

ECMA

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION

STANDARD ECMA-142

SPECIFICATION, FUNCTIONAL MODEL AND
INFORMATION FLOWS FOR CONTROL ASPECTS OF
CIRCUIT MODE BASIC SERVICES IN PRIVATE
TELECOMMUNICATION NETWORKS

June 1990

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BRIEF HISTORY

This Standard is one of a series of ECMA Standards defining services and signalling protocols applicable to Private Telecommunication Networks 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 Standard contains specifications of basic services.

This Standard is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO, CCITT, ETSI and various national standardization bodies in Europe and in the USA. It represents a pragmatic and widely based consensus.

Adopted as Standard ECMA-142 by the General Assembly on 28th June 1990.

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1. SCOPE

This ECMA Standard specifies control aspects of standardized circuit mode basic services which may be supported by Private Telecommunication Networks (PTN).

NOTE 1

Supplementary services are described in other ECMA Standards.

Service specifications are produced in three stages, according to the method described in Standard ECMA-134, which is based on the method used by CCITT Rec. I.130 and Rec. 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 5,6 and 7 describe the common aspects of the services and clauses 8,9,10 and 11 describe those aspects which are service-dependent. Stage 2 (clauses 13,14,15 and 17) identifies the functional entities involved in the basic services and the information flows between them. Clause 12 describes interworking with a public ISDN.

NOTE 2

Stage 3, the definition of the networking and access signalling protocols to support the basic services, will appear in separate Standards.

The purpose of the Stage 1 and Stage 2 specifications is to guide and constrain the work on signalling protocols at Stage 3, 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 3

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 Rec. I.220, I.230, I.231 (Stage 1), Q.71 (Stage 2), I.240, and I.241.

This Standard encompasses the following basic services:

- Circuit Mode 64 kbit/s Unrestricted 8 kHz Structured Bearer Service Category;
- Circuit Mode 64 kbit/s 8 kHz Structured Bearer Service Category Useable for Speech Information Transfer;
- Circuit Mode 64 kbit/s 8 kHz Structured Bearer Service Category Useable for 3,1 kHz Audio Information Transfer;
- Telephony Teleservice;
- Teletex Teleservice;
- Telefax 4 Teleservice;
- Videotex Teleservice.

NOTE 4

Service specifications are based on information concerning the corresponding public ISDN service available at time of publication 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

4. INTRODUCTION

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 an entire channel (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 common channel signalling, which means that signalling information 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).

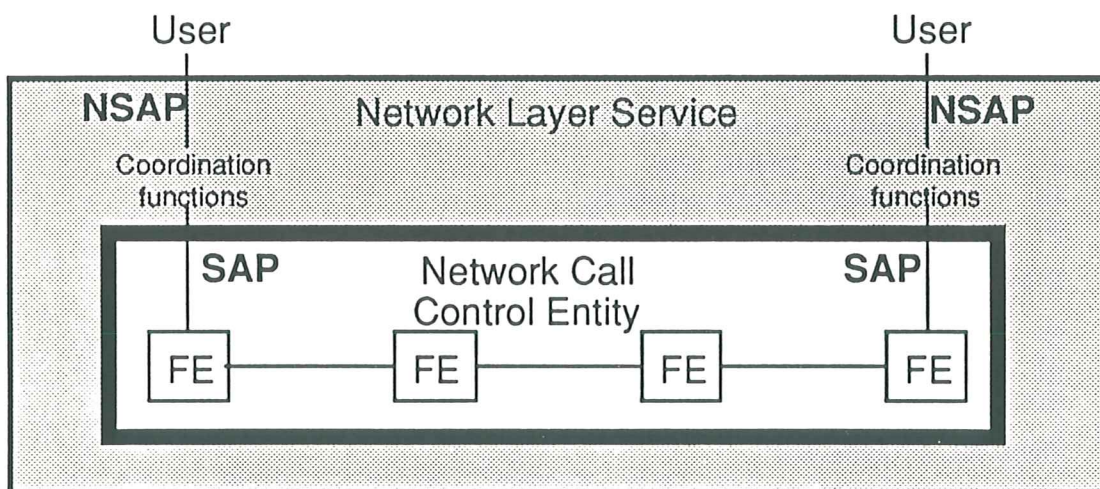
The primitives used across Network Call Control service access points are as follows.

- 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 inband 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 13, 14, 15, 16 and 17. 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 Specifications

Clauses 5 to 11 together contain the Stage 1 specification of basic services.

Clauses 5 to 7 specify the common dynamic aspects of the control of services. It includes service invocation and termination procedures at the calling and called PTN users specified in terms of primitives at Network Call Control service access points.

Clauses 8 to 11 describe the different basic services, as seen by PTN users, in terms of their static aspects, including the properties of the user information and special interworking considerations.

NOTE 9

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

5. DEMAND SERVICE PROCEDURES FOR SERVICES WITHIN A PTN

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

5.1. 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.

5.2. Normal Procedures

5.2.1. 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;
- ii) a number identifying the called PTN user (Destination Number);
- iii) optionally, the called PTN user's subaddress, to further identify the called PTN user (Destination Subaddress);
- iv) optionally, information describing user information transfer protocols for layers up to layer 3 (Low Layer Compatibility information);
- v) optionally, indication of a teleservice or of a non-standardized application by means of High Layer Compatibility information;
- vi) optionally, indication of the PTN user's own subaddress (Originating Subaddress) to identify itself to the called PTN user;
- 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).

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.

The Destination Number consists of the number digits, the identification of the numbering plan and the type of number, in accordance with ECMA-... (PTNA). 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.

The Destination Subaddress, if supplied consists of the "type of subaddress" indicator and the actual subaddress, in accordance with ECMA-... (PTNA).

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.

- 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 Standard ECMA-... (PTNA).

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 of 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 pre-arranged default Connected Number classified as "NETWORK PROVIDED". For the format and type of number see Standard ECMA-... (PTNA).

NOTE 11

For the presentation of the Connected Number and the screening results to the calling PTN user (see Standard ECMA-... (ISSD)).

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

NOTE 12

For the presentation of the Connected Subaddress to the calling PTN user (see Standard ECMA-... (ISSD)).

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.

5.2.3. 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 inband tone or announcement may accompany the RELEASE__indication.

5.3.5. 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.

6. DEMAND SERVICE INTERWORKING CONSIDERATIONS

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

6.1. 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.

6.2. 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 13

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.

6.3. 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.

7. DEMAND SERVICE SDL DIAGRAM

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.

