 - The r2_CHANNEL_ACKNOWLEDGE_indication is processed and the allocated channel is connected and cut-through in the backward direction; the information channel may also be cut-through in the forward direction.

- Function 102 - The r2_REPORT_indication from the subsequent CC functional entity is processed. As the incoming Report Type is Report Type 'alerting' an r1_REPORT_indication , marked as alerting is sent to the Originating CCA functional entity. The allocated channel should then be connected and cut-through in the backward direction, if not already done.

- Function 103 - The r2_SETUP_confirmation is processed and the information channel is cut-through in both directions, if not cut-through already. An r1_SETUP_response is generated and then sent to the Originating CCA functional entity. The Connection Type parameter, Low Layer Compatibility, contained in the r2_SETUP_confirmation is carried in the r2_SETUP_response unchanged.

- Function 106 - The r2_REPORT_indication from the subsequent CC functional entity is processed. As the incoming RT (Report Type) is Report Type 'call rejection' and the information flow contains a Call History : In-Band Information a 'Call Rejection' r1_REPORT_indication is sent to the Originating CCA functional entity. The information channel should then be connected and cut-through in the backward direction, if not already done.

- Function 107 - The r2_REPORT_indication is processed. As the incoming Report Type is Report Type 'interworking encountered' and it contains a Call History 'In-Band Information', an r1_REPORT_request, marked as 'interworking' is sent to the Originating CCA. The allocated channel should then be connected and cut-through to the PTN user in the backward direction, if not already done.

- Function 110 - The r2_RELEASE_indication is processed; an r2_RELEASE_response is formulated and sent to the subsequent CC functional entity; an r1_DISCONNECT_request is formulated and sent to the Originating CCA functional entity; and, the resources are disconnected; the resources are released in the direction of the subsequent CC functional entity.

- Function 111 - The r1_RELEASE_indication from the Originating CCA functional entity is processed. An r1_RELEASE_response is sent to the Originating CCA functional entity, and, the resources are released in the direction of the Originating CCA functional entity.

- Function 115 - The r1_INFORMATION_indication is processed and an r2_INFORMATION_request is sent to the subsequent CC functional entity.

14.1.3 Transit CC functional entity

- Function 200

  . The r2_SETUP_indication is processed.

  . The incoming information channel is reserved and an r2_CHANNEL_ACKNOWLEDGE_request is sent.

  . An outgoing information channel is reserved, based on the Destination Number(DN) and Connection Type(CT) information in the r2_SETUP_indication. The selection may also be dependant upon other information beyond the scope of this Standard.

  . The r2_SETUP_request is generated and sent. The Originating Number, Originating Subaddress, Destination Subaddress, Call History information and the Connection Type parameters, Low Layer Compatibility and High Layer Compatibility, contained in the r2_SETUP_indication, are carried in the r2_SETUP_request.

- Function 201 - The r2_CHANNEL_ACKNOWLEDGE_indication is processed and the allocated channel is connected and cut-through in the backward direction; the information channel may also be cut-through in the forward direction.

- Function 202 - The r2_REPORT_indication is processed. As the incoming Report Type is Report Type 'alerting', an r2_REPORT_indication , marked as alerting, is sent to the preceding CC functional entity. The allocated channel should then be connected and cut-through in the backward direction, if not already done. The Destination Category parameter contained in the r2_REPORT_confirmation is carried in the r2_REPORT_request sent to the preceding CC functional entity.

- Function 203 - The r2_SETUP_confirmation is processed and the information channel is cut-through in the forward direction, if not cut-through already. An r2_SETUP_response is generated and then sent to the preceding CC functional entity. The Connected Number Subaddress, Destination Category parameter "presentation", or the Connection Type parameter, Low Layer Compatibility contained in the r2_SETUP_confirmation, are carried in the r2_SETUP_response.

- Function 206 - The r2_REPORT_indication is processed. As the incoming Report Type is Report Type 'call rejection' and the primitive contains a Call History : In-Band Information, an r2_REPORT_indication , marked as Call Rejection is sent to the Preceding CC functional entity. The information channel is then connected and cut-through in the backward direction, if not already done.

- Function 207 - The r2_REPORT_indication is processed. As the incoming Report Type is Report Type 'interworking encountered' and it contains a Call History 'In-Band Information', an r2_REPORT_request, marked as 'interworking' is sent to the preceding CC. The allocated channel is then connected and cut-through to the PTN user in the backward direction, if not already done.

- Function 210 - The r2_RELEASE_indication is processed; an r2_RELEASE_response is formulated and sent to the subsequent CC functional entity; an r2_RELEASE_request is formulated and sent to the preceding CC functional entity; and, the resources are disconnected, and then released in the direction of the subsequent CC functional entity.

- Function 211 - The r2_RELEASE_confirmation from the preceding CC functional entity is processed; and, the resources are released in the direction of the preceding CC functional entity.

- Function 215 - The r2_INFORMATION_indication is processed and an r2_INFORMATION_request is sent to the subsequent CC functional entity.

14.1.4 Destination CC functional entity

- Function 300

  . The r2_SETUP_indication is processed.

  . The incoming information channel is reserved and an r2_CHANNEL_ACKNOWLEDGE_request is sent.

  . An outgoing information channel is reserved, based on the Destination Number(DN) and Connection Type(CT) information in the r2_SETUP_indication. The selection may also be dependant upon other information beyond the scope of this Standard.

  . The r3_SETUP_request is generated and sent. The Originating Subaddress, the Destination Subaddress, Call History information or the Connection Type parameters, Low Layer Compatibility or High Layer Compatibility contained in the incoming r2_SETUP_indication, are carried in the r3_SETUP_request.

- Function 301 - The r3_CHANNEL_ACKNOWLEDGE_indication is processed and the allocated channel is reserved.

- Function 302 - The r3_REPORT_indication from the Destination CCA functional entity is processed. As the incoming Report Type is Report Type 'alerting', an r2_REPORT_request, marked as alerting is sent to the preceding CC functional entity. If the Bearer service_requested was Speech, or 3,1 kHz, then Ring tone is applied towards the Originating CCA functional entity.

- Function 303 - The r3_SETUP_confirmation is processed. If Ring Tone had been applied towards the Originating CCA functional entity it is removed. The information channel is connected and cut-through in both forward and backward directions. An r2_SETUP_response is generated and then sent to the preceding CC functional entity. The Connected Number, the Connected Subaddress, and the Connection Type parameter, Low Layer Compatibility contained in the r3_SETUP_confirmation, are carried in the r2_SETUP_response. The Connected Number is screened by the CC functional entity. If the Connected Number is determined to be one of the numbers assigned to that access, the CC functional entity uses this Connected Number and classifies it "USER PROVIDED, VERIFIED AND PASSED". If the Connected Number is provided and it is determined not to be part of the set of multiple numbers assigned to that access, the CC functional entity provides a prearranged default Connected Number classified as "NETWORK PROVIDED". For the format and type of number see ETS 300 189.

- Also an r3_CHAN CONNECT_request is generated and sent to the Destination CCA functional entity. In the case where more than one CCA functional entity has responded, the CC functional entity shall release all the CCA functional entities other than the one that has been awarded the call.

- Function 310 - The r3_DISCONNECT_indication is processed; an r3_RELEASE_request is formulated and sent to the Destination CCA functional entity; an r2_RELEASE_request is formulated and sent to the preceding CC functional entity; and, the resources are disconnected.

- Function 311 - The r3_RELEASE_confirmation from the Destination CCA functional entity is processed; and, the resources are released in the direction of the Destination CCA functional entity.

- Function 312 - The r2_RELEASE_confirmation from the preceding CC functional entity is processed; and, the resources are released in the direction of the preceding CC functional entity.

- Function 320 - The r3_SETUP_REJECT_request is processed; and, an r2_RELEASE_request is sent to the preceding CC functional entity, and the resources are released in the direction of the Destination CCA.

- Function 321 - The r3_SETUP_REJECT_request is processed; and, because the Destination CC wants to offer an in-band indication an r2_REPORT_request is sent to the preceding CC, and the in-band source is applied to the information channel.

14.1.5 Destination CCA functional entity

- Function 400

  . The r3_SETUP_indication is processed.

  . An r3_CHANNEL_ACKNOWLEDGE_request is sent.

  . The addressing and compatibility requirements contained within the r3_SETUP_indication is processed to ascertain if the call request should be passed to the PTN user. The information within the r1_SETUP_indication that is checked is the Connection Type, Destination Number, Low Layer Compatibility, and High Layer Compatibility.

  . A SETUP_indication primitive is generated and sent to the PTN user.

- Function 401 - The REPORT_request primitive marked as alerting from the Destination PTN user is processed; and, an r3_REPORT_request , with a Report Type of 'alerting' is sent to the Destination CC functional entity.

- Function 402 - The SETUP_response primitive from the Destination PTN user is processed; and, an r3_SETUP_response is sent to the Destination CC functional entity. In this example the Connected Number, the Connected Subaddress, and the Connection Type parameter, Low Layer Compatibility are carried in the r3_SETUP_response. The information channel is cut-through in the forward direction, if not cut-through already.

- Function 403 - The r3_CHAN CONNECT_indication is processed and the information channel is cut-through in both the forward and backward directions.

- Function 410 - The RELEASE_request primitive from the Destination PTN user is processed; an r3_DISCONNECT_request is formulated and sent to the Destination CC functional entity; and, the resources are disconnected.

- Function 411 - The r3_RELEASE_indication from the Destination CC functional entity is processed; an r3_RELEASE_response is sent to the Destination CC functional entity; and, the resources are released. A RELEASE_confirmation primitive is then sent to the Destination PTN user.

- Function 420 - The RELEASE_request primitive from the Destination PTN user is processed. An r3_SETUP_REJECT_request is sent to the Destination CC functional entity, the resources are released in both directions and a RELEASE_confirmation primitive is returned to the PTN user. The r3_SETUP_REJECT_request/indication contains a CC service element.

14.1.6 Incoming gateway CC functional entity

- Function 130 - On receipt of an incoming call from the other network, an outgoing information channel is reserved, based on the Destination Number and Connection Type information that is available from the other network, then an r2_SETUP_request is sent to the subsequent CC functional entity. The r2_SETUP_request primitive contains an appropriate Call History parameter.

NOTE 83:
The information flows between the CC functional entity and a non-ISDN are beyond the scope of this Standard.

- Function 131 - The r2_REPORT_indication marked as alerting from the subsequent CC functional entity is processed. The information channel should then be connected and cut-through in the backward direction, if not already done. As the incoming Report Type is Report Type 'Call Rejection' and the primitive contains a Call History : In-Band Information the information channel is then connected and cut-through in the backward direction, if not already done.

NOTE 84:
The information flows between the CC functional entity and a non-ISDN are beyond the scope of this Standard.

- Function 132 - The r2_SETUP_confirmation is processed and the information channel is cut-through in the forward direction, if not cut-through already.

NOTE 85:
The information flows between the CC functional entity and a non-ISDN are beyond the scope of this Standard.

- Function 140

  . The r2*_SETUP_indication is processed.

  . The incoming information channel is reserved and an r2*_CHANNEL_ACKNOWLEDGE_request is sent.

  . An outgoing information channel is reserved, based on the Destination Number(DN) and Connection Type(CT) information in the r2*_SETUP_indication . The selection may also be dependant upon other information beyond the scope of this Standard.

  . The r2_SETUP_request is generated and sent. If present, the Originating Number, Originating Subaddress, the Destination Subaddress, Call History information or the Connection Type parameters, Low Layer Compatibility and High Layer Compatibility contained in the incoming r2*_SETUP_indication are carried in the r2_SETUP_request.

NOTE 86:
The Originating Number can be obtained using the public ISDN service (see ETS 300 089).

NOTE 87:
The information flows between the CC functional entity and a public ISDN is beyond the scope of this Standard.

- Function 141 - The r2_CHANNEL_ACKNOWLEDGE_indication is processed and the allocated channel is connected and cut-through in the backward direction; the information channel may also be cut-through in the forward direction.

- Function 142 - The r2_REPORT_indication is processed. As the incoming Report Type is Report Type : alerting an r2*_REPORT_indication , marked as an Alerting primitive is sent to the public ISDN. The allocated channel should then be connected and cut-through in the backward direction, if not already done.

NOTE 88:
The information flows between the CC functional entity and a public ISDN are beyond the scope of this Standard.

- Function 143 - The r2_SETUP_confirmation is processed and the information channel is cut-through in the forward direction, if not cut-through already. An r2*_SETUP_response is generated and then sent to the public ISDN functional entity.

NOTE 89:
The information flows between the CC functional entity and a public ISDN are beyond the scope of this Standard.

14.1.7 Outgoing gateway CC functional entity

- Function 330

  . The r2_SETUP_indication is processed.

  . The incoming information channel is reserved and an r2_CHANNEL_ACKNOWLEDGE_request is sent to the preceding CC functional entity.

  . An outgoing information channel is reserved, based on the Destination Number(DN) and Connection Type(CT) information in the r2_SETUP_indication. The selection may also be dependant upon other information beyond the scope of this Standard.

NOTE 90:
The information flows supported over the relationship with a non-ISDN are beyond the scope of this Standard.

- Function 331 - In this example when interworking with a Non-ISDN Network an r2_REPORT is normally sent to the preceding CC functional entity, with appropriate parameter in the CH service element indicating interworking. The event that causes the CC functional entity to send this information flow is beyond the scope of this Standard.

- Function 333 - For the call to be completed successfully the Gateway CC functional entity shall send an r2_SETUP_response to the preceding CC functional entity. The event that causes the CC functional entity to send this information flow is beyond the scope of this Standard.

- Function 335 - The r2_INFORMATION_indication is processed.

NOTE 91:
The information flows supported over the relationship with a non-ISDN are beyond the scope of this Standard.

- Function 340

  . The r2_SETUP_indication is processed.

  . The incoming information channel is reserved and an r2_CHANNEL_ACKNOWLEDGE_request is sent.

  . An outgoing information channel is reserved, based on the Destination Number(DN) and Connection Type(CT) information in the r2_SETUP_indication . The selection may also be dependant upon other information beyond the scope of this Standard.

  . The r2*_SETUP_request is generated and sent.

NOTE 92:
The information flows between the CC functional entity and a public ISDN are beyond the scope of this Standard.

- Function 341 - The r2*_CHANNEL_ACKNOWLEDGE_indication is processed and the allocated channel is connected and cut-through in the backward direction; the information channel may also be cut-through in the forward direction.

- Function 342 - The r2*_REPORT_indication is processed. As the incoming Report Type is Report Type : Alerting an r2_REPORT_indication, marked as alerting is sent to the preceding CC functional entity. The allocated channel should then be connected and cut-through in the backward direction, if not already done.

NOTE 93:
The information flows between the CC functional entity and a public ISDN are beyond the scope of this Standard.

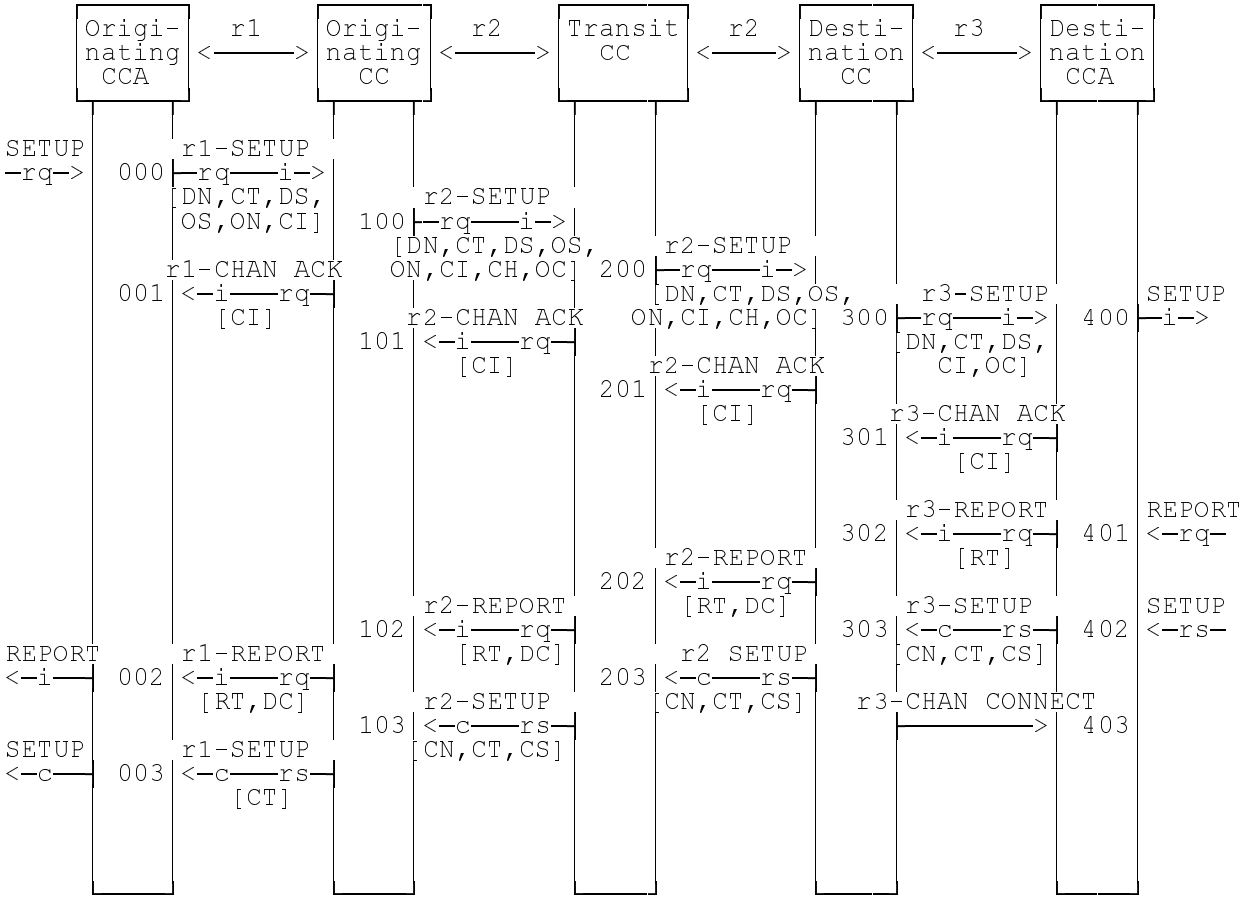
- Function 343 - The r2*_SETUP_confirmation is processed and the information channel is cut-through in the forward direction, if not cut-through already. An r2_SETUP_response is generated and then sent to the preceding CC functional entity. In this example, the Connected Number, Connected Subaddress or the Connection Type parameter, Low Layer Compatibility contained in r2*_SETUP_confirmation are carried in the r2_SETUP_response.