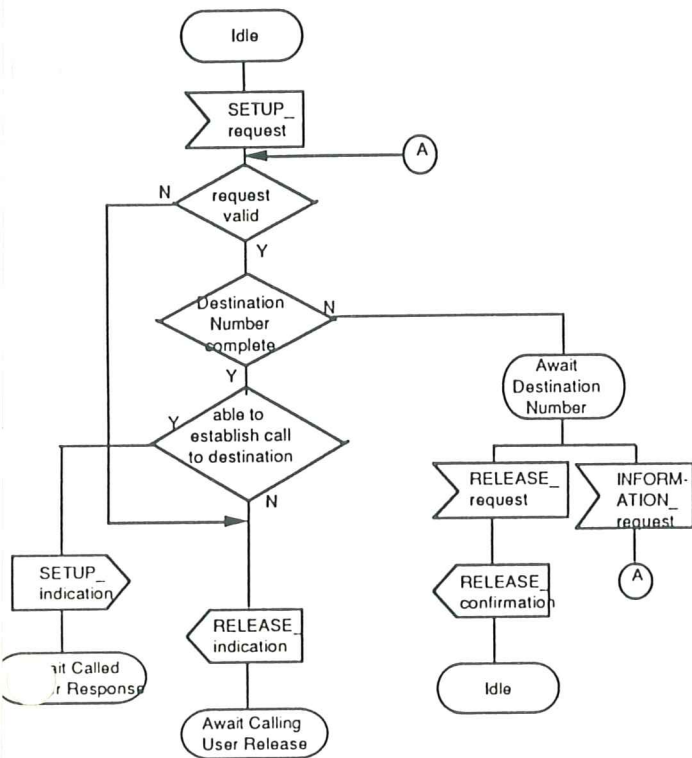


Figure 3 - Stage 1 SDL diagram (Part 1)

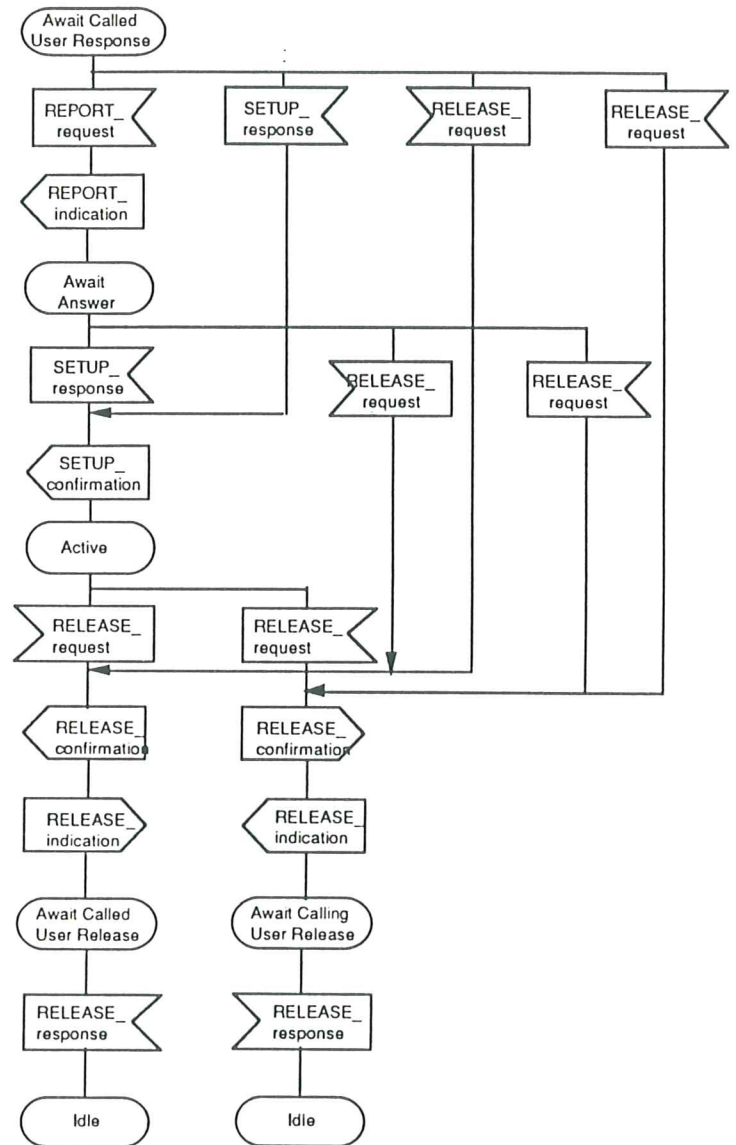


Figure 3 - Stage 1 SDL diagram (Part 2)

8.2.3. Interworking with analogue networks

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 64kbit/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 16

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 3,1kHz audio bearer service.

NOTE 17

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.

8.3. Attributes

8.3.1. 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.

8.3.2. Secondary information transfer attributes

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

- v) Establishment of communication: demand / reserved / permanent (Note 18);
- vi) Symmetry: bidirectional symmetric / unidirectional (Note 19);
- vii) Communication configuration: point-to-point / multi-point (Note 20).

NOTE 18

Only demand services are specified in this Standard.

NOTE 19

Only bidirectional symmetric services are specified in this Standard.

NOTE 20

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

8.3.3. Access attributes

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

- viii) Access channel: B;

NOTE 23

Although in general a network which uses u-law encoding should provide A-law/u-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 u-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/u-law conversion when interworking with public networks which use u-law.

9.3. Attributes

9.3.1. 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.

9.3.2. Secondary information transfer attributes

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

- v) Establishment of communication: demand / reserved / permanent (Note 24);
- vi) Symmetry: bidirectional symmetric / unidirectional (Note 25);
- vii) Communication configuration: point-to-point / multi-point (Note 26).

NOTE 24

Only demand services are specified in this Standard.

NOTE 25

Only bidirectional symmetric services are specified in this Standard.

NOTE 26

Only point-to-point services are specified in this Standard. Multipoint configurations can be achieved using conference call supplementary services.

9.3.3. Access attributes

The access attributes for this service category are:

- viii) Access channel: B;
- ix) Access protocol: CCITT Rec. G.711 (A-law or u-law).

NOTE 27

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

10. CIRCUIT MODE 64 kBIT/S 8 kHz STRUCTURED BEARER SERVICE CATEGORY USEABLE FOR 3,1 kHz AUDIO INFORMATION TRANSFER

10.1. 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.

10.3. Attributes

10.3.1. 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.

10.3.2. Secondary information transfer attributes

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

- v) Establishment of communication: demand / reserved / permanent (Note 31);
- vi) Symmetry: bidirectional symmetric / unidirectional (Note 32);
- vii) Communication configuration: point-to-point / multi-point (Note 33).

NOTE 31

Only demand services are specified in this Standard.

NOTE 32

Only bidirectional symmetric services are specified in this Standard.