NOTE 94:
The Connected Number can be obtained using the public ISDN service (see ETS 300 094).

NOTE 95:
The information flows between the CC functional entity and a public ISDN are beyond the scope of this Standard.

14.2 Non-automatic Call Establishment

The information flow sequence when a call attempt encounters a Destination CCA that does not immediately enter the call established state is shown in figure 6.



Legend

The RT (Report Type) in this sequence is "User being alerted".

Figure 6 - Non-automatic call establishment

14.3 Automatic Answering

The information flow sequence when a call attempt encounters a Destination CCA that immediately enters the call established state is shown in figure 7.

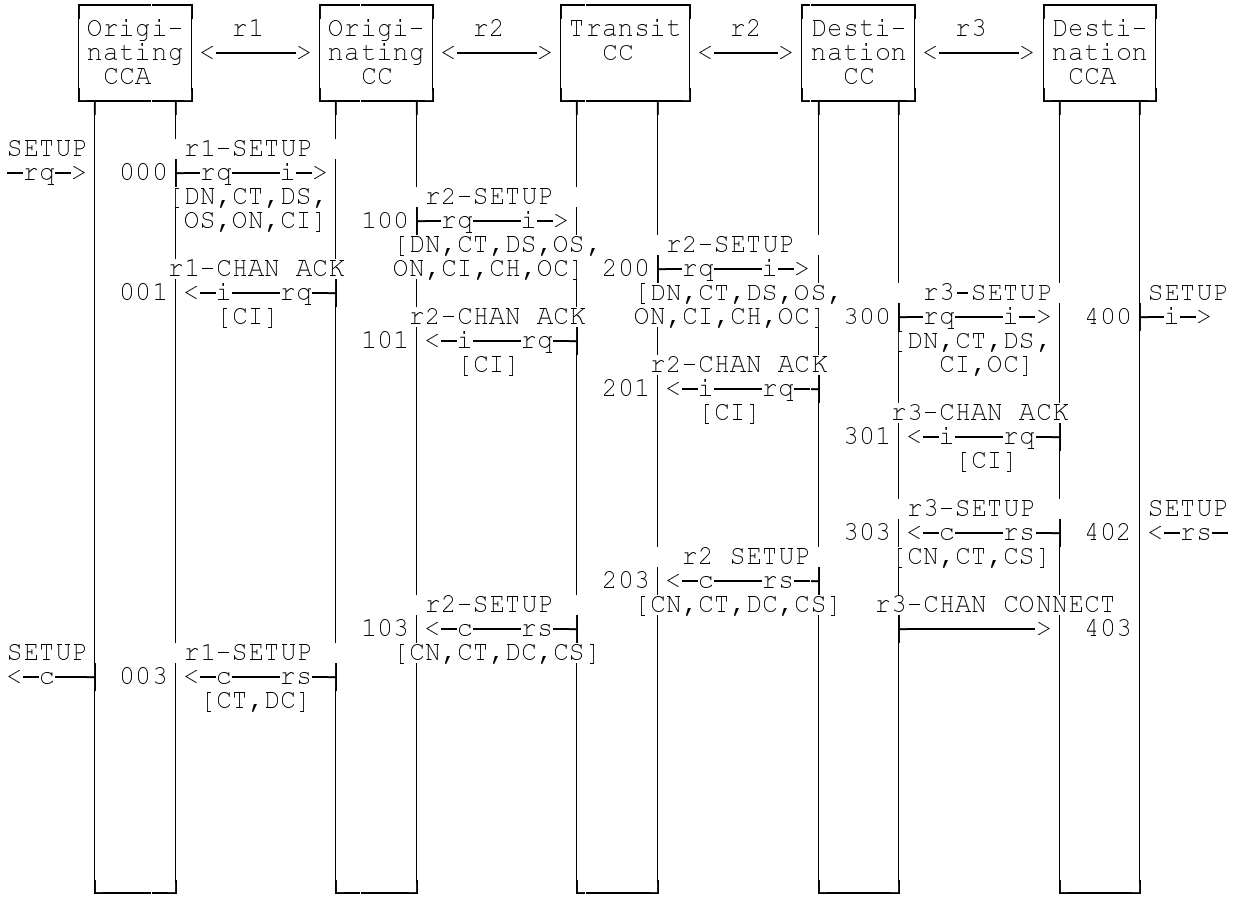
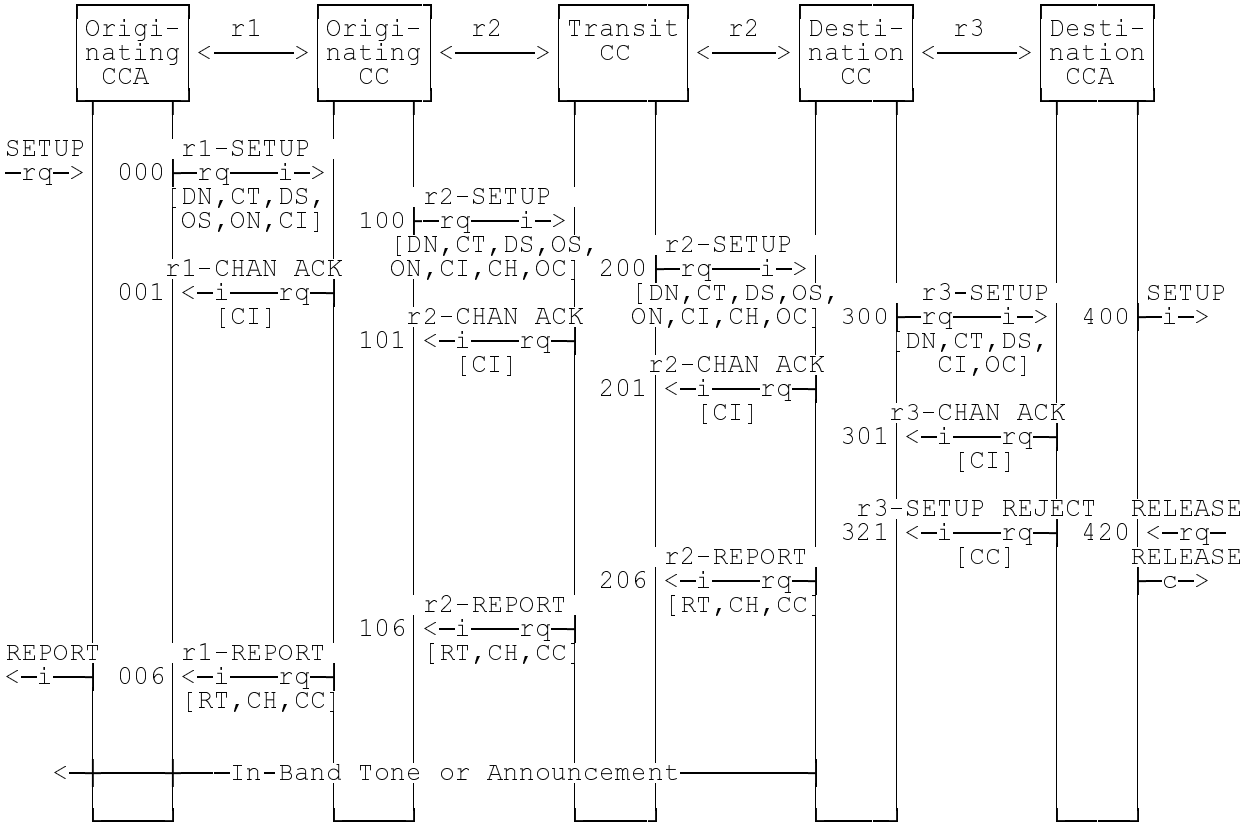


Figure 7 - Automatic call establishment

14.4 Unsuccessful calls with the provision of tones and announcements

The information flow sequence when a call attempt is unsuccessful and fails with the provision of in-band tones and announcements is shown in figure 8.



NOTE 96:
It is possible to clear the call from either end.

NOTE 97:
In this example the source of the in-band tone or announcement is collocated with a Destination CC functional entity. The particular location of the source of the in-band tone or announcement is decided by the management function on a per call basis, and is beyond the scope of this Standard.

NOTE 98:
The RT (Report Type) in this sequence is "Call Rejected".

Figure 8 - Unsuccessful calls with the provision of tones and announcements

14.5 Unsuccessful calls without the provision of tones and announcements

The information flow sequence when a call attempt is unsuccessful and fails without the provision of in-band tones and announcements is shown in figure 9.

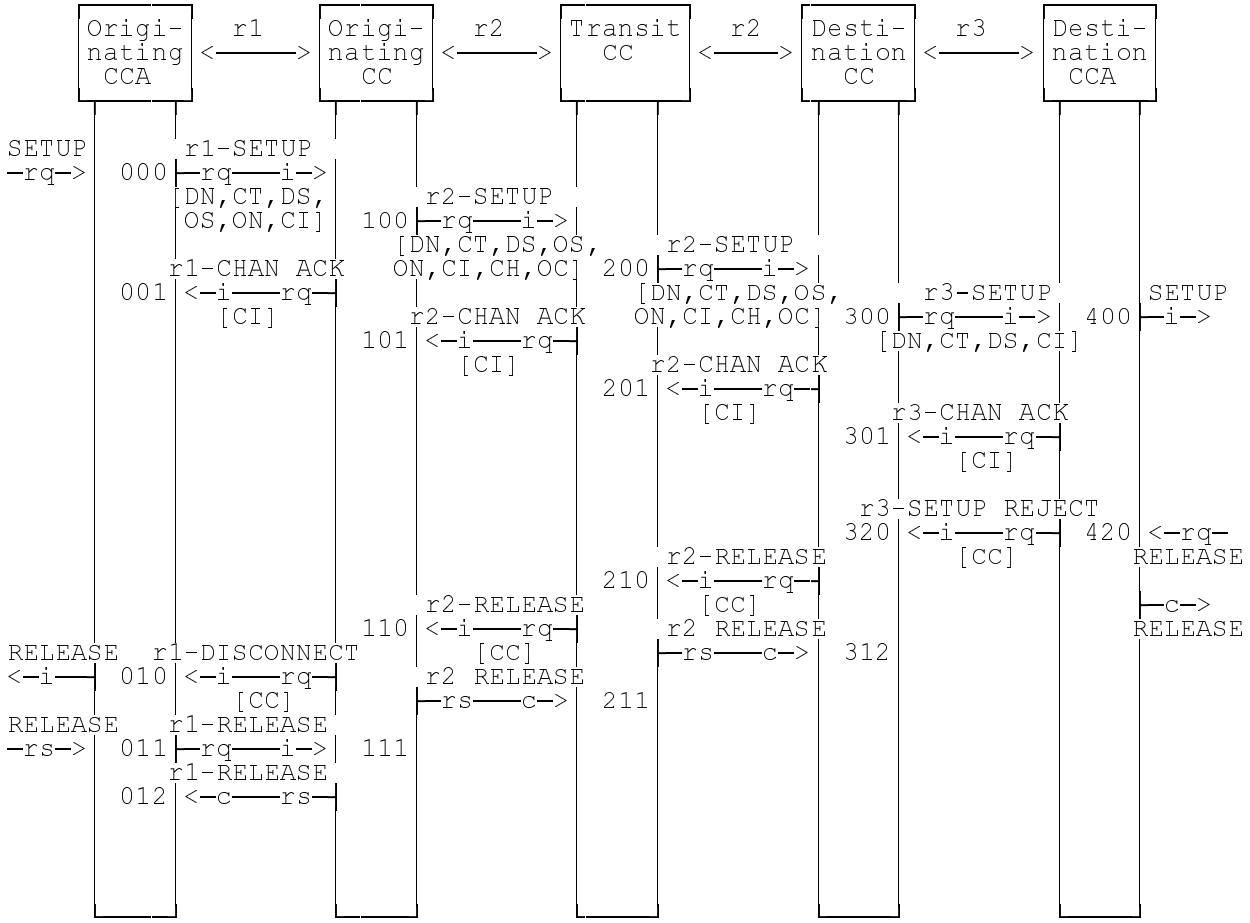
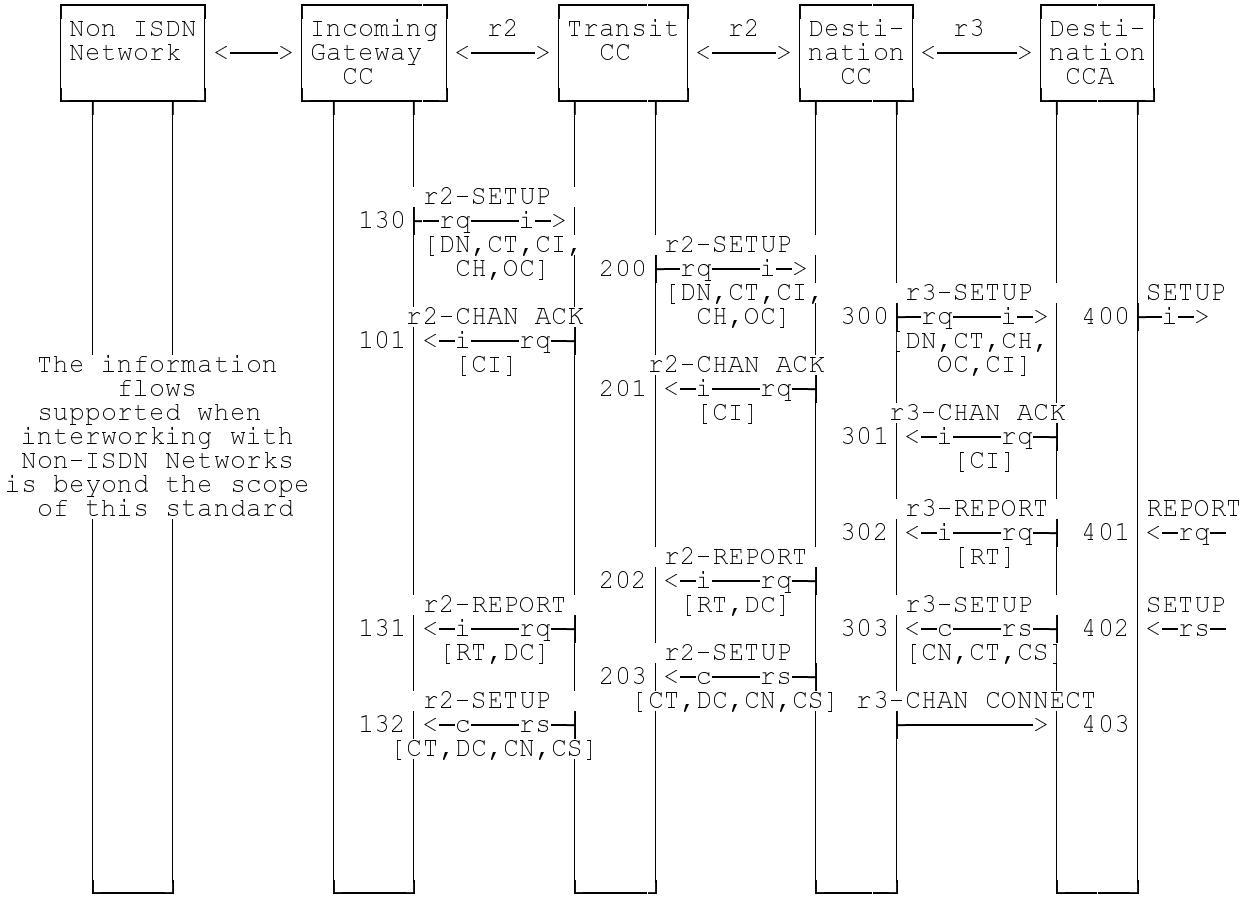


Figure 9 - Unsuccessful calls without the provision of tones and announcements

14.6 Incoming interworking with a non-ISDN

The information flow sequence when a call attempt from a non-ISDN interworks with the PTN is shown in figure 10.



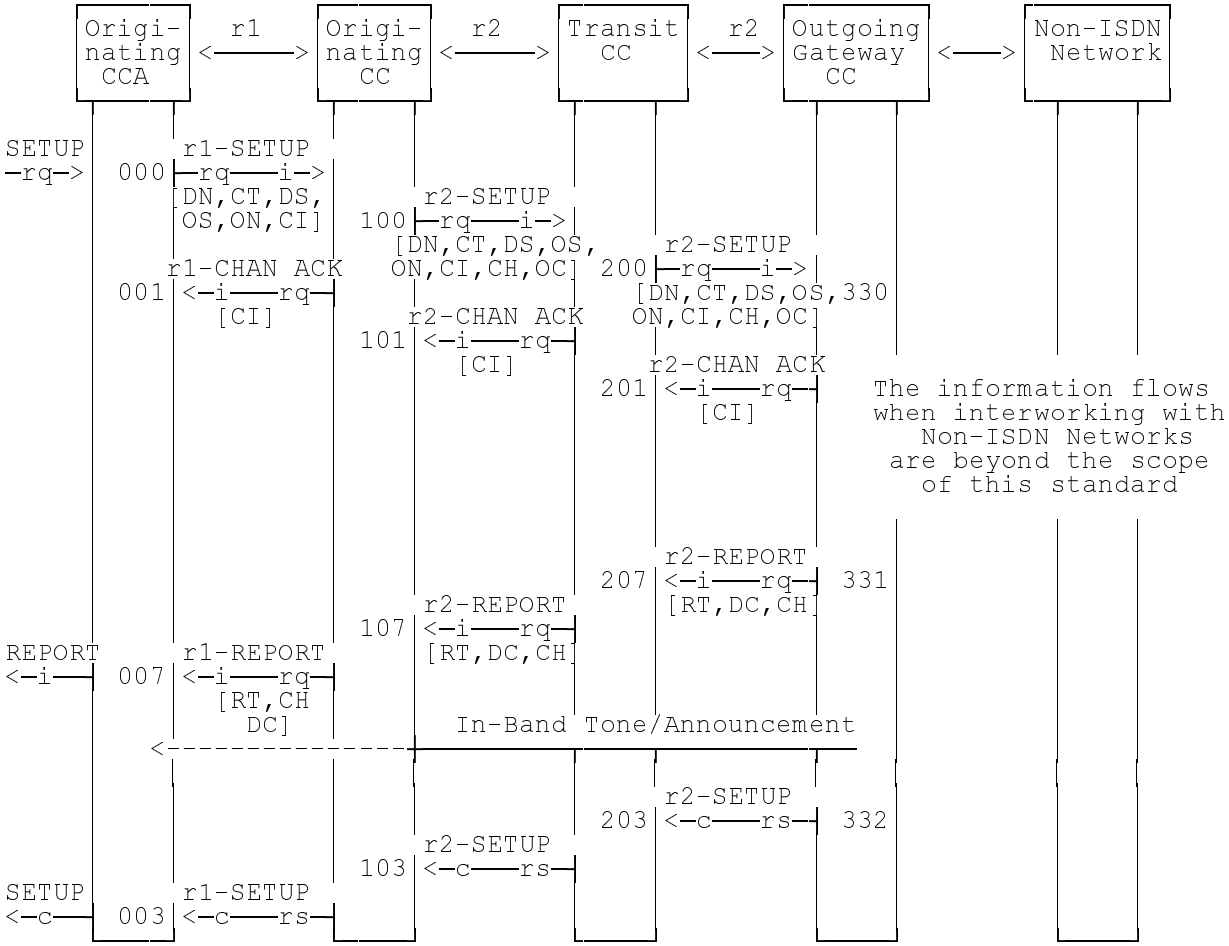
Legend

The RT (Report Type) in this sequence is "User being alerted".