NOTE 33

Only point-to-point services are specified in this Standard. Multipoint configurations can be achieved using conference call supplementary services.

10.3.3. Access attributes

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

- viii) Access channel: B;
- ix) Access protocol: G.711 (A-law or u-law).

NOTE 34

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

11. Teleservices

The teleservices specified in this standard, 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 specified in this clause 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.

situations. Failure to specify this information in the bearer capability shall not render the bearer capability incompatible with the Teletex teleservice.

NOTE 40

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

NOTE 41

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.

11.3. 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 42);
- v) Establishment of communication: demand;
- vi) Symmetry: bidirectional symmetric;
- vii) Communication configuration: point-to-point;
- viii) Access channel (Note 45): B;
- ix) Access protocol (Note 45): X.75 layer 2; ISO 8208 layer 3 (Note 43).

NOTE 42

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

NOTE 43

The layer 2 and layer 3 access protocols do not normally need to be specified for a circuit mode unrestricted bearer capability. If specified by the calling PTN user in the bearer capability, the network may use this information in potential interworking situations. Failure to specify this information in the bearer capability shall not render the bearer capability incompatible with the Telefax 4 teleservice.

NOTE 44

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

NOTE 45

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.

11.4. 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;

interworking situations. Due to the prevailing interworking situations, the Bearer Capability can be indicated as a default to the PTN, which does not reflect the Bearer Capability originally required 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 - xxxxx - "Integrated Services Digital Network (ISDN) Direct Dialling In (DDI) supplementary service Service Description"

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 - yyyyy - "Integrated Services Digital Network (ISDN) Calling Line Identification presentation supplementary service Service Description".

NOTE 50

For the presentation of the Originating Number and Originating Subaddress to the called PTN user, see Standard ECMA-ISSD.

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

12.2 Sending a service request to a public ISDN

Subclause 6.2 applies. In addition, Standard ECMA-PTNA applies for sending the calling PTN user's identity to a public ISDN.

12.3 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 - yyyyy - "Integrated Services Digital Network (ISDN) Connected Line Identification presentation supplementary service Service Description".

NOTE 51

For the presentation of the Connected Number and Connected Subaddress to the calling PTN user, see Standard ECMA-ISSD.

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

NOTE 53

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.

13.2.1 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.

13.2.1.1 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 54

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

13.2.1.2 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 55

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

13.2.2 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;

- 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 58

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

13.2.2.4 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 59

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 60

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 61

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.

14. DEFINITION OF INFORMATION FLOWS

14.1 Conventions used within the description of information flows

14.1.1 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.

In clauses 15 and 16 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.

14.2 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 both relationships, r1 and r2. 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.

Service element	Relationship	Request/ Indication	Response/ confirmation
DN Destination Number	r1, r2	M	–
CN Connected Number	r2, r1 destination	–	M
ON Originating Number	r2, r1 originating	M	–
CT Connection Type	r1, r2	M	0
DS Destination Subaddress	r1, r2	0	–
CS Connected Subaddress	r2, r1 destination	–	0
OS Originating Subaddress	r2, r1 originating	0	–
CI Channel Identifier	r1, r2	M	0
CH Call History	r1, r2	0	0
OC Originating Category	r2, r1 destination	0	–
DC Destination Category	r2, r1 originating	–	0
DT Date/Time	r1 originating	–	0 (Note 62)

Table 1. Information content of SETUP

NOTE 62

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

CT Connection Type - Circuit Mode Bearer: Suitable for speech	M (Note 74) 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 64) Symmetry - o (Note 64) Configuration - o (Note 64) Encoding Law (mu/A) - m	0 Low layer compatibility - o
CT Connection Type - Circuit Mode Bearer: Usable for 3,1 kHz	M (Note 74) 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 64) Symmetry - o (Note 64) Configuration - o (Note 64) Encoding law (mu/A) - m	0 Low layer compatibility - o
DS Destination Subaddress	0 Subaddress - m Type of subaddress - m	-
CS Connected Subaddress	-	0 Subaddress - m Type of subaddress m
OS Originating Subaddress	0 Subaddress - m Type of subaddress - m	-
CI Channel Identifier	M (Note 68)	-
CH Call History	0 (Note 64) Interworking encountered - o (Note 75) Signalling interworking - trunk release conditions - o (Notes 69 and 76) Signalling interworking - interworking with a non- common channel signalling system - o Transits Count - o	0 (Note 66) Interworking encountered - o (Note 75) Signalling inter- working - trunk release conditions o (Notes 69 and 76) Signalling inter- working - interwork- ing with a non- common channel sig- nalling system - o
OC Originating Category	0	-
DC Destination Category	-	0
DT Date/Time	-	0 (Note 77)

Table 2. Detailed information content of SETUP (continued)

NOTE 75

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

NOTE 76

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

NOTE 77

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

14.3 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 and r2. 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 3.

Service element	Relationship	Request/Indication
RT Report Type	r1, r2	M (Note 78)
CH Call History	r2, r1	0
DC Destination Category	r1 originating, r2	0
CC Clearing Cause	r1 originating, r2	0 (Note 78)

Table 3. Information content of REPORT

NOTE 78

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

Service element	Relationship	Request/Indication
CI Channel Identifier	r1, r2	M (Note 85)

Table 5. Information content of CHANNEL_ACKNOWLEDGE

NOTE 85

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 r1 destination.

14.5 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 r1 destination.

14.6 DISCONNECT

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

Service element	Relationship	Request/Indication
CC Clearing Cause	r1	M

Table 6. Information content of DISCONNECT

14.7 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 and r2. The service element that shall be conveyed with RELEASE is shown in table 7.

Service element	Relationship	Request/Indication	Response/confirmation
CC Clearing Cause	r1, r2	0 (Note 86)	-

Table 7. Information content of RELEASE

NOTE 86

Mandatory, if no previous DISCONNECT, otherwise optional.

- 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.

15.1.2 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

- . 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.

15.1.4 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.

15.1.5 Destination CCA functional entity

- Function 400

- . The r1_SETUP_indication is processed.
- . An r1_CHANNEL_ACKNOWLEDGE_request is sent.
- . The addressing and compatibility requirements contained within the r1_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 r1_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 r1_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 r1_SETUP_response. The information channel is cut-through in the forward direction, if not cut-through already.
- Function 403 - The r1_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 r1_DISCONNECT_request is formulated and sent to the Destination CC functional entity; and, the resources are disconnected.
- Function 411 - The r1_RELEASE_indication from the Destination CC functional entity is processed; an r1_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 r1_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 r1_SETUP_REJECT_request/indication contains a CC service element.

15.1.6 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 89

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

NOTE 95

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

15.1.7 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 96

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 97

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.