Figure 10 - Incoming interworking with a non-ISDN

14.7 Outgoing interworking with a non-ISDN

The information flow sequence when a call attempt from the PTN interworks with a non-ISDN is shown in figure 11.



NOTE 99:
CH (Call History) in the REPORT_request/indication information flows contains the Public Network Interworking marker.

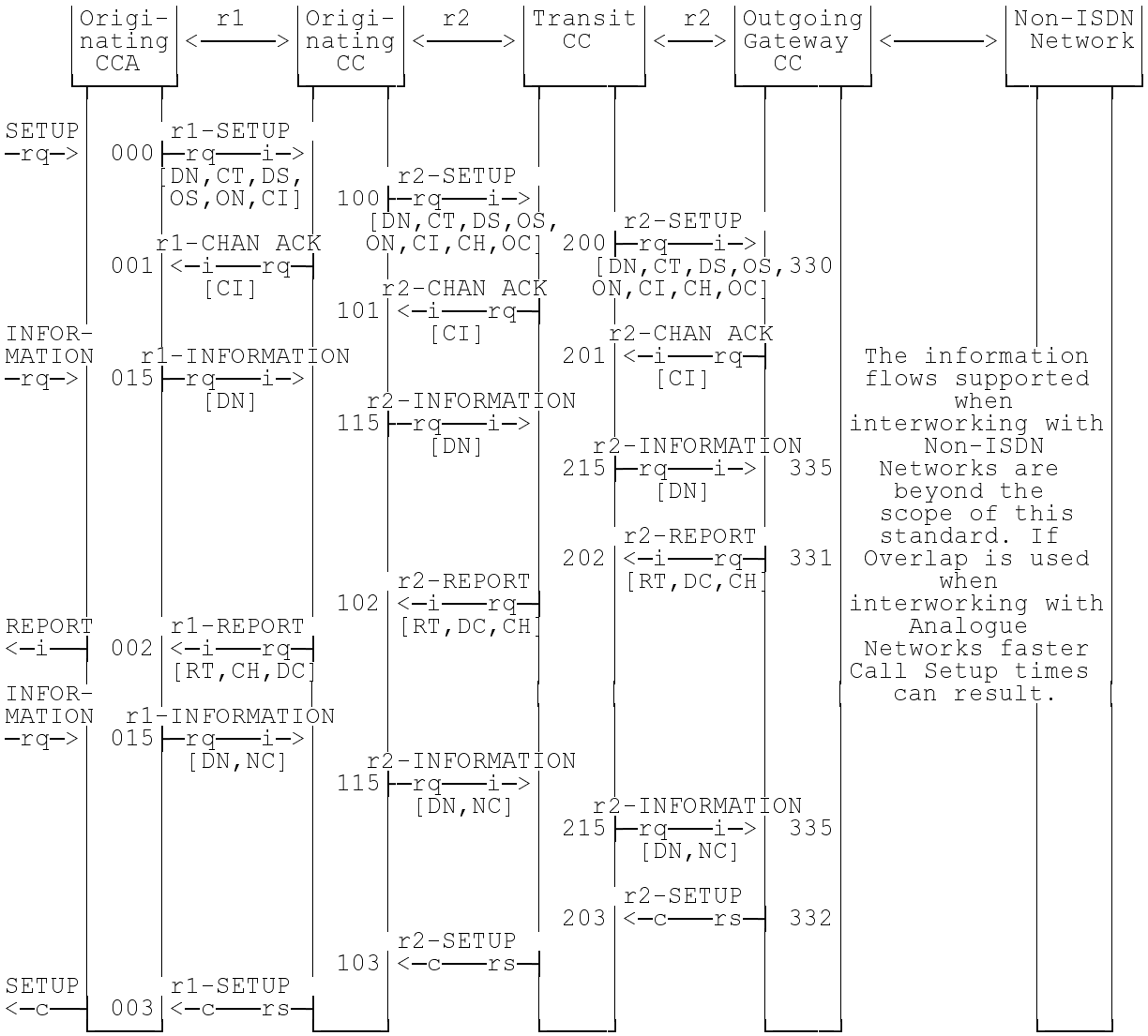
NOTE 100:
This sequence shows the scenario where the non-ISDN is unable to provide an indication of alerting or in-band tones being applied.

NOTE 101:
The RT (Report Type) shown in this sequence is 'interworking encountered'.

Figure 11 - Outgoing interworking with a non-ISDN

14.8 Outgoing interworking with overlap sending

The information flow sequence when a call attempt using overlap sending from the PTN interworks with a non-ISDN is shown in figure 12.



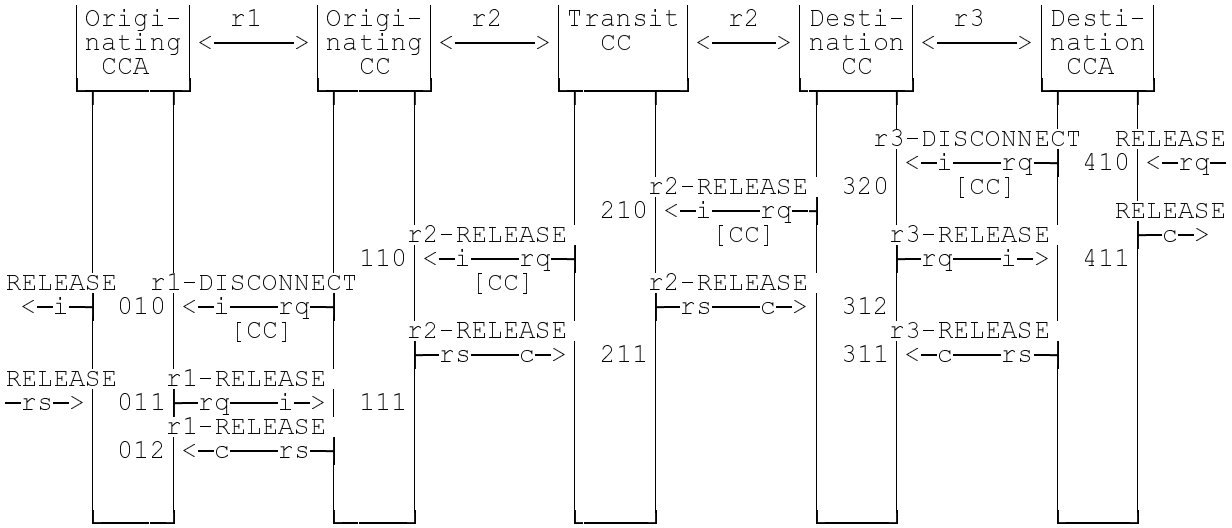
Legend

The RT (Report Type) shown in this sequence is 'interworking encountered'.

Figure 12 - Outgoing interworking using overlap sending, interworking with a non-ISDN

14.9 Basic call clearing

The information flow sequence when a call is cleared is shown in figure 13.

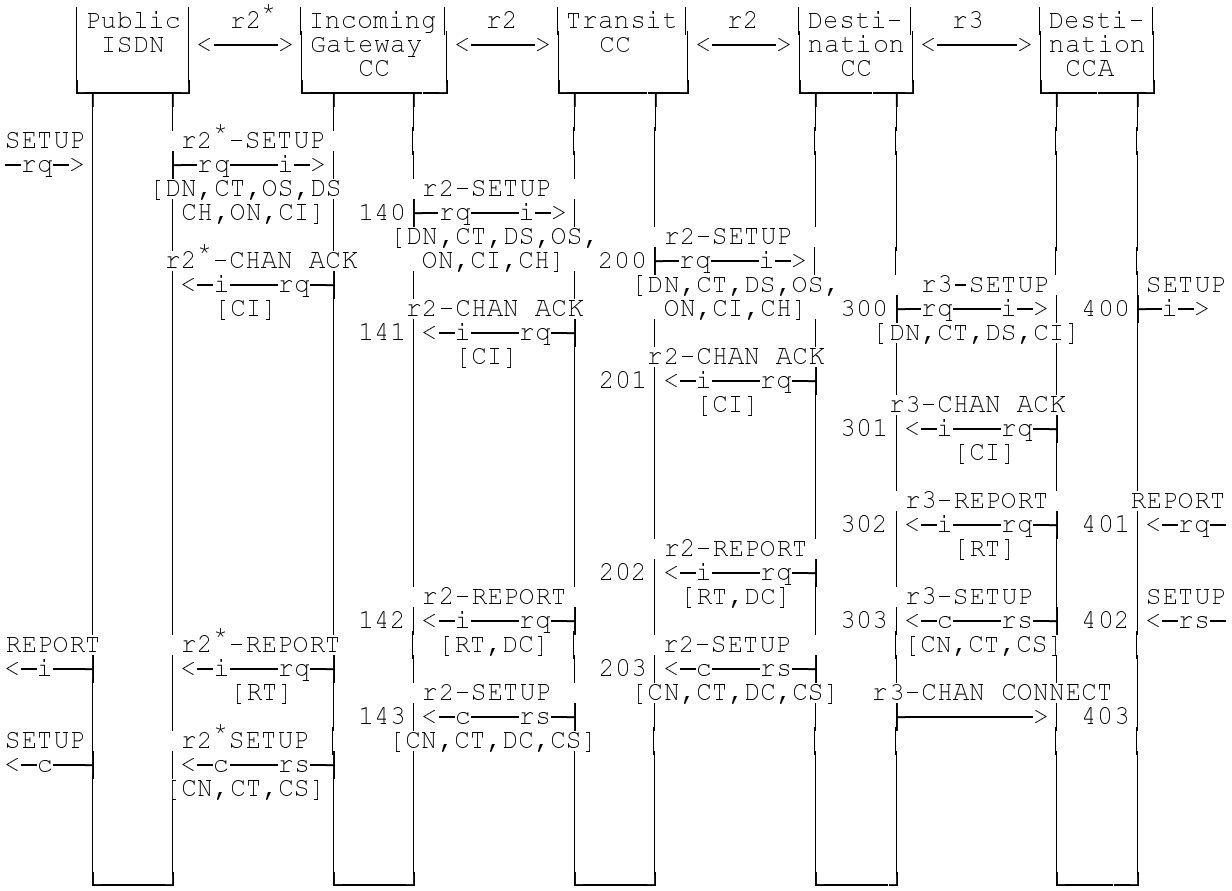


NOTE 102:
Three Stage Clearing is used on the r1 or r3 that originates clearing as this allows for supplementary service information to be passed from the network to the extension (e.g. call charging). Three Stage Clearing is used on the r1 or r3 that has not initiated clearing as this allows for symmetry to be maintained.

Figure 13 - Basic call clearing

14.10 Incoming interworking with a public ISDN

The information flow sequence when a call attempt from a public ISDN interworks with the PTN is shown in figure 14.

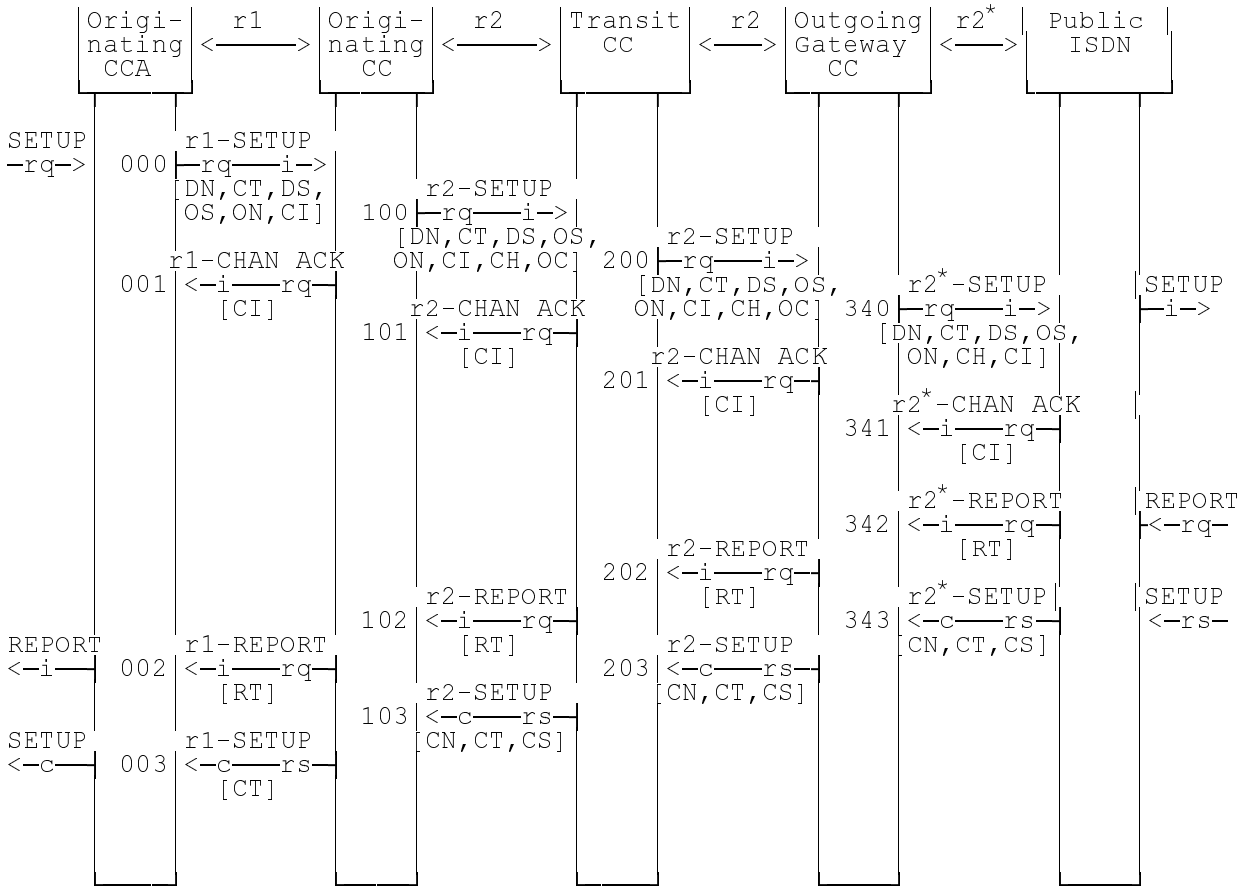


NOTE 103:
Call History contains the Public Network Interworking marker.

Figure 14 - Incoming interworking with a public ISDN

14.11 Outgoing interworking with a public ISDN

The information flow sequence when a call attempt from the PTN interworks with a public ISDN is shown in figure 15.



NOTE 104:
Call History contains the Public Network Interworking marker.

Figure 15 - Outgoing interworking with a public ISDN

15 SDL diagrams for functional entities

The FE Behaviours in SDL form shown in this clause are intended to illustrate typical FE behaviour in terms of information flows sent and received.

The SDL diagrams are in five groups:

- Originating CCA functional entity SDL diagrams
- Originating CC functional entity SDL diagrams
- Transit CC functional entity SDL diagrams
- Terminating CC functional entity SDL diagrams
- Terminating CCA functional entity SDL diagrams

Only timers that can be considered as call control (i.e. not protocol timers) are shown.

NOTE 105:
In this clause the primitive and information flows are shortened: "request" to "req"; "indication" to "ind"; "response" to "resp"; and, "confirmation" to "cfm".

NOTE 106:
Also in this clause the terms "backwards" and "forwards" are used. At a particular functional entity the direction towards the Originating PTN user is called the "Backwards" direction. The direction towards the Destination PTN user is called the "Forwards" direction.

15.1 Originating CCA functional entity SDL diagrams

Output signals to the left and input signals from the left represent primitives to and from the Originating PTN user. Output signals to the right and input signals from the right represent information flows across r1 to and from the Subsequent CC functional entity. The only exception to this rule is when the text within the signals explicitly identifies from what function the signal originates.

15.1.1 Originating CCA states used in SDL diagrams

Orig_CCA_Idle - No Call in progress

Orig_CCA_Forward_Release_Forward_r1_Disconnect - Originating PTN user has initiated clearing and the CCA is awaiting response from the subsequent CC to the request for clearing.

Orig_CCA_Backward_Release - Clearing of the PTN user to CCA channel has been initiated, clearing across r1 complete, awaiting response from the PTN user.

Orig_CCA_Wait_for_Release_Channel - In-band tones/announcements being given to the PTN user, clearing across r1 complete, PTN user or CCA originated clearing awaited.

Orig_CCA_Call_Sent - Call has been initiated by the CCA, the channel has been reserved to the Originating CC, and an end to end response is awaited.

Orig_CCA_Wait_for_Chan_Ack/Additional_Digits - Call has been initiated by the CCA functional entity, and the CCA is awaiting a response from the subsequent CC.

Orig_CCA_Call_Active - Call is in active phase.

Orig_CCA_Backward_Release_Backward_r1_Disconnect - Originating CC has initiated clearing and the CCA is awaiting response from the Originating PTN user to the request for clearing.

Orig_CCA_Forward_r1_Release - Clearing of the CCA to CC channel has been initiated, PTN user clearing complete, awaiting response from the Originating CC.

15.1.2 Originating CCA SDL diagrams

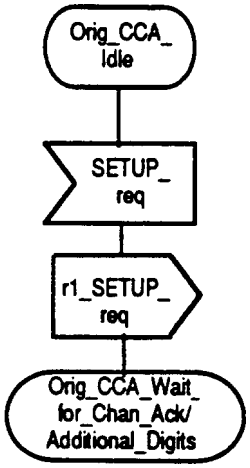
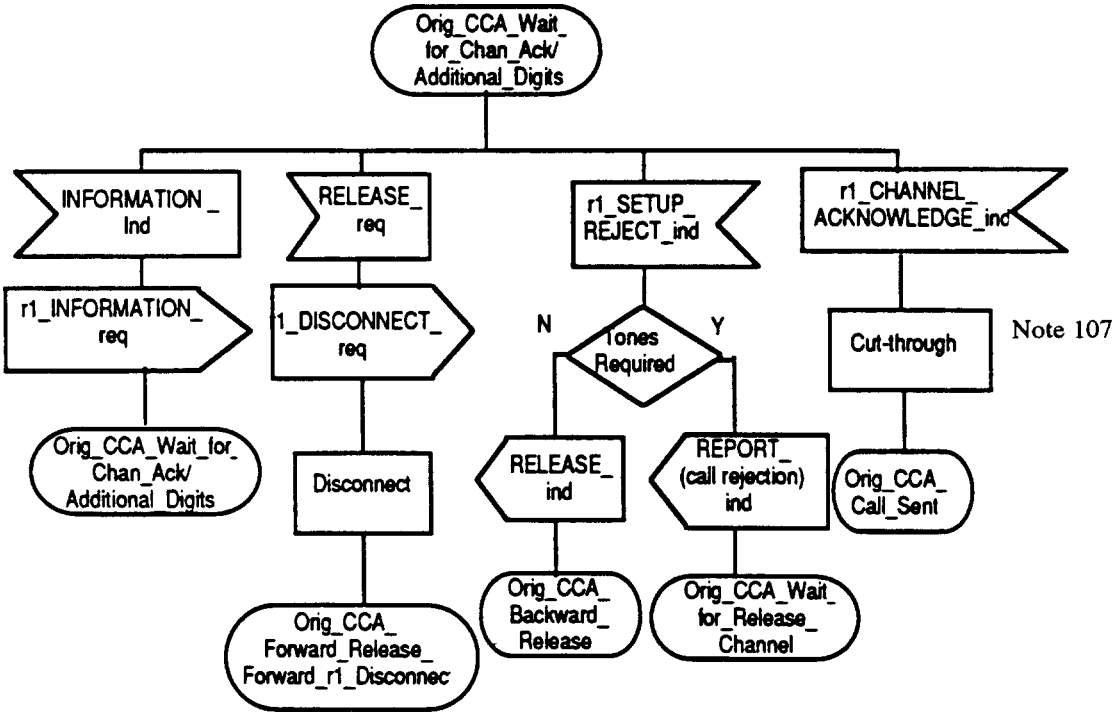
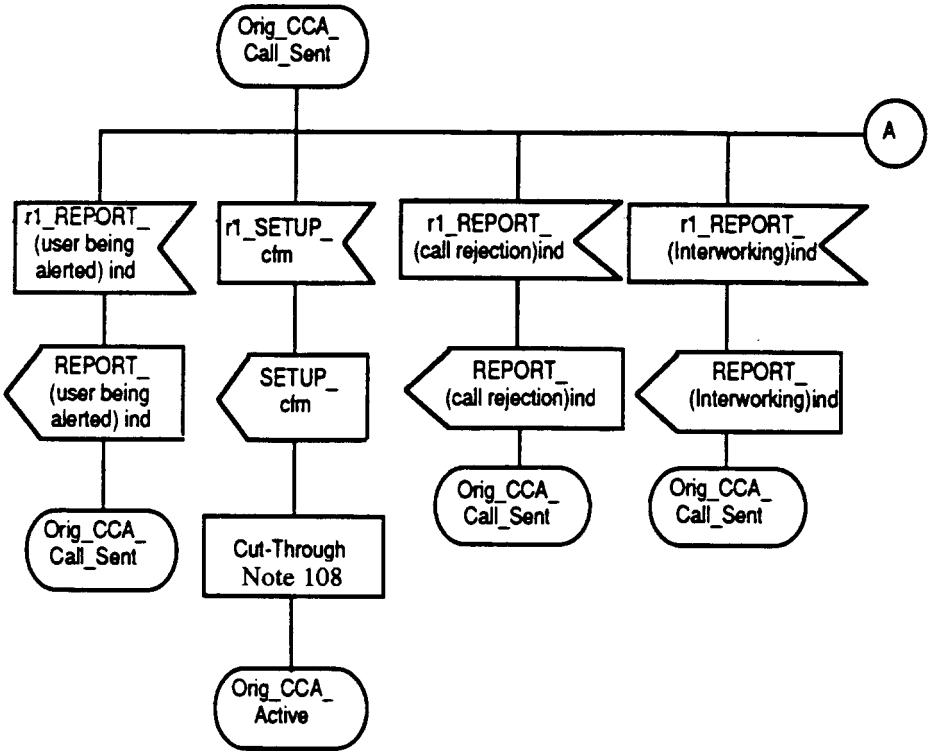


Figure 16 - Stage 2 SDL diagram for Originating CCA functional entity (Part 1)



NOTE 107:
Cut-through at this point is optional.

Figure 17 - Stage 2 SDL diagram for Originating CCA functional entity (Part 2)



NOTE 108:
This is the latest point at which cut-through shall occur.

Figure 18 - Stage 2 SDL diagram for Originating CCA functional entity (Part 3)

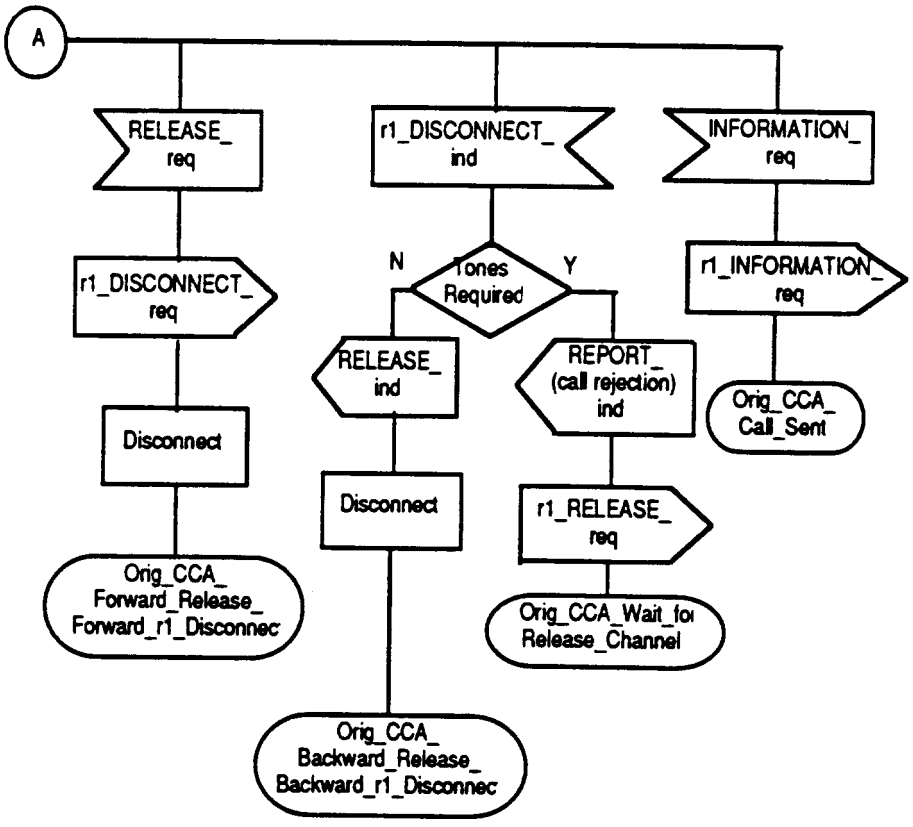


Figure 19 - Stage 2 SDL diagram for Originating CCA functional entity (Part 4)

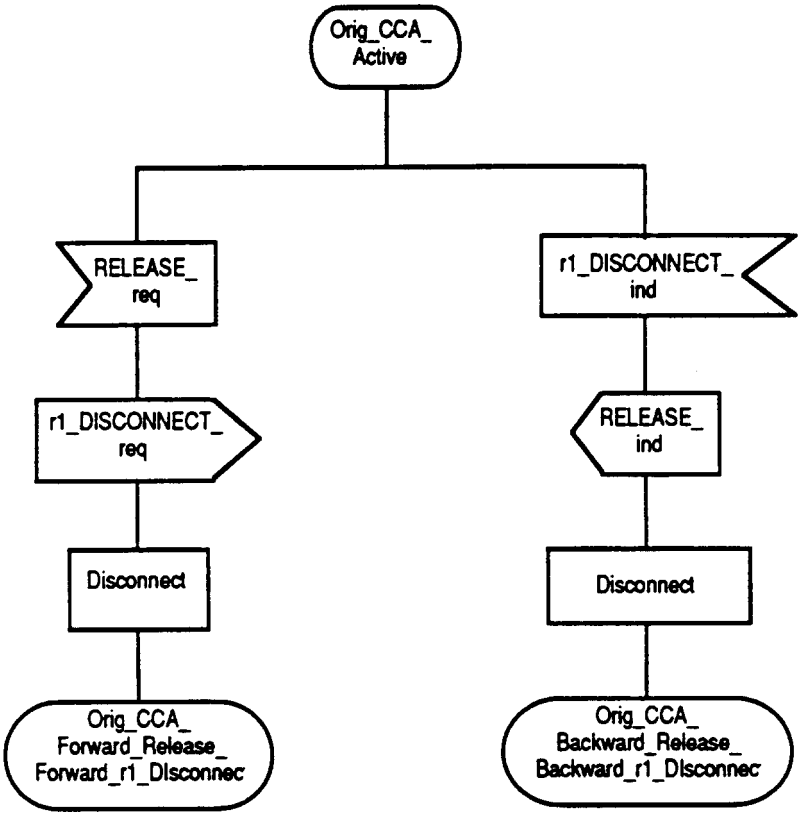


Figure 20 - Stage 2 SDL diagram for Originating CCA functional entity (Part 5)

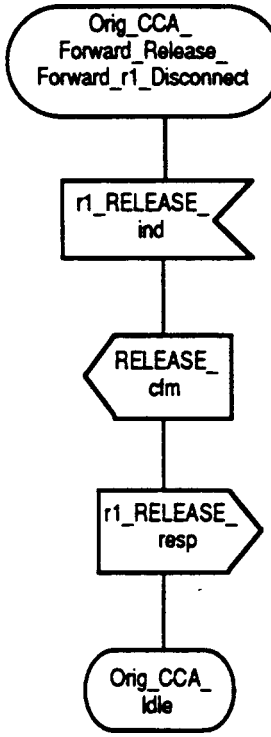


Figure 21 - Stage 2 SDL diagram for Originating CCA functional entity (Part 6)

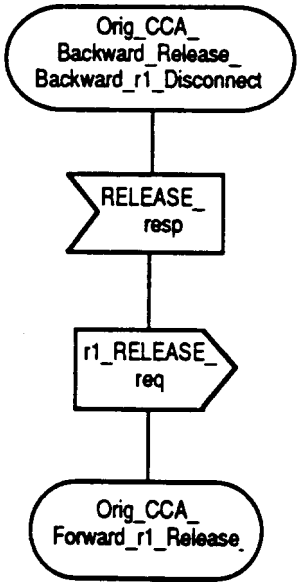


Figure 22 - Stage 2 SDL diagram for Originating CCA functional entity (Part 7)

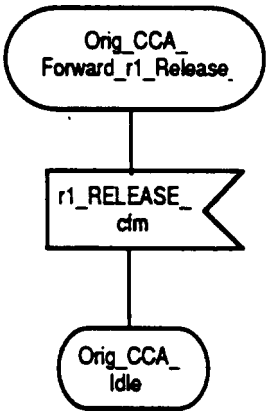


Figure 23 - Stage 2 SDL diagram for Originating CCA functional entity (Part 8)

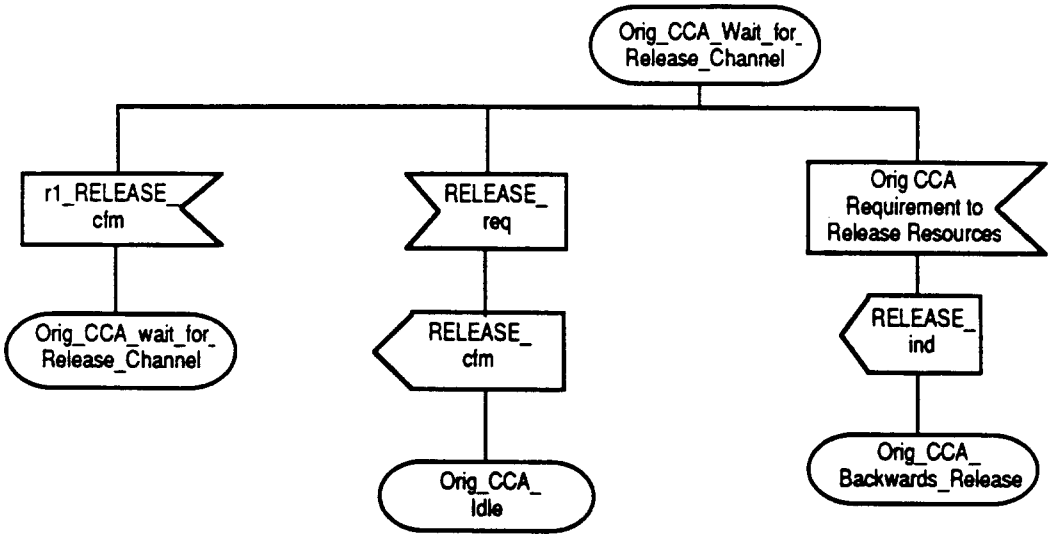


Figure 24 - Stage 2 SDL diagram for Originating CCA functional entity (Part 9)

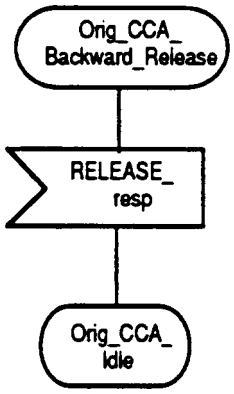


Figure 25 - Stage 2 SDL diagram for Originating CCA functional entity (Part 10)

15.2 Originating CC functional entity SDL diagrams

Output signals to the left and input signals from the left represent information flows across r1 to and from the Originating CCA functional entity. Output signals to the right and input signals from the right represent information flows across r2 to and from the Subsequent CC functional entity. The only exception to this rule is when the text within the signals explicitly identifies from what function the signal originates.

15.2.1 Originating CC states used in SDL diagrams

Orig_CC_Idle - No Call in progress

Orig_CC_Call_Sent - Call has been initiated by the CC, the channel has been reserved to the subsequent CC, and an end to end response is awaited.

Orig_CC_Wait_for_Release_Channel - In-band tones/announcements being given to the PTN user, PTN user or CC originated clearing awaited.

Orig_CC_Wait_for_Chan_Ack/Additional_Digits - Call has been initiated by the CC functional entity, and the CC is awaiting a response from the subsequent CC.

Orig_CC_Wait_for_Address_Info - The CC is awaiting additional information from the Originating CCA.

Orig_CC_Call_Active - Call is in active phase.

Orig_CC_Backward_r1_Release - Resources have been disconnected, and clearing of the resources in the backward direction has been initiated, CC awaiting response from the preceding CC.

Orig_CC_Backward_r1_Release_Forward_r2_Release - Resources have been disconnected, and clearing has been initiated in both directions, awaiting responses from both the Originating CCA and the subsequent CC.

Orig_CC_Forward_r2_Release - Resources have been disconnected, and clearing of the resources in the forward direction has been initiated, CC awaiting response from the subsequent CC.

Orig_CC_Backward_r1_Disconnect - Disconnection of resources has been initiated, awaiting responses from the Originating CCA.