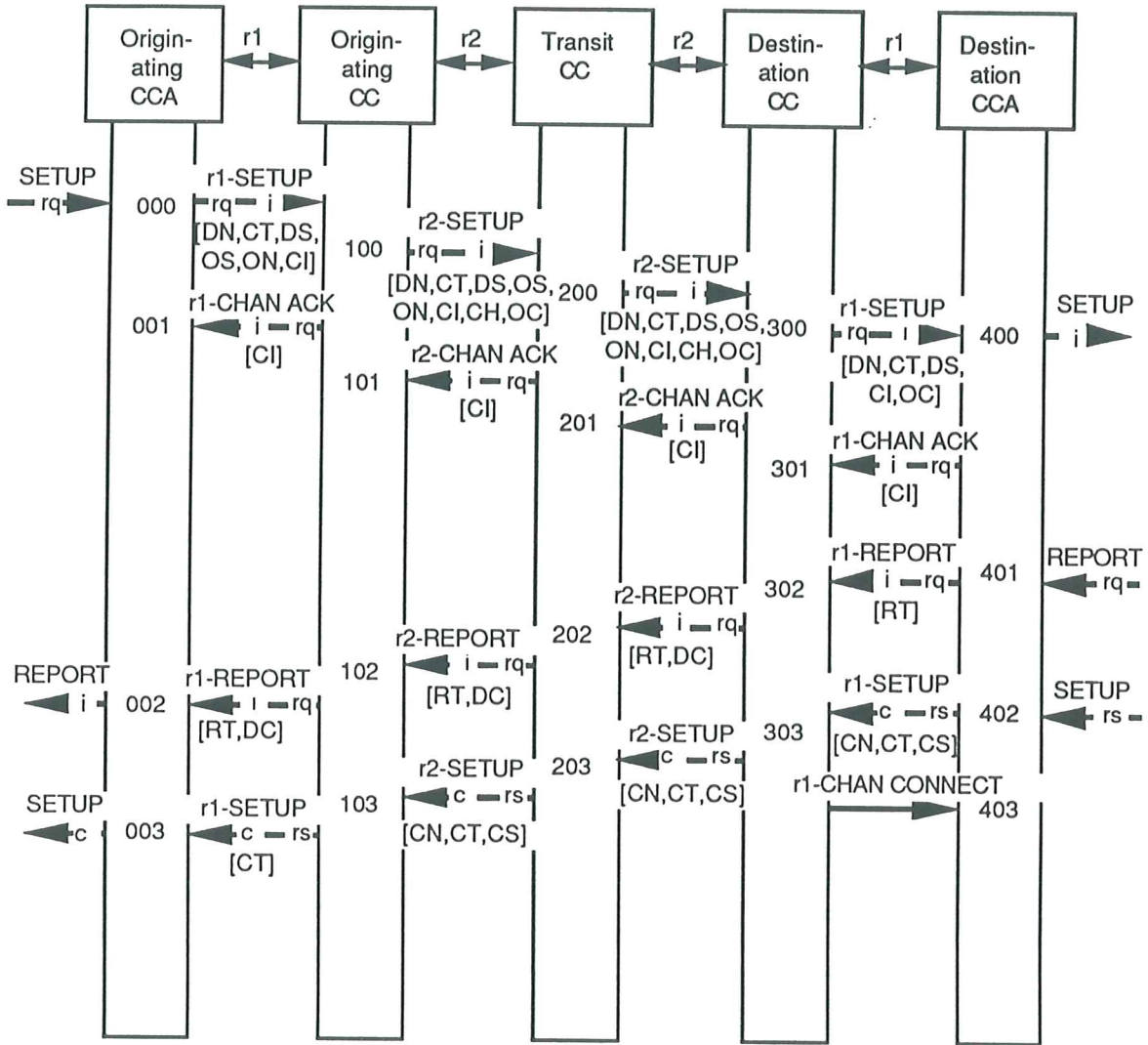
NOTE 98

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.

15.2 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.



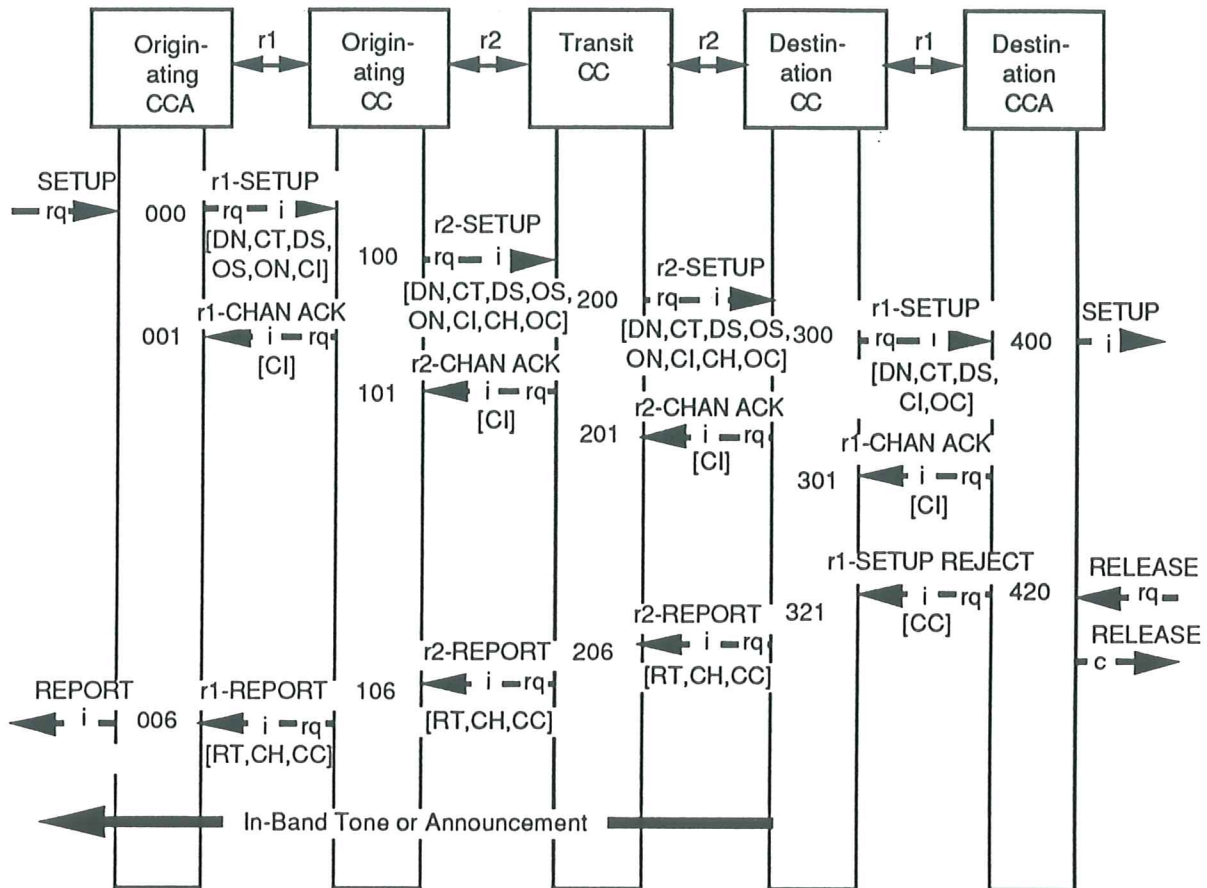
Legend

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

Figure 6 - Non-automatic call establishment

15.4 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 102

It is possible to clear the call from either end.