15.2.2 Originating CC SDL diagrams

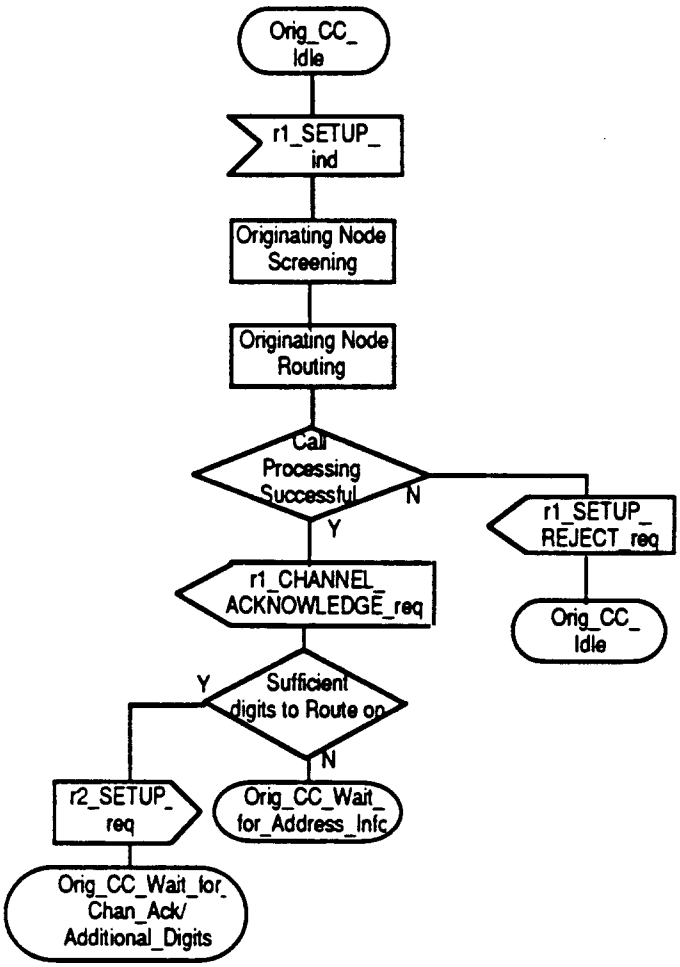


Figure 26 - Stage 2 SDL diagram for Originating CC functional entity (Part 1)

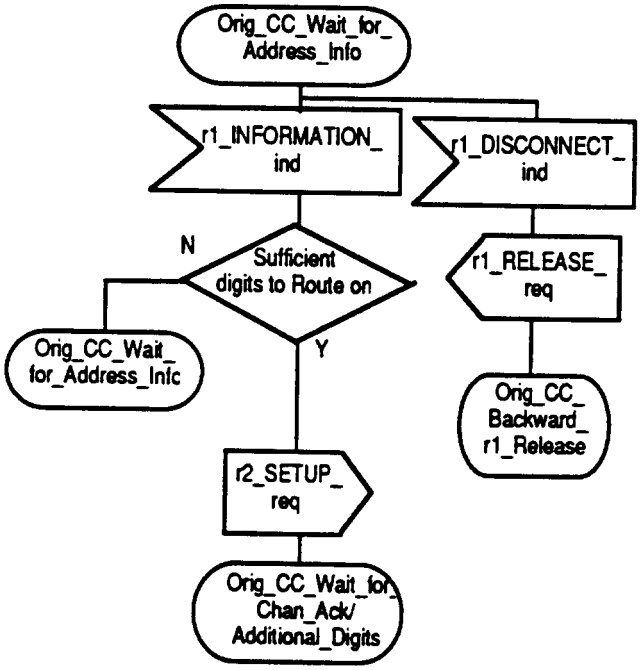
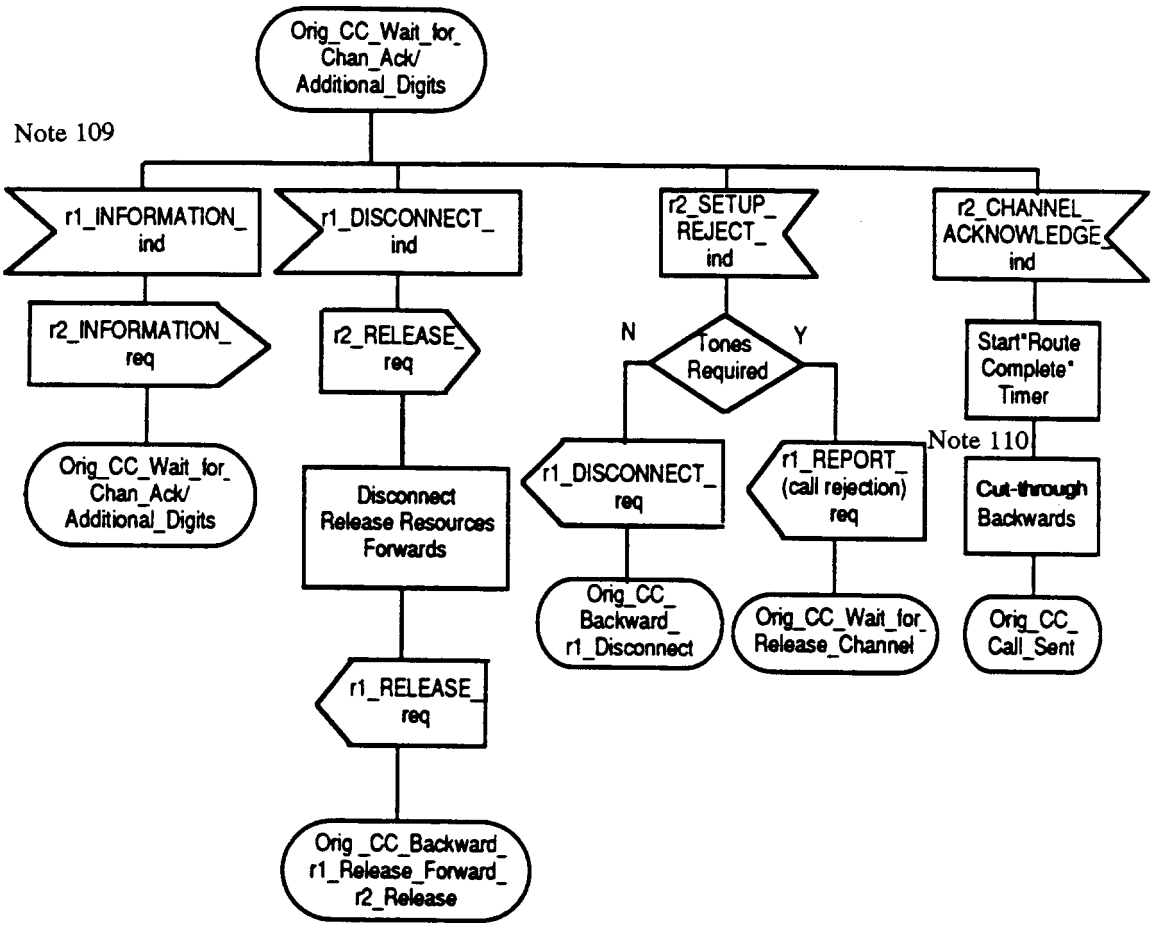


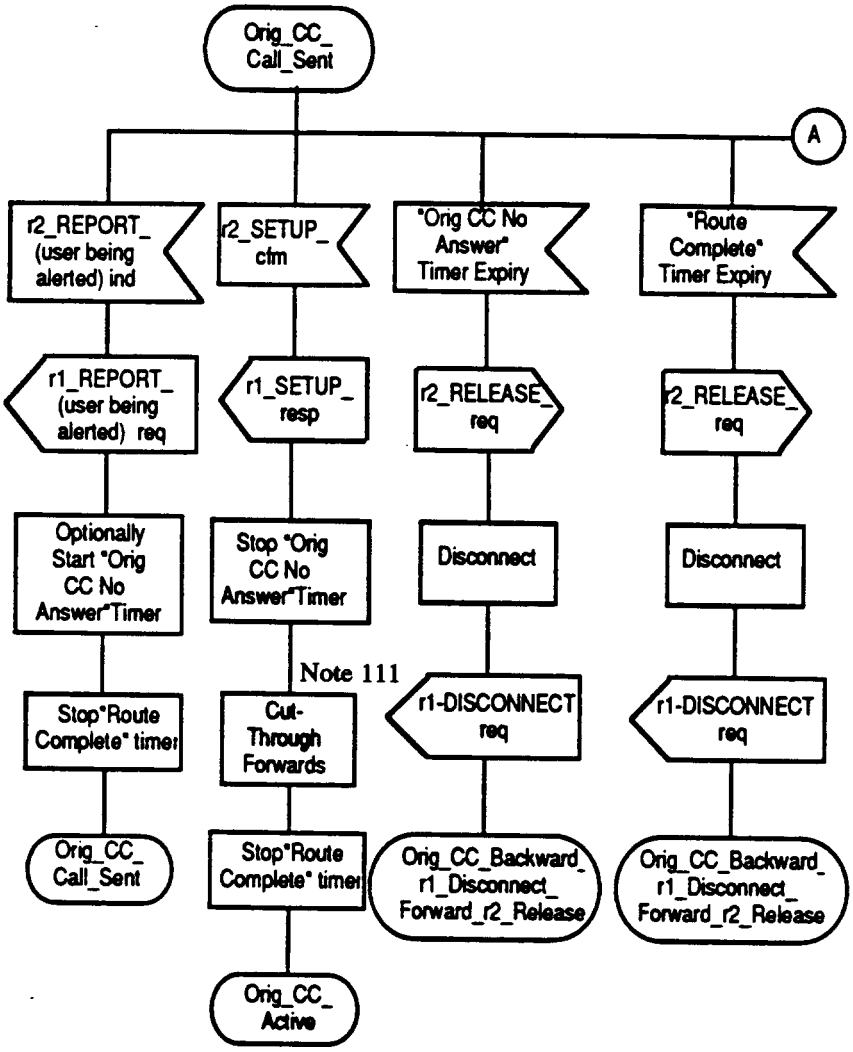
Figure 27 - Stage 2 SDL diagram for Originating CC functional entity (Part 2)



NOTE 109:
This information flow is not acted upon after the receipt of a SETUP or INFORMATION information flow with an 'number complete indicator' parameter. There is an interdigit timer that is active, on the expiry of this timer no more INFORMATION information flows are accepted.

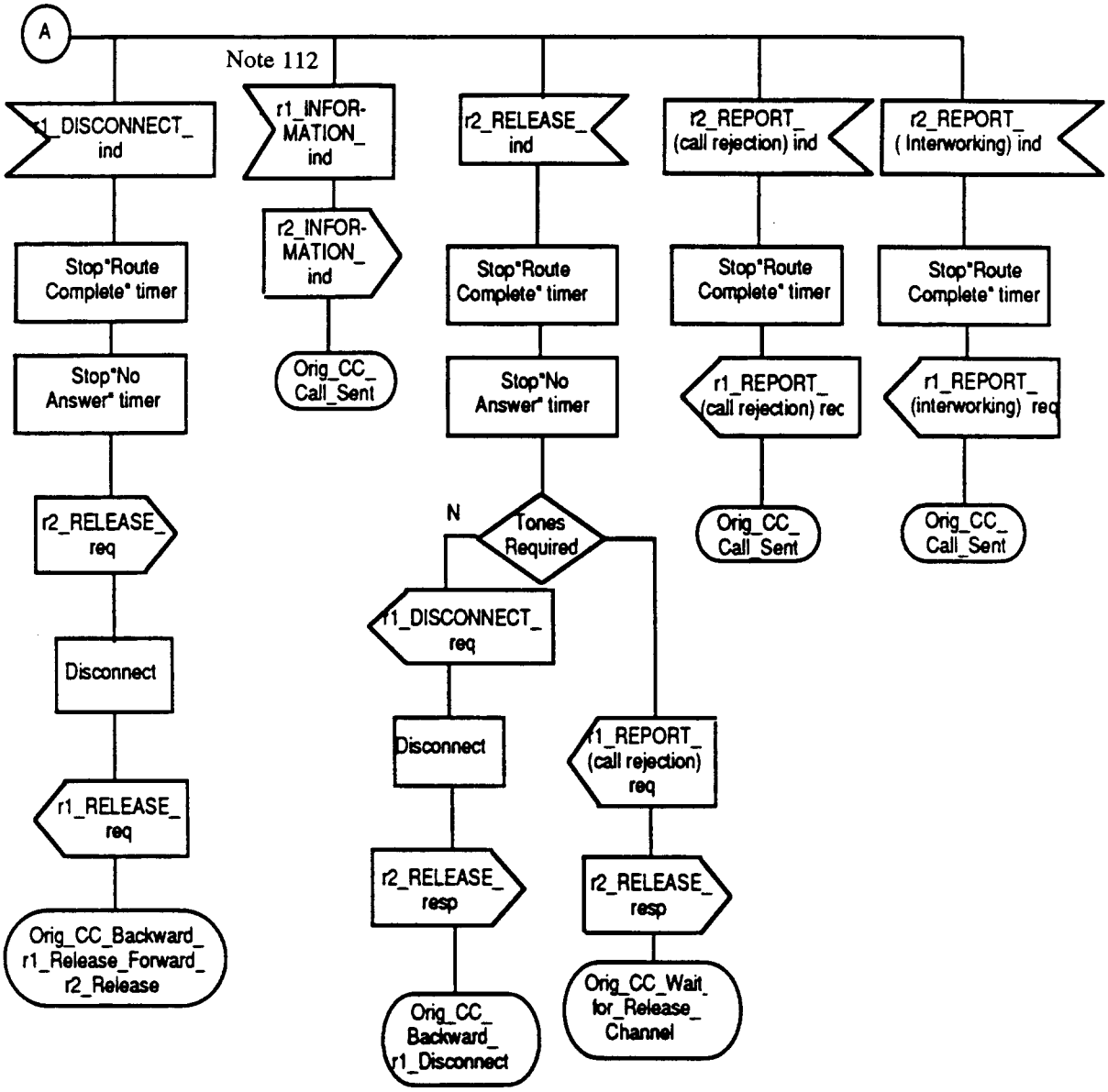
NOTE 110:
This is the earliest that the CC functional entity can cut through in the forward direction.

Figure 28 - Stage 2 SDL diagram for Originating CC functional entity (Part 3)



NOTE 111:
This is the earliest that the CC functional entity can cut through in the backwards direction.

Figure 29 - Stage 2 SDL diagram for Originating CC functional entity (Part 4)



NOTE 112:
This information flow is not acted upon after the receipt of an INFORMATION information flow with an 'number complete indicator' parameter. There is an interdigit timer that is active, on the expiry of this timer no more INFORMATION information flows are accepted.

Figure 30 - Stage 2 SDL diagram for Originating CC functional entity (Part 5)

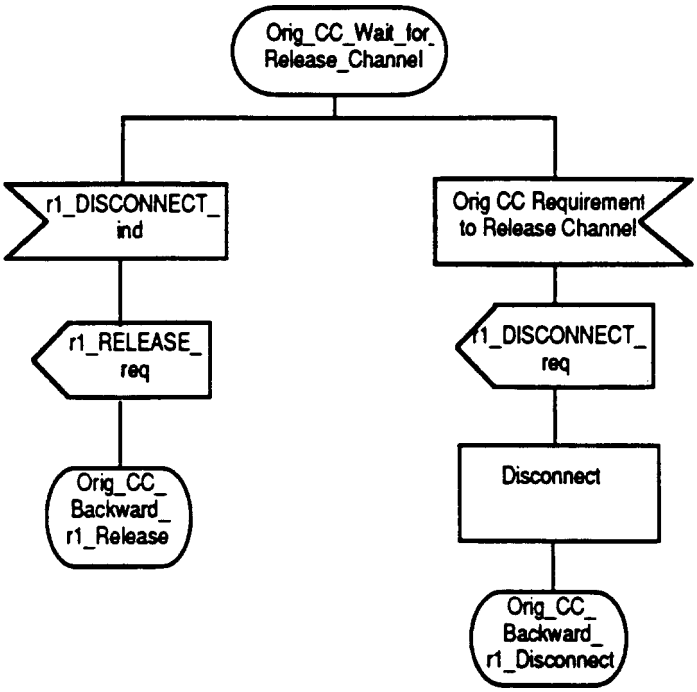


Figure 31 - Stage 2 SDL diagram for Originating CC functional entity (Part 6)

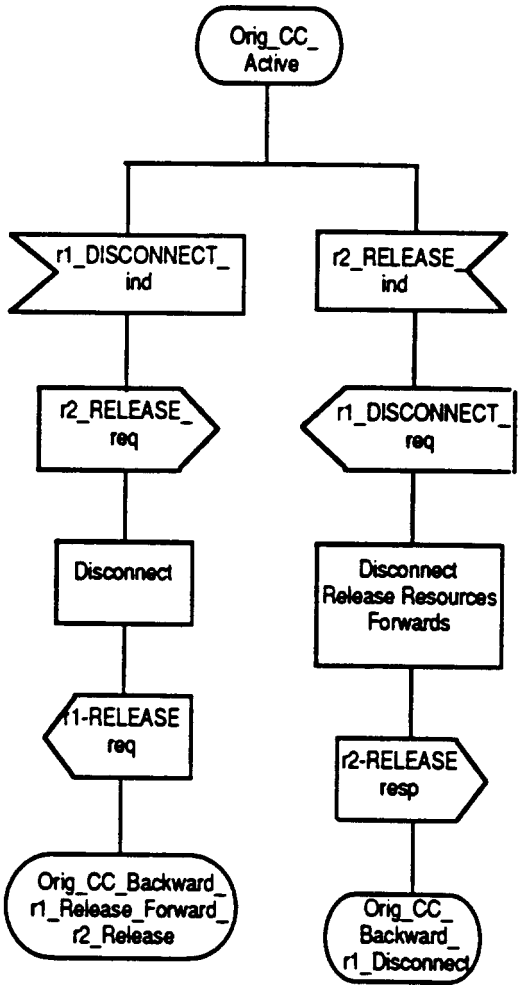


Figure 32 - Stage 2 SDL diagram for Originating CC functional entity (Part 7)

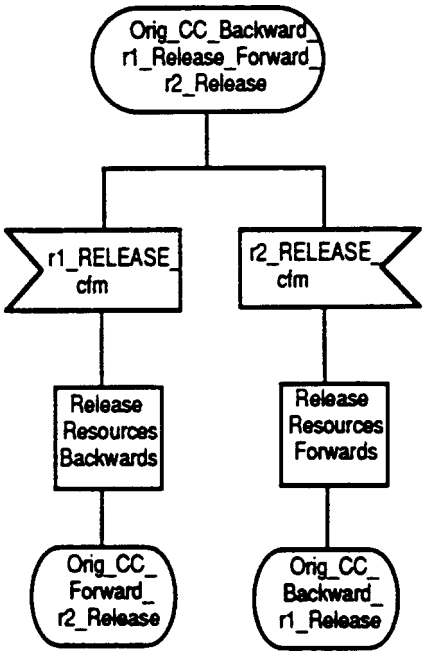


Figure 33 - Stage 2 SDL diagram for Originating CC functional entity (Part 8)

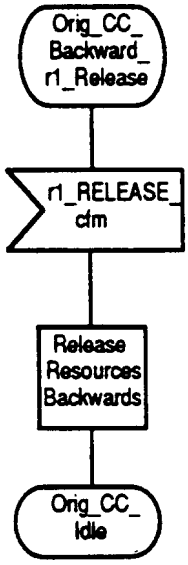


Figure 34 - Stage 2 SDL diagram for Originating CC functional entity (Part 9)

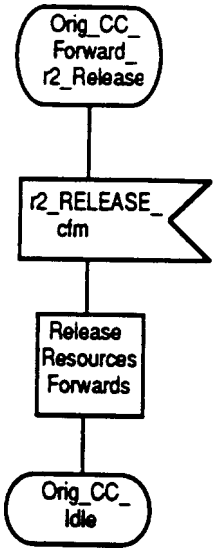


Figure 35 - Stage 2 SDL diagram for Originating CC functional entity (Part 10)

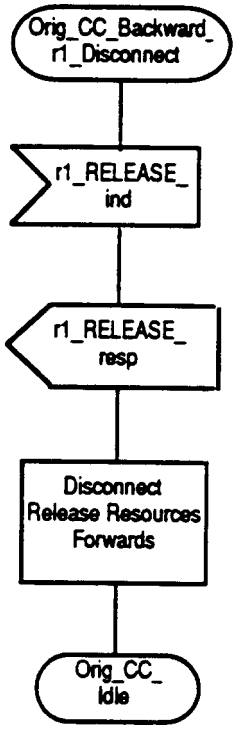


Figure 36 - Stage 2 SDL diagram for Originating CC functional entity (Part 11)

15.3 Transit CC functional entity SDL diagrams

Output signals to the left and input signals from the left represent information flows across r2 to and from the Preceding CC functional entity. Output signals to the right and input signals from the right represent information flows across r2 to and from the Subsequent CC functional entity. The only exception to this rule is when the text within the signals explicitly identifies from what function the signal originates.

15.3.1 Transit CC states used in SDL diagrams

Transit_CC_Idle - No Call in progress

Transit_CC_Call_Sent - Call has been initiated by the CC, the channel has been reserved to the subsequent CC, and an end to end response is awaited.

Transit_CC_Wait_for_Release_Channel - In-band tones / announcements being given to the PTN user, PTN user or CC originated clearing awaited.

Transit_CC_Wait_for_Chan_Ack/Additional_Digits - Call has been initiated by the CC functional entity, and the CC is awaiting a response from the subsequent CC.

Transit_CC_Wait_for_Address_Info - The CC is awaiting additional information from the preceding CC.

Transit_CC_Call_Active - Call is in active phase.

Transit_CC_Backward_r2_Release - Resources have been disconnected, and clearing of the resources in the backward direction has been initiated, CC awaiting response from the preceding CC.

Transit_CC_Forward_r2_Release - Resources have been disconnected, and clearing of the resources in the forward direction has been initiated, CC awaiting response from the subsequent CC.

15.3.2 Transit CC SDL diagrams

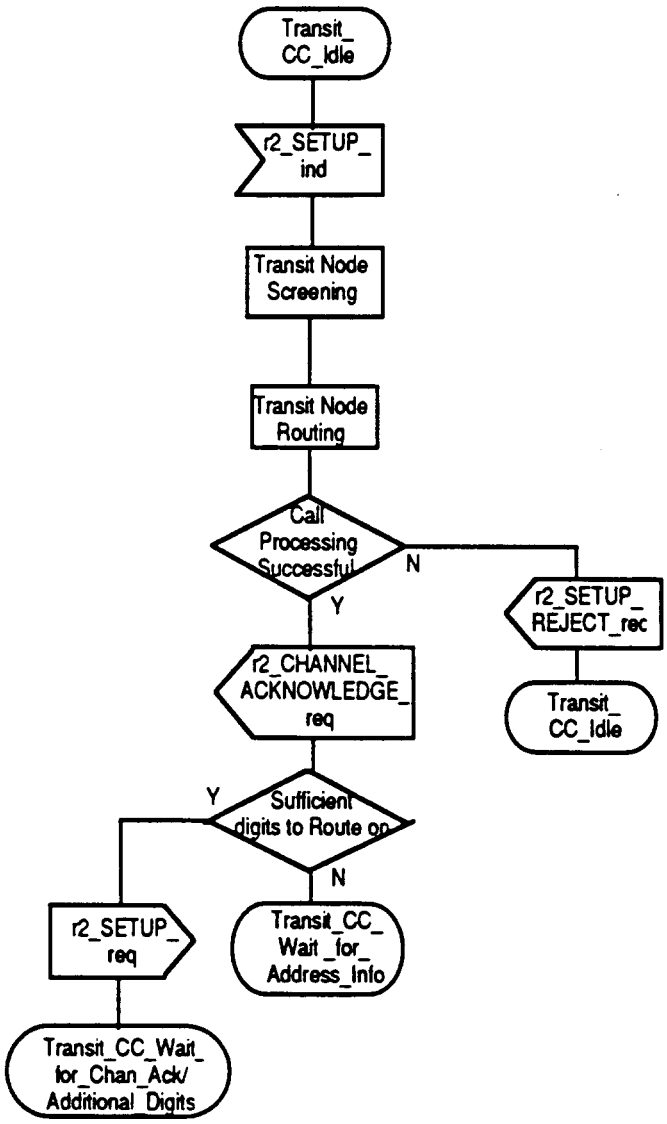


Figure 37 - Stage 2 SDL diagram for Transit CC functional entity (Part 1)

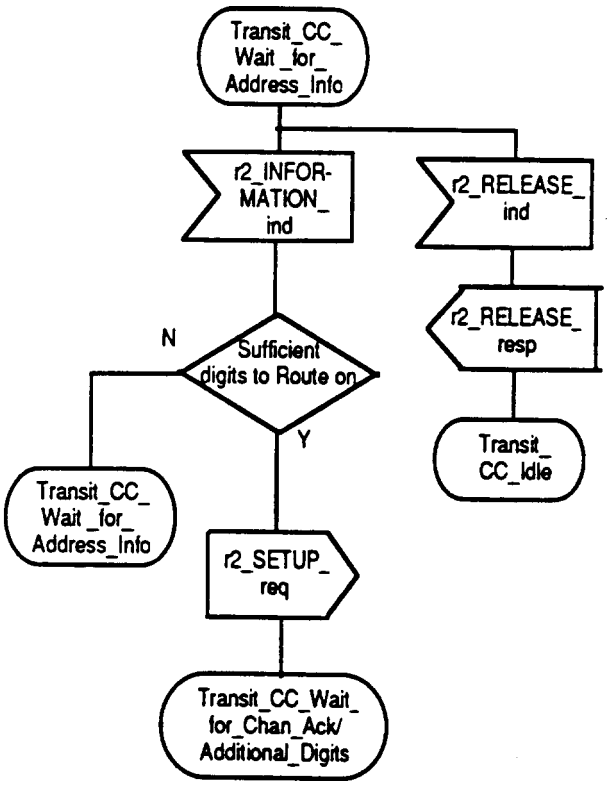
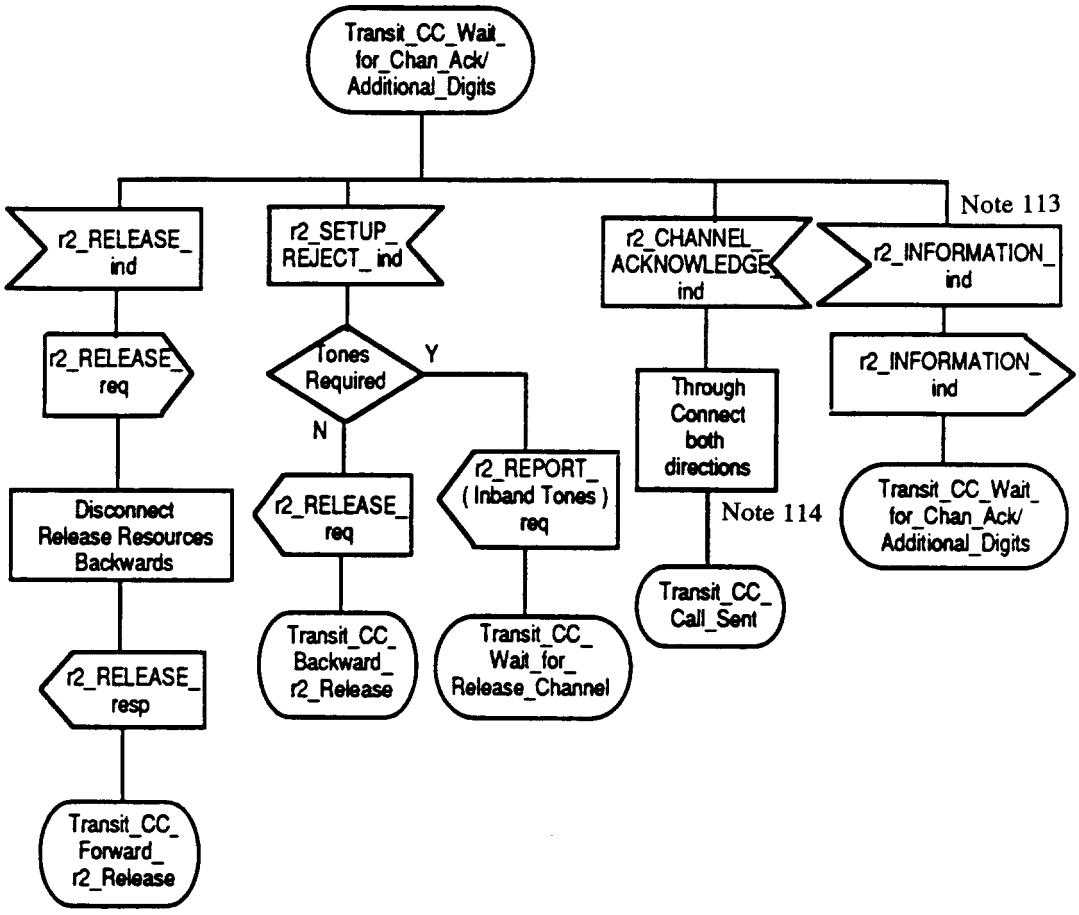


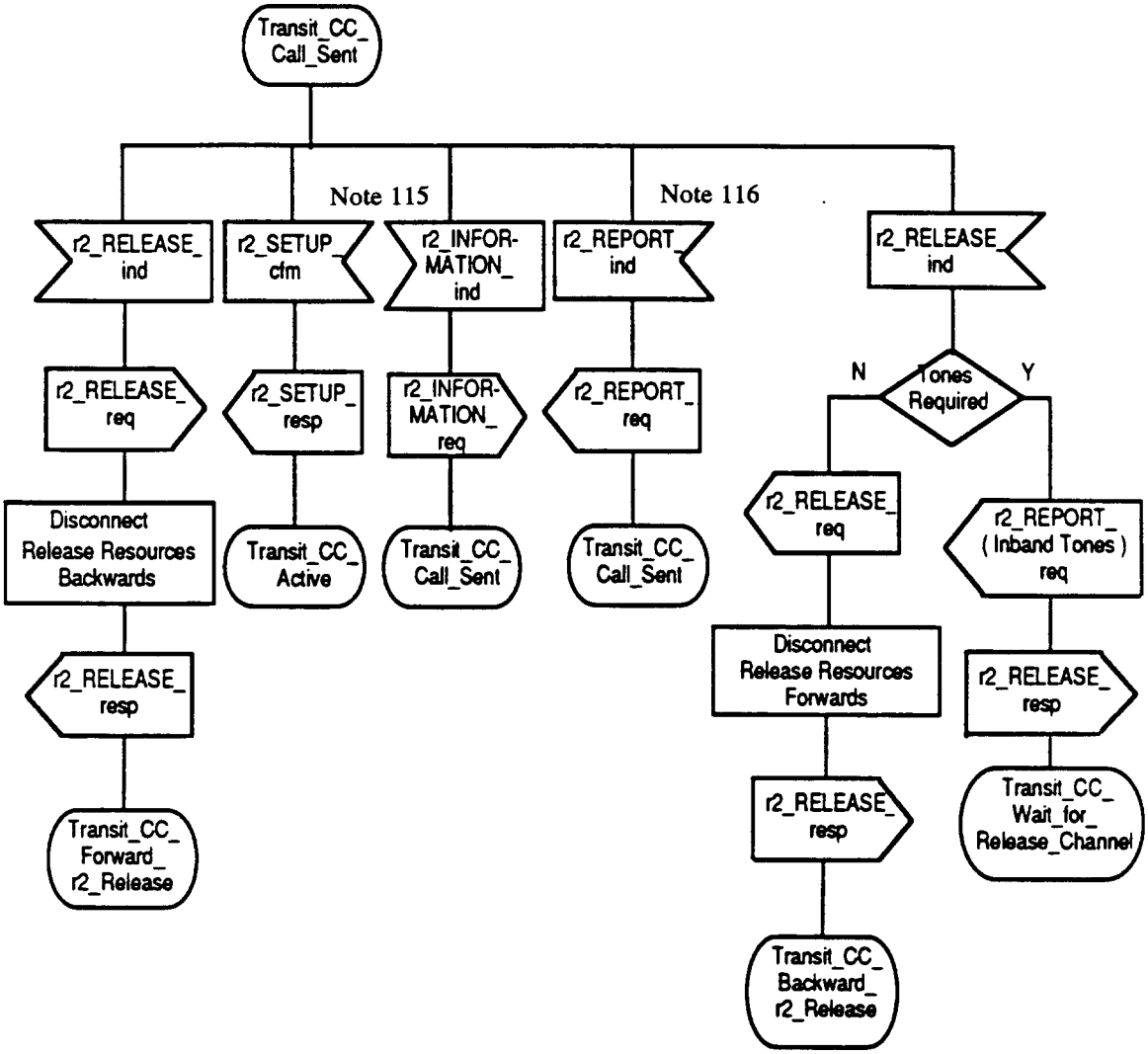
Figure 38 - Stage 2 SDL diagram for Transit CC functional entity (Part 2)



NOTE 113:
This information flow is not acted upon after the receipt of a SETUP or INFORMATION information flow with an 'number complete indicator' parameter. There is an interdigit timer that is active, on the expiry of this timer no more INFORMATION information flow are accepted.

NOTE 114:
This is the earliest point at which cut-through can occur.

Figure 39 - Stage 2 SDL diagram for Transit CC functional entity (Part 3)



NOTE 115:
This information flow is not acted upon after the receipt of an INFORMATION information flow with an 'number complete indicator' parameter. There is an interdigit timer that is active, on the expiry of this timer no more INFORMATION information flows are accepted.

NOTE 116:
The REPORT information flow can have the parameters: 'interworking', or 'call rejection'.

Figure 40 - Stage 2 SDL diagram for Transit CC functional entity (Part 4)

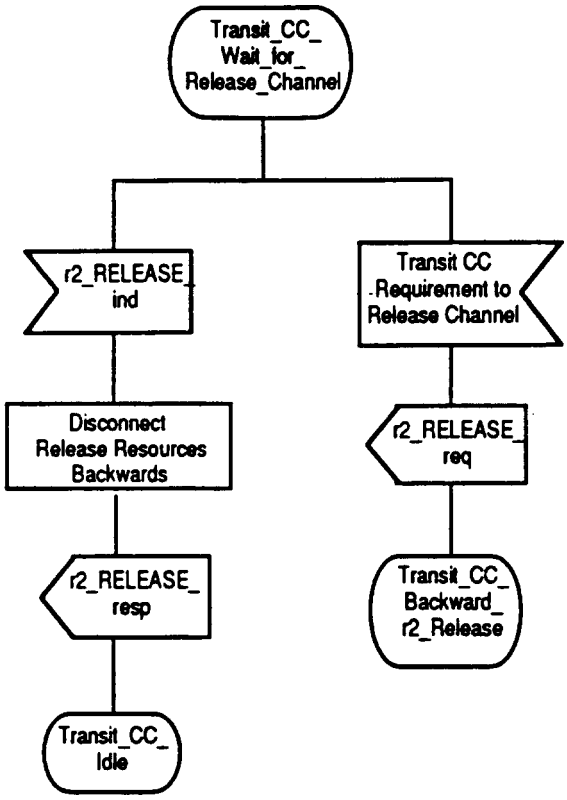


Figure 41 - Stage 2 SDL diagram for Transit CC functional entity (Part 5)

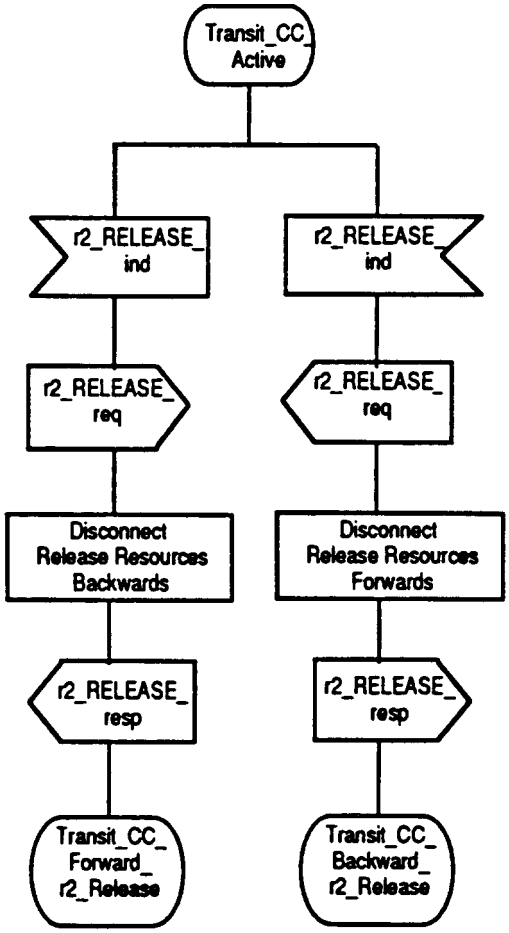


Figure 42 - Stage 2 SDL diagram for Transit CC functional entity (Part 6)

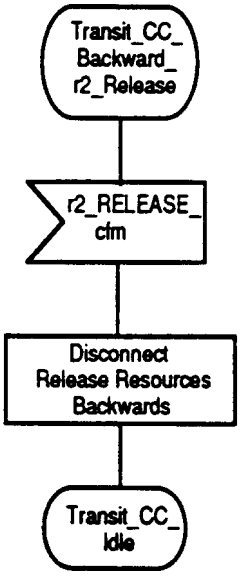


Figure 43 - Stage 2 SDL diagram for Transit CC functional entity (Part 7)

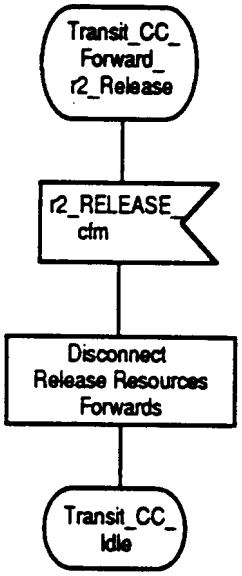


Figure 44 - Stage 2 SDL diagram for Transit CC functional entity (Part 8)

15.4 Destination CC functional entity SDL diagrams

Output signals to the left and input signals from the left represent information flows across r2 to and from the Preceding CCA functional entity. Output signals to the right and input signals from the right represent information flows across r3 to and from the Destination CCA functional entity. The only exception to this rule is when the text within the signals explicitly identifies from what function the signal originates.

15.4.1 Destination CC states used in SDL diagrams

Dest_CC_Idle - No Call in progress

Dest_CC_Await Response - Call has been initiated by the CC, CC await responses from the CCAs.

Dest_CC_Wait_for_Release_Channel - In-band tones/announcements being given to the calling PTN user, PTN user or CC originated clearing awaited.