NOTE 103

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

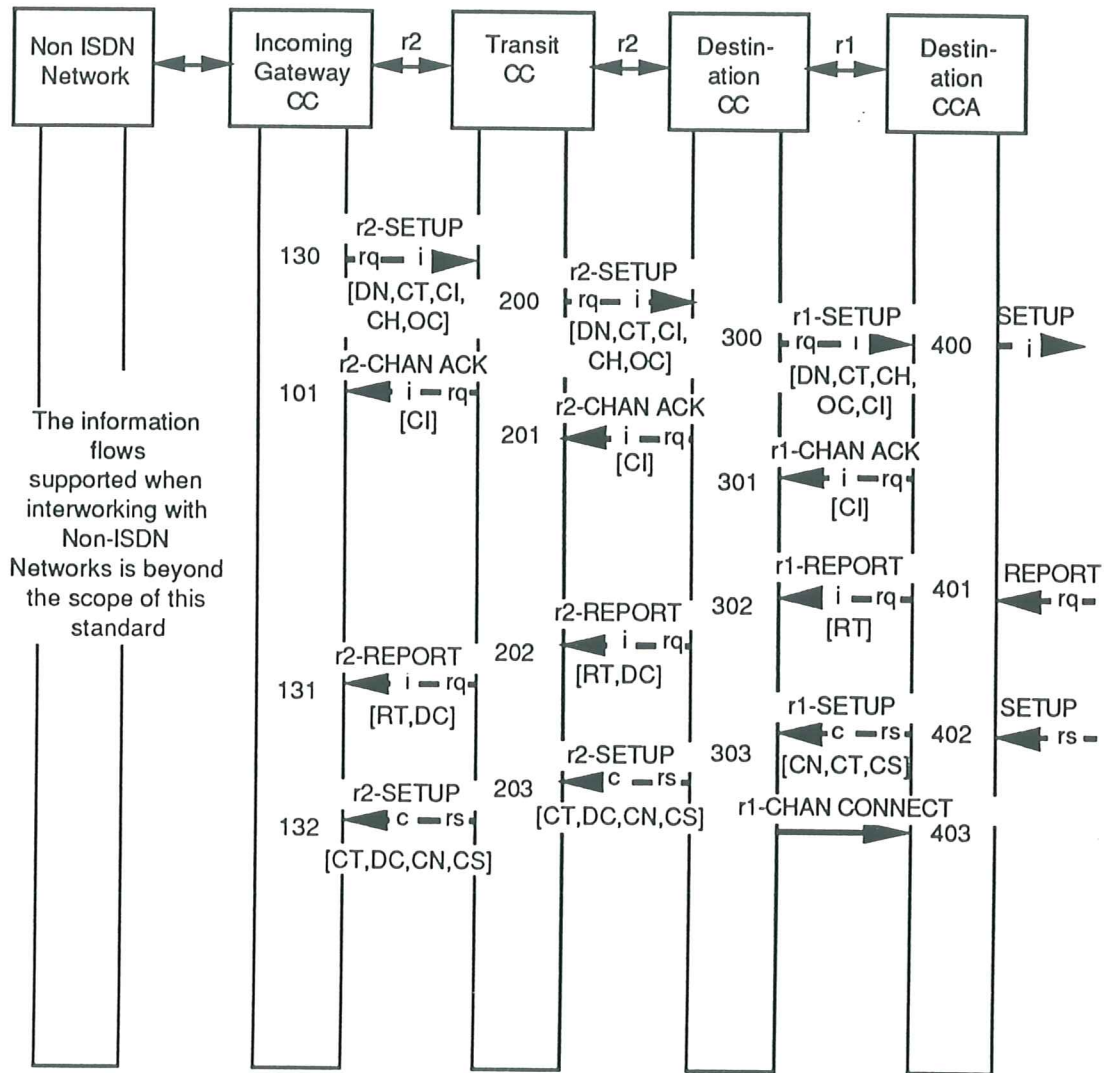
NOTE 104

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

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

15.6 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.



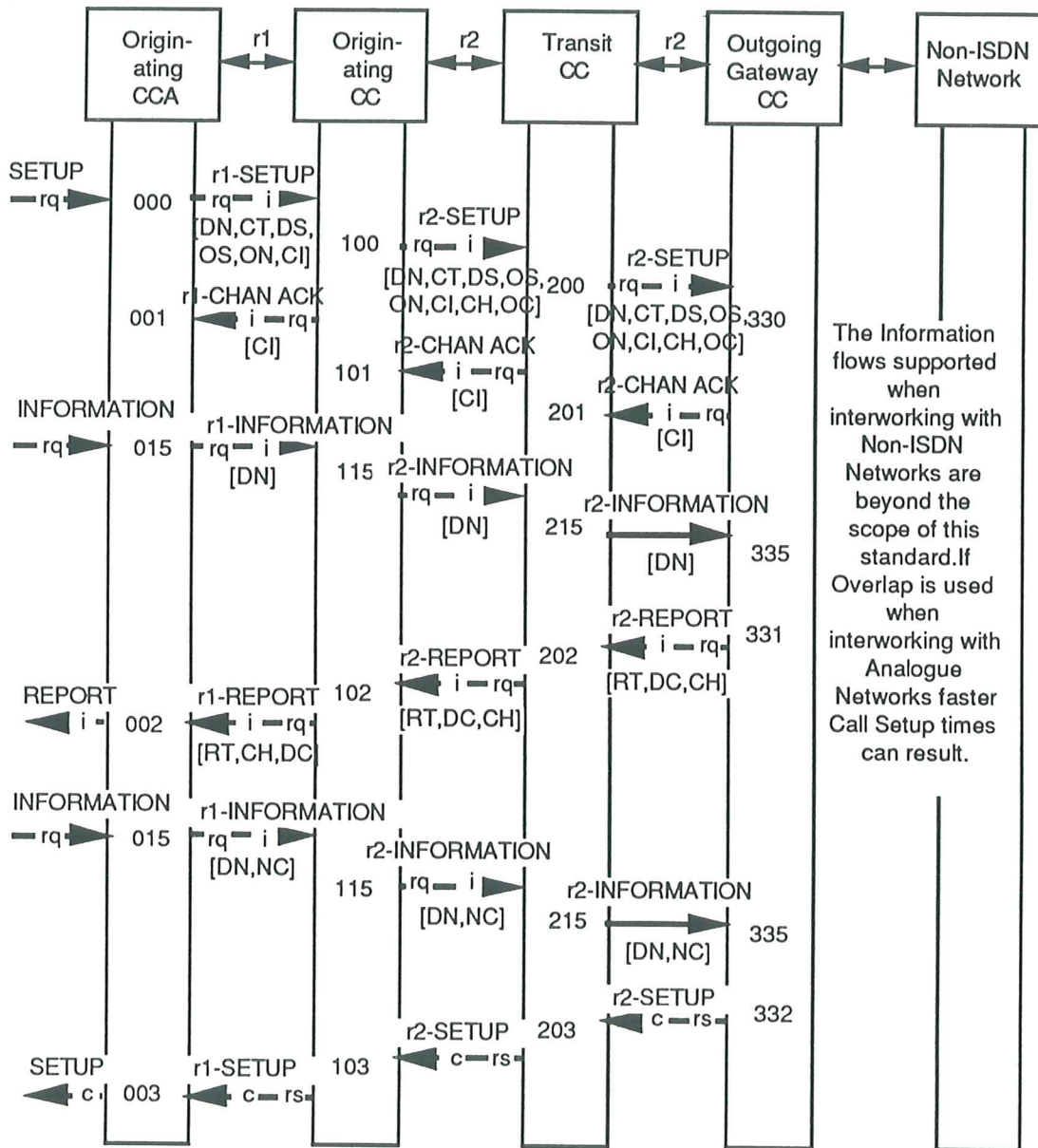
Legend

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

Figure 10 - Incoming interworking with a non-ISDN

15.8 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

15.10 Incoming interworking with a public ISDN

- 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 111

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

NOTE 112

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.

16.1 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.

16.1.1 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.

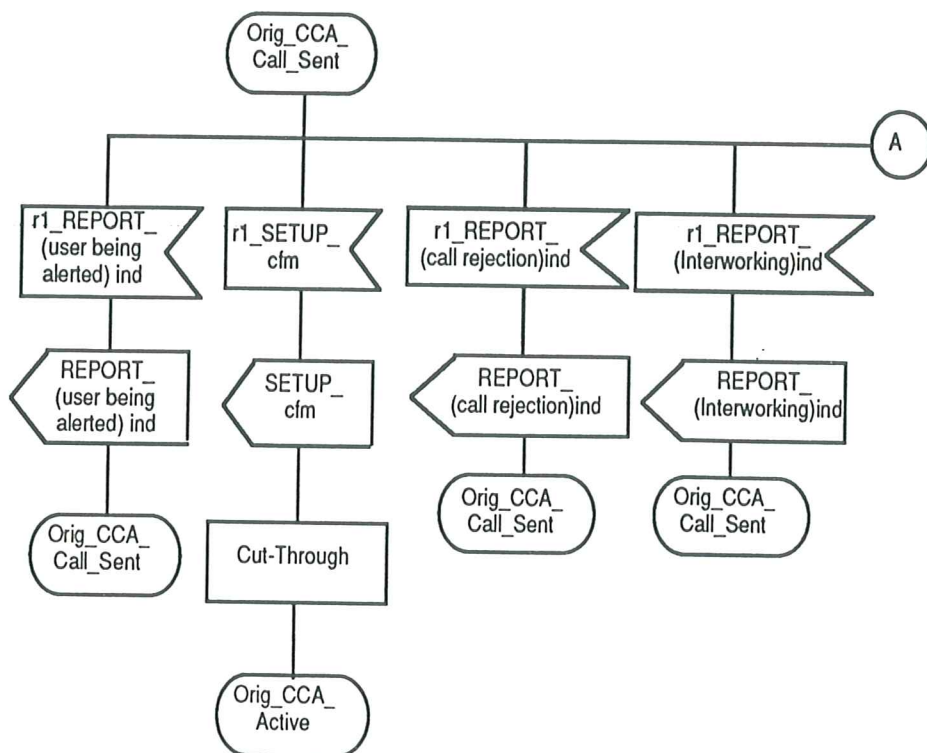


Figure 18 - Stage 2 SDL diagram for Originating CCA functional entity (Part 3)

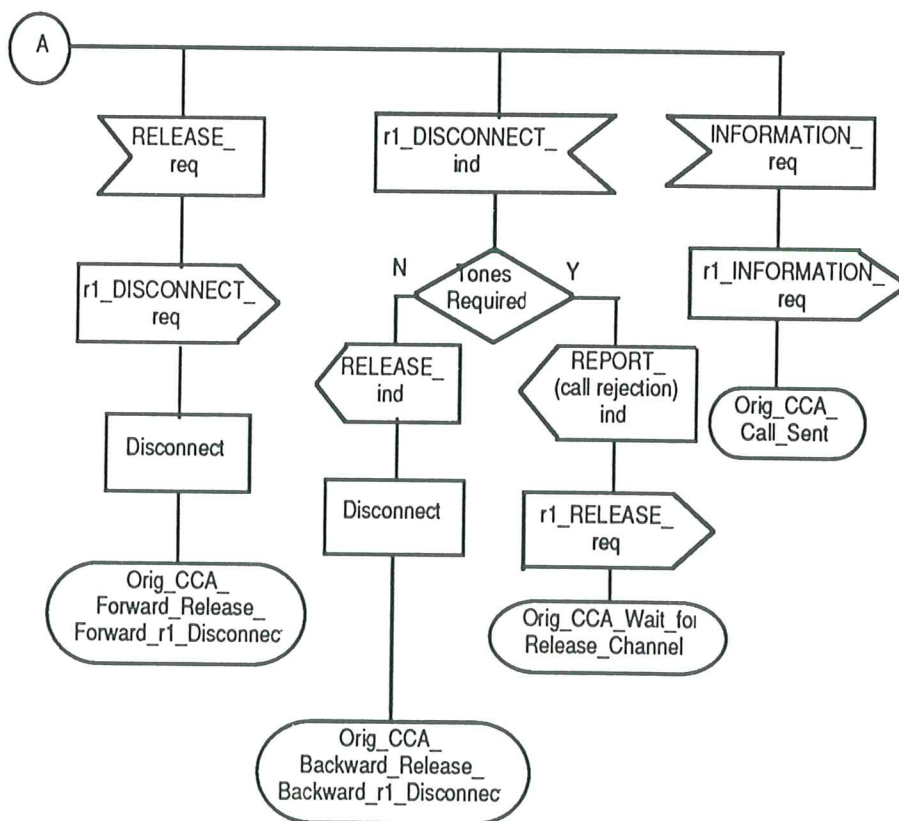


Figure 19 - Stage 2 SDL diagram for Originating CCA functional entity (Part 4)