Dest_CC_Wait_for_Address_Info - The CC is awaiting additional information from the preceding CC.

Dest_CC_Call_Active - Call is in active phase.

Dest_CC_Backward_r2_Release - Resources have been disconnected, and clearing of the resources in the backward direction has been initiated, CC awaiting response from the preceding CC.

Dest_CC_Forward_r3_Release_Backward_r2_Release - Resources have been disconnected, and clearing has been initiated in both directions, CC awaiting responses from both the Destination CCA and the preceding CC.

Dest_CC_Forward_r3_Release - Resources have been disconnected, and clearing of the resources in the forward direction has been initiated, CC awaiting response from the Destination CCA.

Dest_CC_Forward_r3_Disconnect - Disconnection has been initiated, CC awaiting Destination CCA response.

15.4.2 Destination CC SDL diagrams

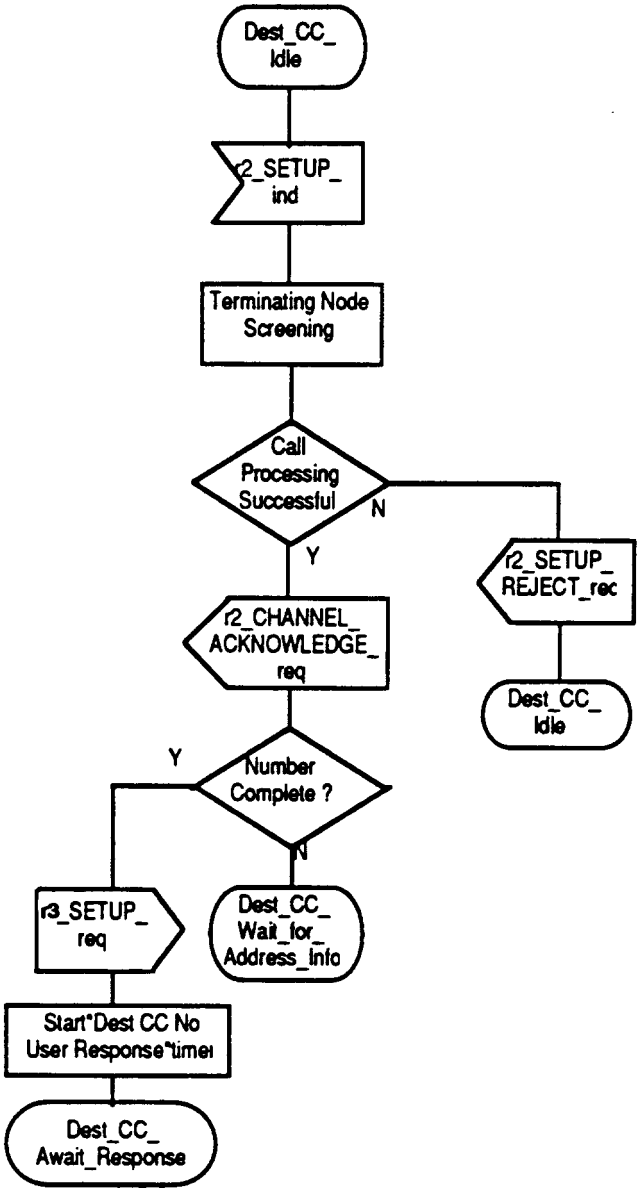


Figure 45 - Stage 2 SDL diagram for Destination CC functional entity (Part 1)

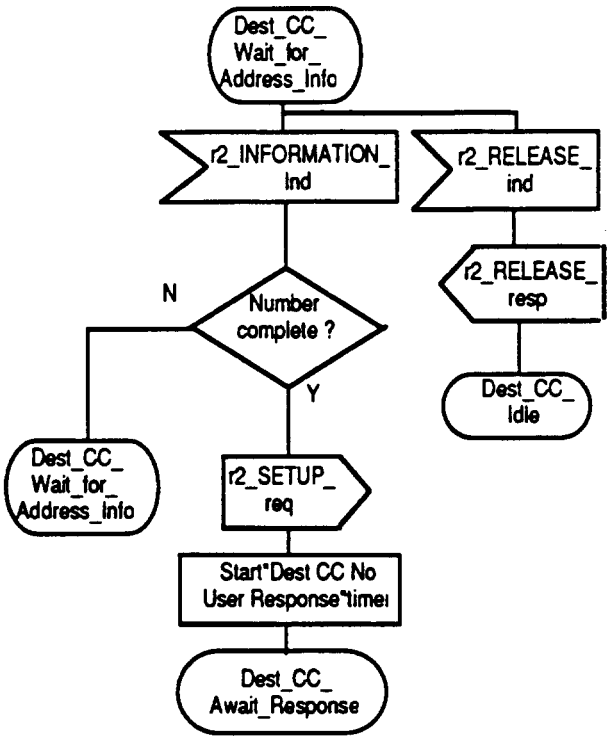
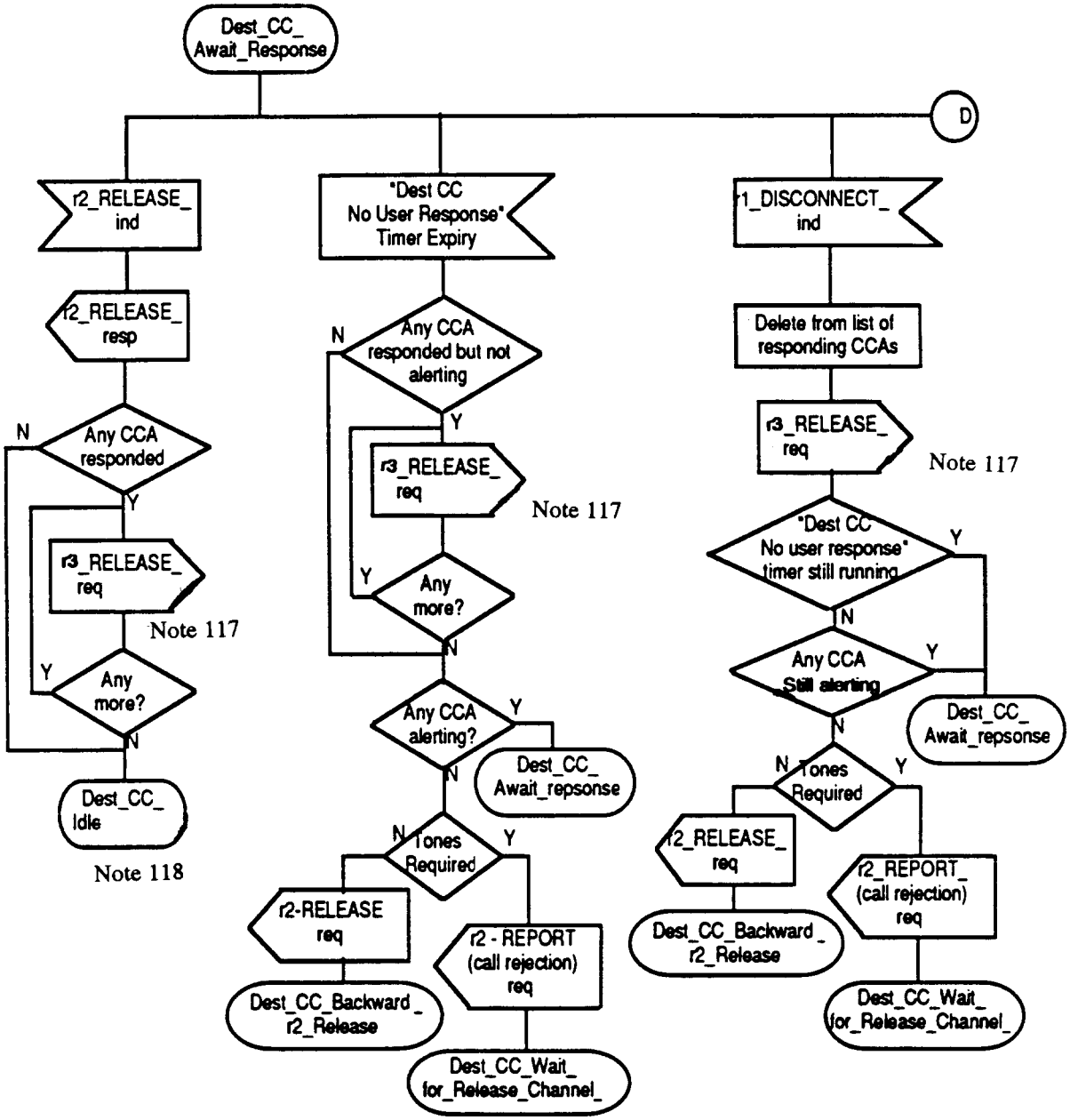


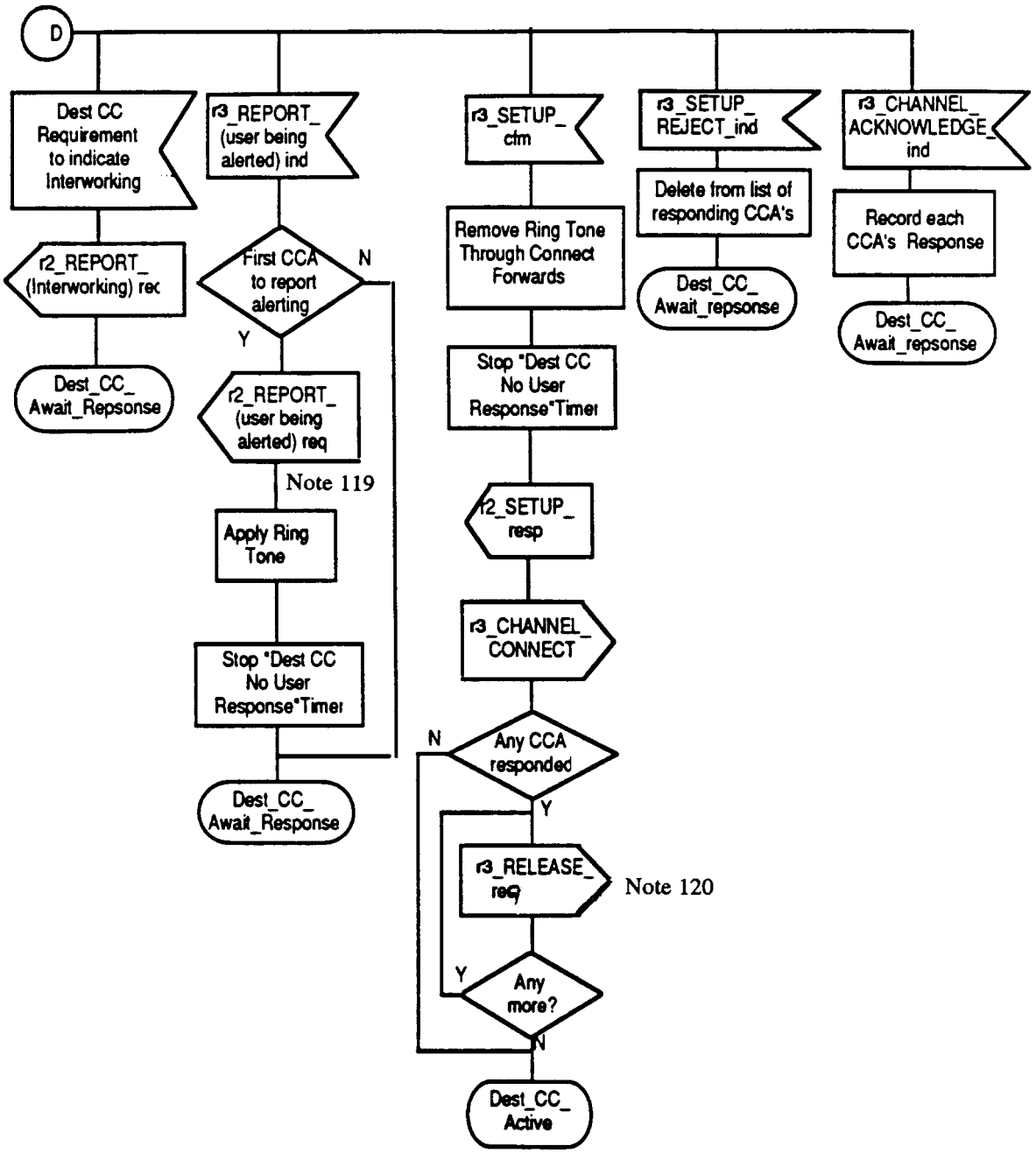
Figure 46 - Stage 2 SDL diagram for Destination CC functional entity (Part 2)



NOTE 117:
A separate state machine is generated (not shown) for each CCA to which an r3_RELEASE_req is sent. The separate state machine is cleared on receipt of an r3_RELEASE_cfm.

NOTE 118:
If any further CCAs respond prior to the expiry of the Dest CC No User response timer, they should be cleared by sending an r3_RELEASE_req and generating a new state machine to await confirmation.

Figure 47 - Stage 2 SDL diagram for Destination CC functional entity (Part 3)



NOTE 119:
The provision of Ring Tone depends on the Basic Service provided.

NOTE 120:
A separate state machine is generated (not shown) for each CCA to which an r3_RELEASE_req is sent. The separate state machine is cleared on receipt of an r3_RELEASE_cfm.

Figure 48 - Stage 2 SDL diagram for Destination CC functional entity (Part 4)

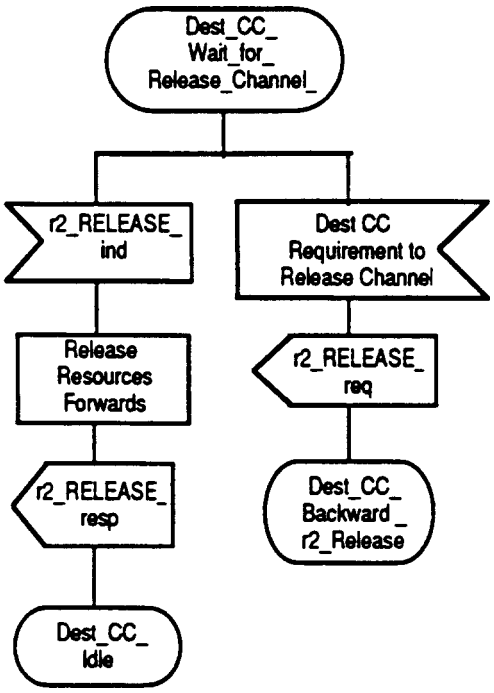


Figure 49 - Stage 2 SDL diagram for Destination CC functional entity (Part 5)

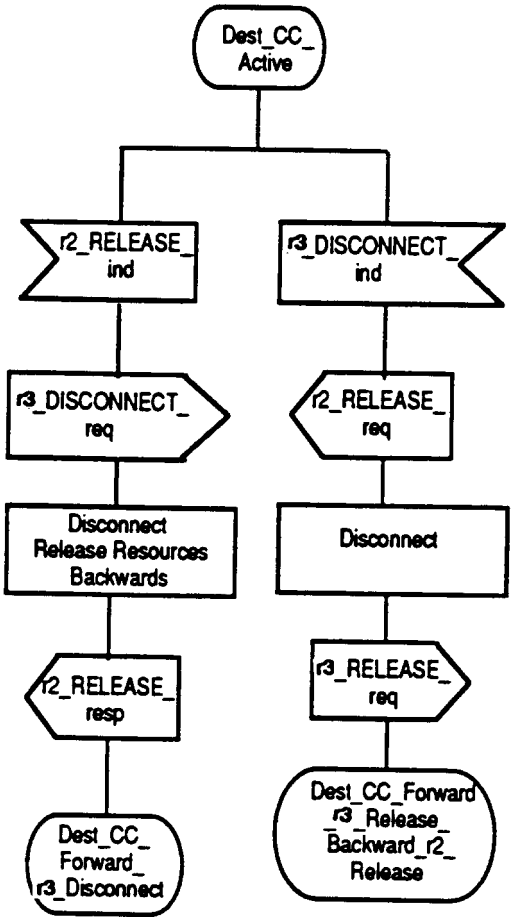


Figure 50 - Stage 2 SDL diagram for Destination CC functional entity (Part 6)

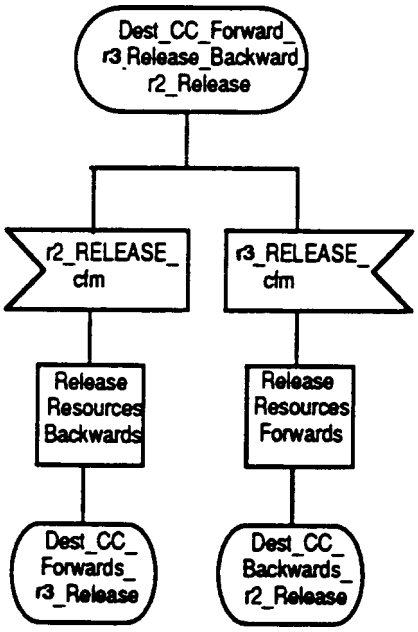


Figure 51. Stage 2 SDL diagram for Destination CC functional entity (Part 7)

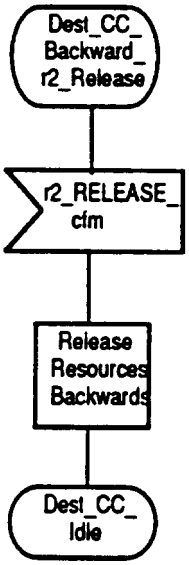


Figure 52. Stage 2 SDL diagram for Destination CC functional entity (Part 8)

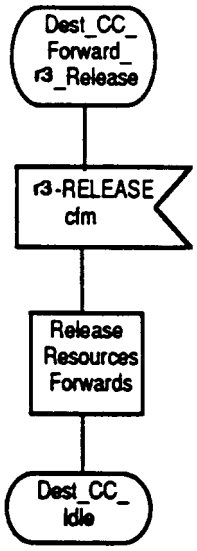


Figure 53 - Stage 2 SDL diagram for Destination CC functional entity (Part 9)

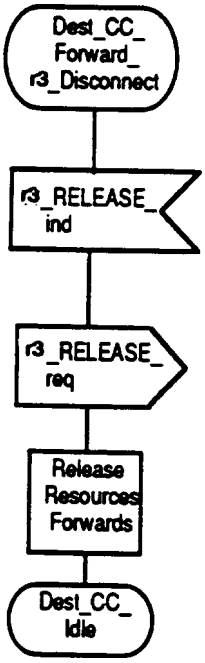


Figure 54 - Stage 2 SDL diagram for Destination CC functional entity (Part 10)

15.5 Destination CCA functional entity SDL diagrams

Output signals to the left and input signals from the left represent information flows across r3 to and from the Destination CC functional entity. Output signals to the right and input signals from the right represent primitives to and from the Destination PTN user. The only exception to this rule is when the text within the signals explicitly identifies from what function the signal originates.