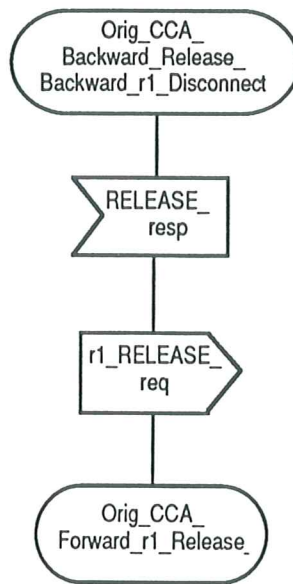


Figure 22 - Stage 2 SDL diagram for Originating CCA functional entity (Part 7)

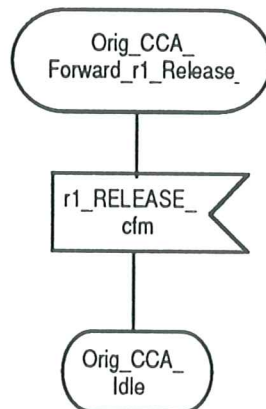


Figure 23 - Stage 2 SDL diagram for Originating CCA functional entity (Part 8)

16.2 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.

16.2.1 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.

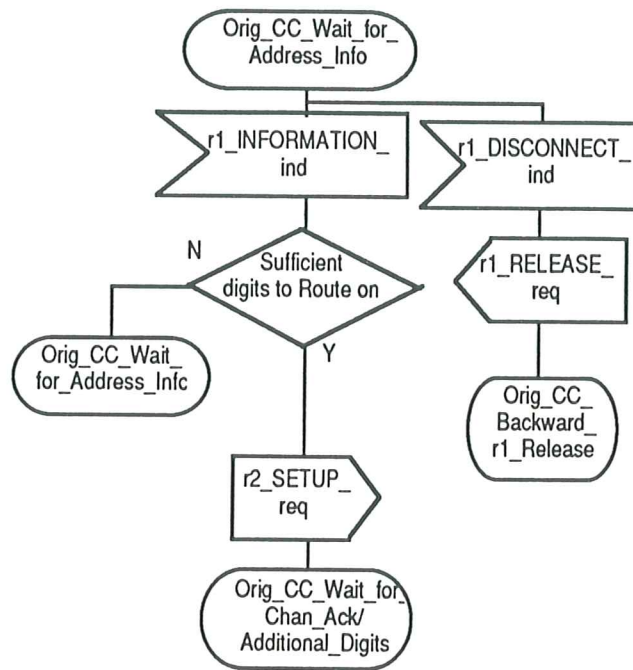
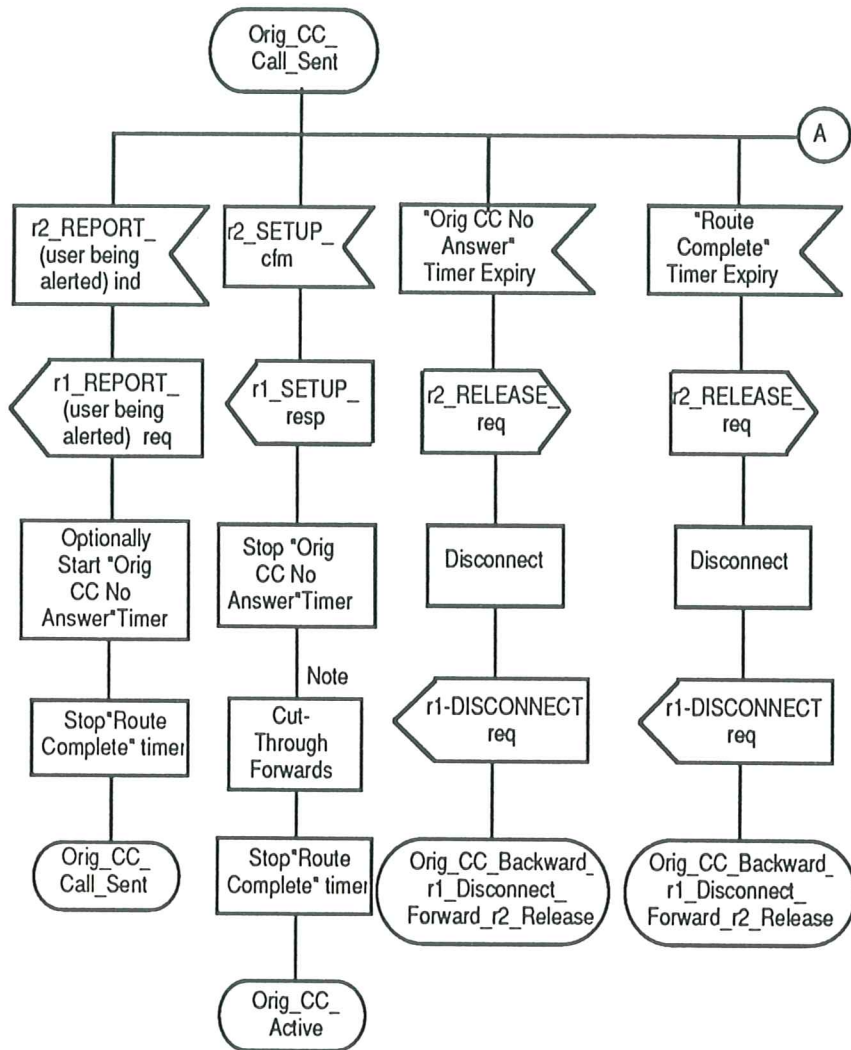


Figure 27 - Stage 2 SDL diagram for Originating CC functional entity (Part 2)



NOTE 115

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)