15.5.1 Destination CCA states used in SDL diagrams

Dest_CCA_Idle - No Call in progress

Dest_CCA_Call_Sent - Call has been initiated by the CC, the channel has been reserved to the PTN user, and Destination PTN user response is awaited.

Dest_CCA_Call_Active - Call is in active phase.

Dest_CCA_Backward_r3_Release - Resources have been disconnected, and clearing of the resources in the backward direction has been initiated, CCA awaiting response from the preceding CC.

Dest_CCA_Backward_Release_Backward_r3_Disconnect - Disconnection has been initiated, CCA awaiting response from Destination PTN user.

Dest_CCA_Forward_Release_Forward_r3_Disconnect - Disconnection has been initiated, CCA awaiting response from Destination CC.

Dest_CCA_Pending_Channel_Confirmation - Call has been accepted, CCA awaiting to be awarded the call.

15.5.2 Destination CCA SDL diagrams

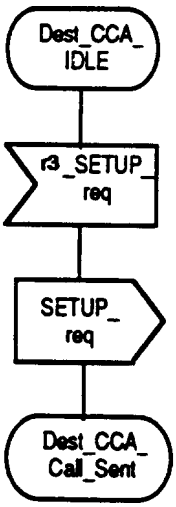


Figure 55 - Stage 2 SDL diagram for Destination CCA functional entity (Part 1)

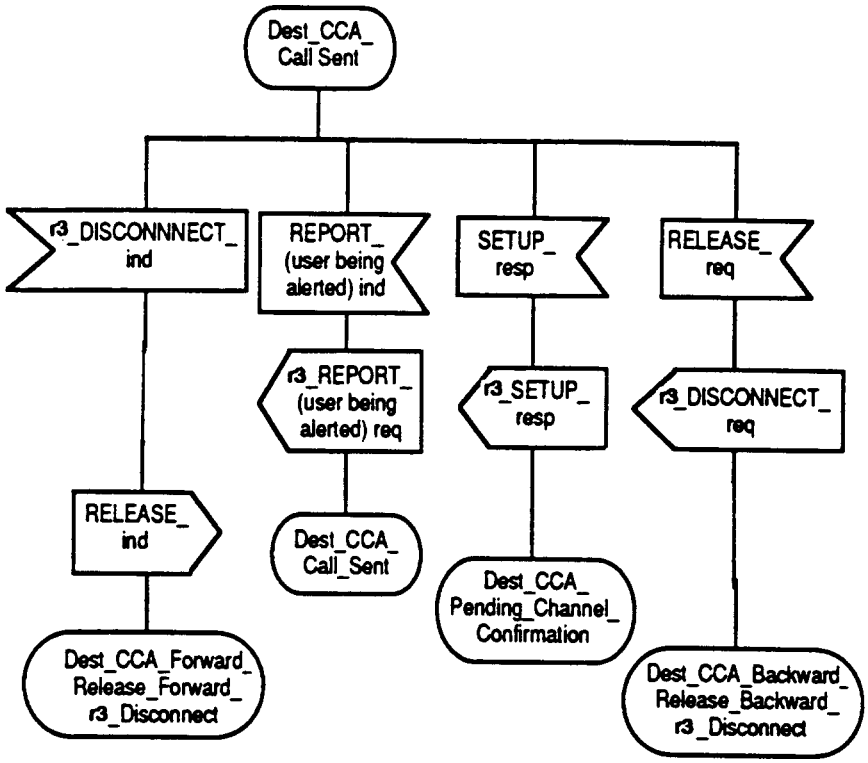


Figure 56 - Stage 2 SDL diagram for Destination CCA functional entity (Part 2)

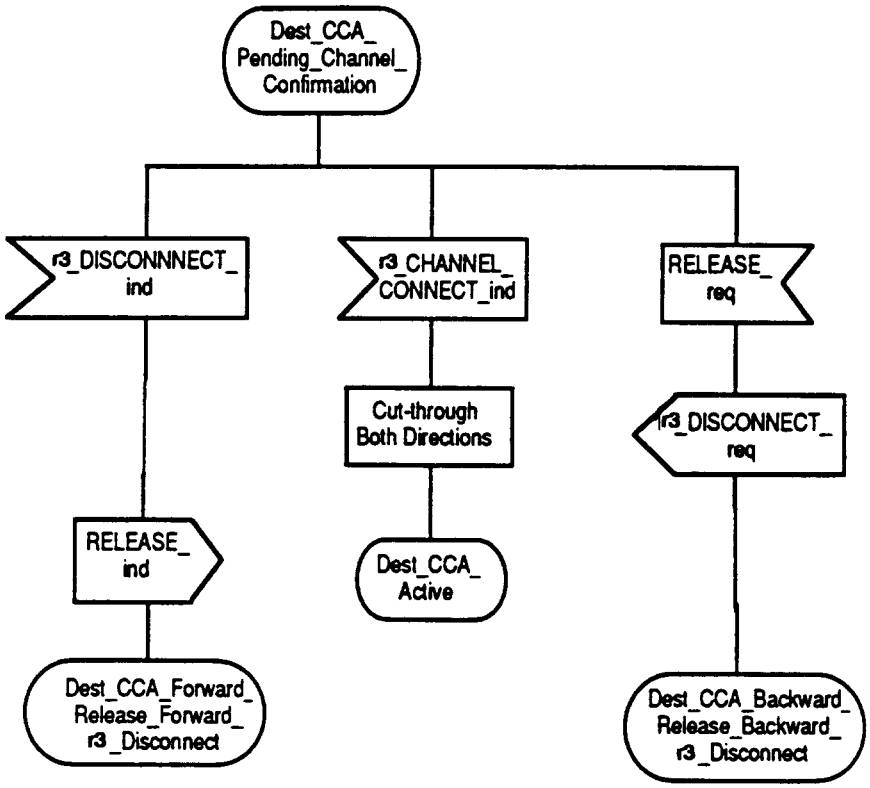


Figure 57 - Stage 2 SDL diagram for Destination CCA functional entity (Part 3)

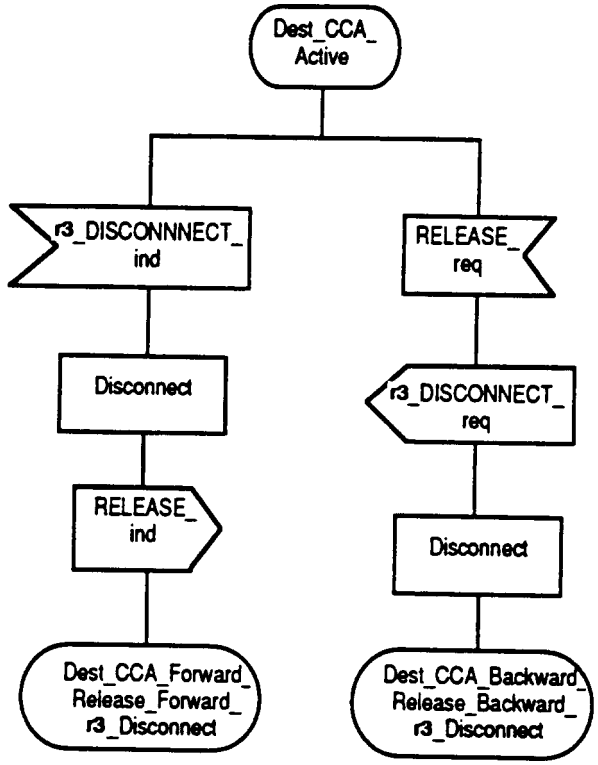


Figure 58 - Stage 2 SDL diagram for Destination CCA functional entity (Part 4)

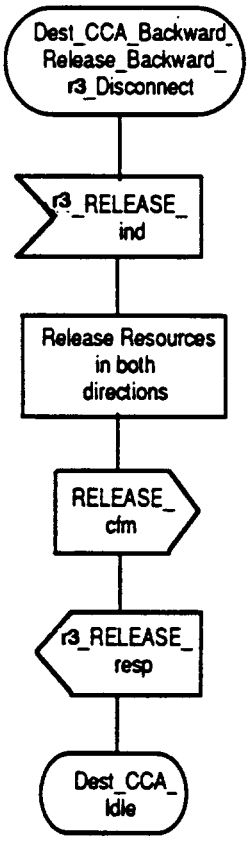


Figure 59 - Stage 2 SDL diagram for Destination CCA functional entity (Part 5)

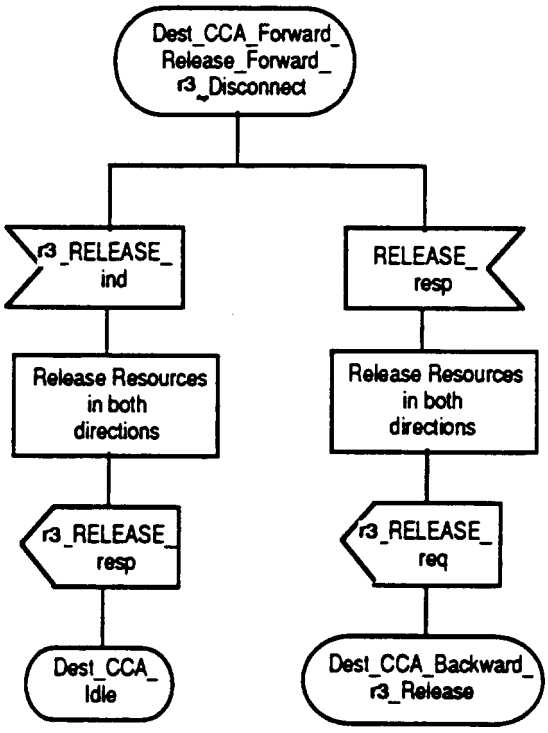


Figure 60 - Stage 2 SDL diagram for Destination CCA functional entity (Part 6)

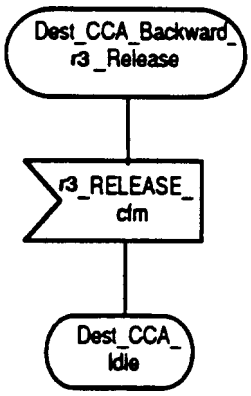
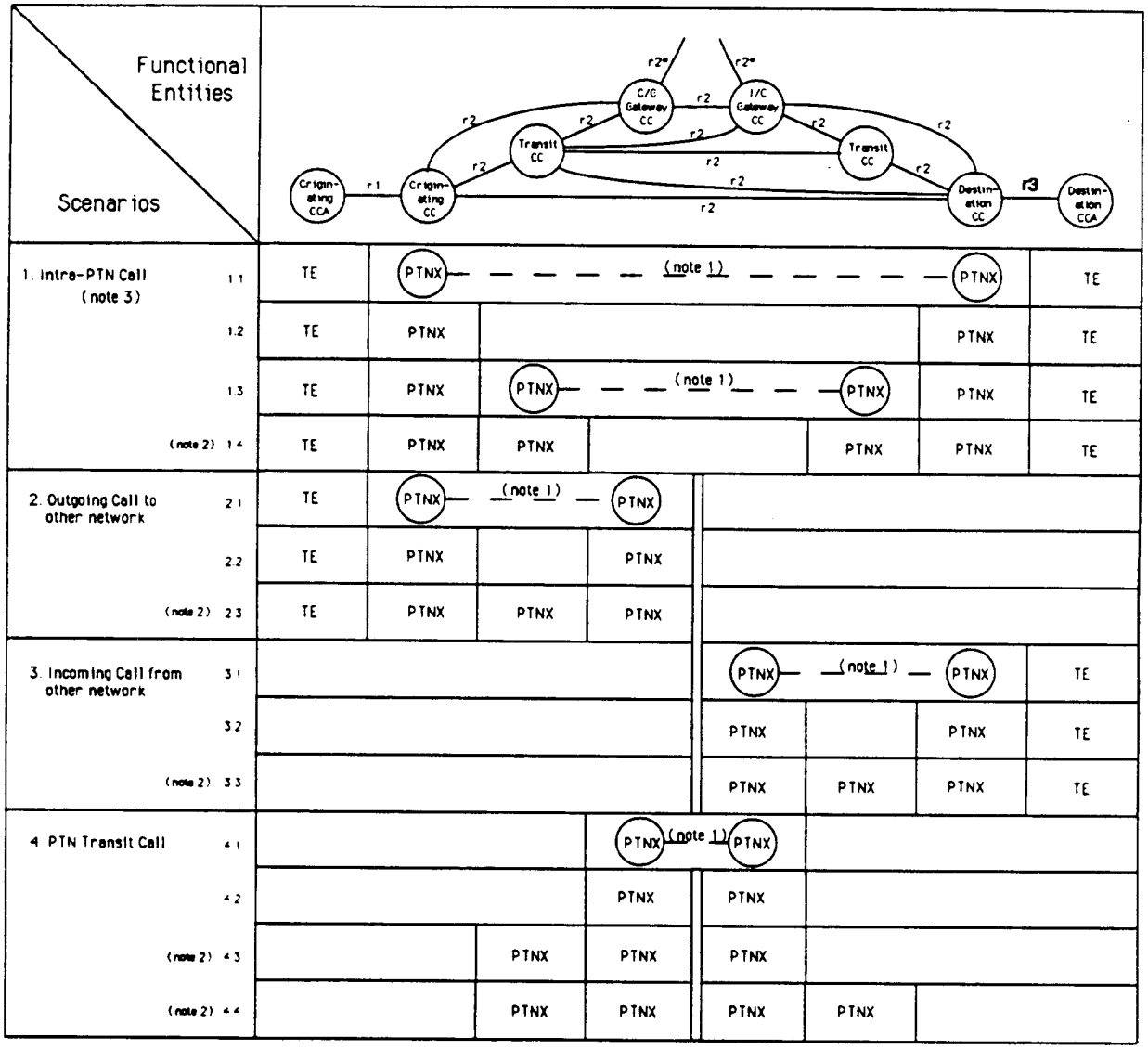


Figure 61 - Stage 2 SDL diagram for Destination CCA functional entity (Part 7)

16 Allocation of functional entities to physical entities

The allocations of the functional elements to physical locations are shown in table 10.

Table 10. Allocation of FEs to physical entities



Legend PTNX = Private Telecommunication Network Exchange
I/C Gateway CC = Incoming Gateway CC
O/G Gateway CC = Outgoing Gateway CC
TE = Terminal equipment Type 1, Terminal Adaptor together with Terminal Equipment Type 2

Note 1 :
Entities Connected by a dashed line are physically co-located.

Note 2 :
Transit CC can be allocated physically to either one or multiple, concatenated PTNXs.

Note 3 :
A tandem outgoing and incoming call is to be considered as two separate PTN calls and not an intra-PTN call (see scenarios 2 and 3 above).

Annex A (informative): Relationship to corresponding public ISDN Standards

The circuit mode basic services for PTNs specified in this Standard complement and are compatible with the corresponding services for public ISDNs. For stage 2, currently, there is only a CCITT Recommendation Q.71 (Blue Book). The main differences can be summarised as follows.

1. PTN terminology is used, where appropriate, instead of public ISDN terminology.

2. All circuit mode services are specified in this Standard with a single prose specification of the common dynamic aspects at Stage 1.

3. This Standard specifies services at Stage 1 in line with OSI principles, by means of primitives transferred across service access points.

4. Subaddressing is an optional part of basic services in a PTN, whereas public ISDN Standards define it as a supplementary service.

5. Multiple subscriber number is an optional part of basic services in a PTN, whereas the public ISDN Standards define it as a supplementary service.

6. The use of the Direct Dial In supplementary service of a public ISDN for calls incoming to a PTN from a public ISDN is regarded as part of basic services in a PTN.

7. The use of the Calling Line Identification Presentation and Connected Line Identification Presentation supplementary services of a public ISDN for obtaining the Originating Number or the Connected Number when a call is from or to a public ISDN is regarded as part of basic services in a PTN.

8. The provision to the PTN of the user's own number (Originating Number or Connected Number) and the provision of an Originating Number or a Connected Number by a PTN to another network is part of basic services in a PTN and not part of the Calling Line Identification Presentation and Connected Line Identification Presentation supplementary services. These supplementary services are concerned only with the presentation of the number from the network to the served PTN user.

Annex B (informative): Other references

ECMA Technical Report

ECMA TR/44 An Architectural Framework for Private Networks

ETSI

ETS 300 063	Integrated Services Digital Network (ISDN); Direct Dialling In (DDI) supplementary service, Functional capabilities and information flows.
ETS 300 091	Integrated Services Digital Network (ISDN); Calling Line Identification Presentation (CLIP) and Calling Line Identification Restriction (CLIR) supplementary services, Functional capabilities and information flows.
ETS 300 096	Integrated Services Digital Network (ISDN); Connected Line Identification Presentation (COLP) and Connected Line Identification Restriction (COLR) supplementary services, Functional capabilities and information flows.
ETS 300 060	Integrated Services Digital Network (ISDN); Subaddressing (SUB) supplementary service, Functional capabilities and information flows.
ETS 300 173	Private Telecommunication Network (PTN); Specification, functional model and information flows, Identification supplementary services.
ETR 010	ISDN Standards Management (ISM); The ETSI guide on the European Integrated Services Digital Network.

CCITT Recommendations (Blue Book)

G.711	Primary PCM Multiplex Equipment for Voice Frequencies.
I.130	Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN.
I.140	Attribute technique for the characterization of telecommunications services supported by an ISDN and network capabilities of an ISDN.
I.210	Principles of telecommunications services supported by an ISDN and the means to describe them.
I.220	Common dynamic description of basic telecommunication services.
I.230	Definition of bearer services.
I.231	Circuit mode bearer services categories.
I.240	Definition of teleservices.
I.241	Teleservices supported by an ISDN.
I.520	General arrangements for network interworking between ISDN's.
Q.65	Stage 2 of the method for the characterisation of services supported by an ISDN.
Q.71	ISDN 64 kbit/s circuit mode switched bearer services.
X.31	Support of packet mode terminal equipment by an ISDN.

History

Document history	
December 1992	First Edition
February 1996	Converted into Adobe Acrobat Portable Document Format (PDF)