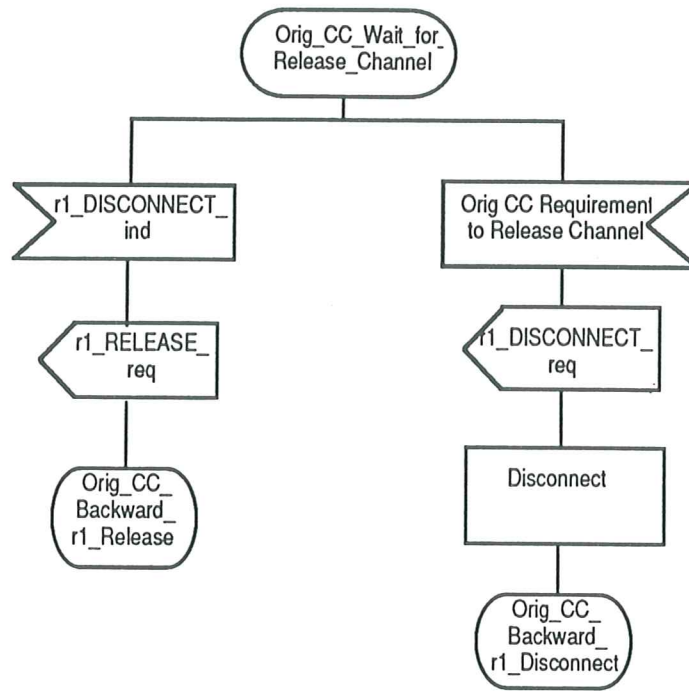


Figure 31 - Stage 2 SDL diagram for Originating CC functional entity (Part 6)

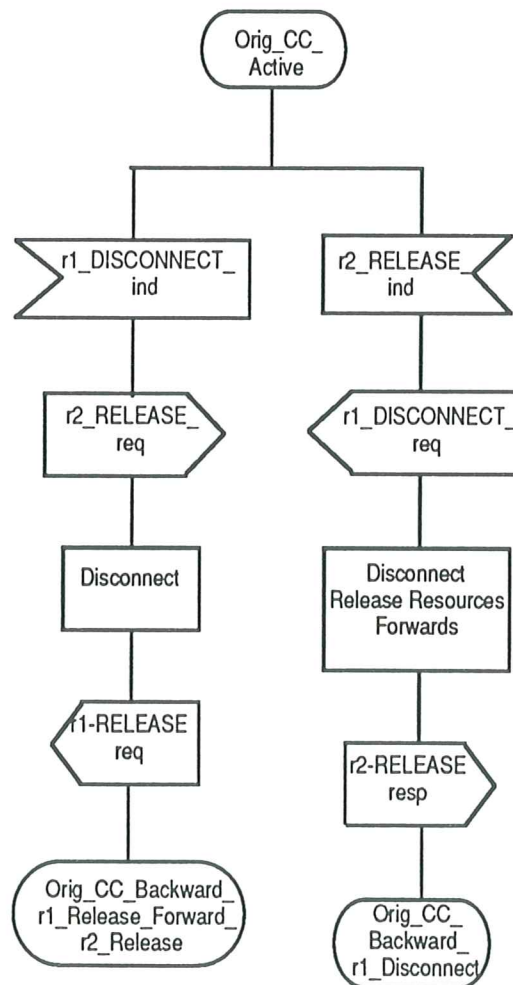


Figure 32 - Stage 2 SDL diagram for Originating CC functional entity (Part 7)

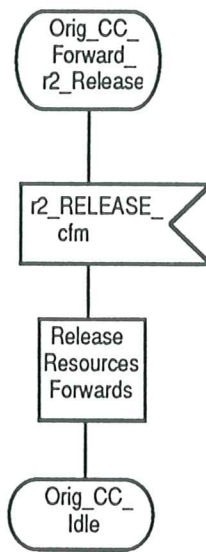


Figure 35 - Stage 2 SDL diagram for Originating CC functional entity (Part 10)

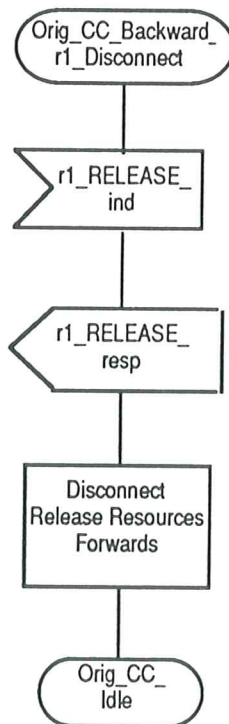


Figure 36 - Stage 2 SDL diagram for Originating CC functional entity (Part 11)

16.3.2 Transit CC SDL diagrams

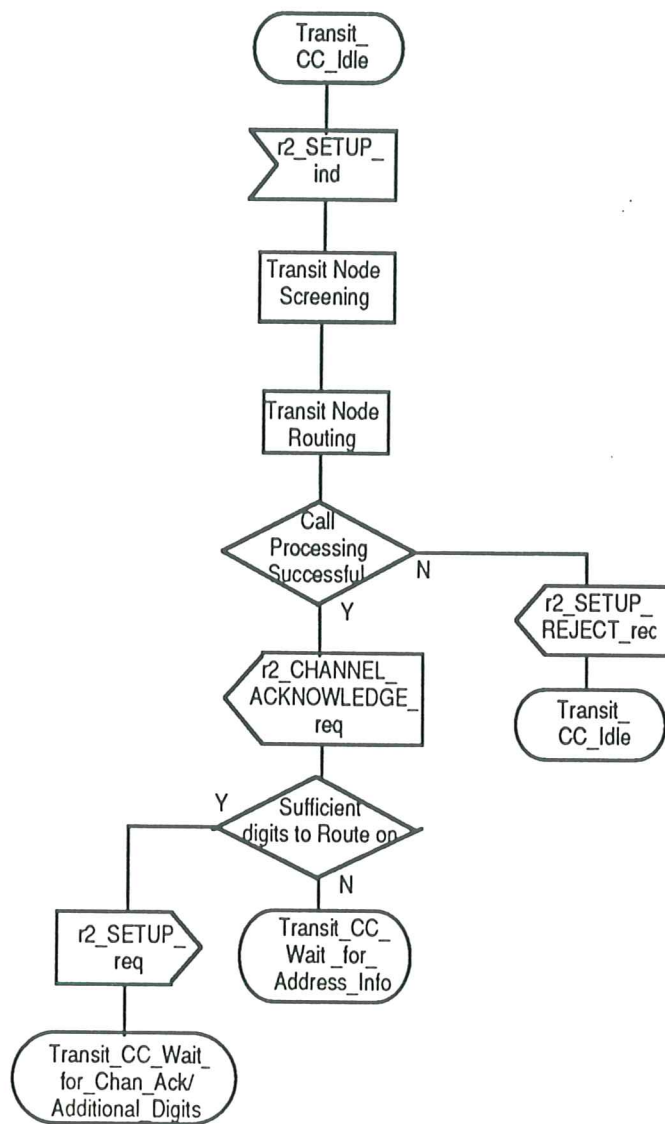
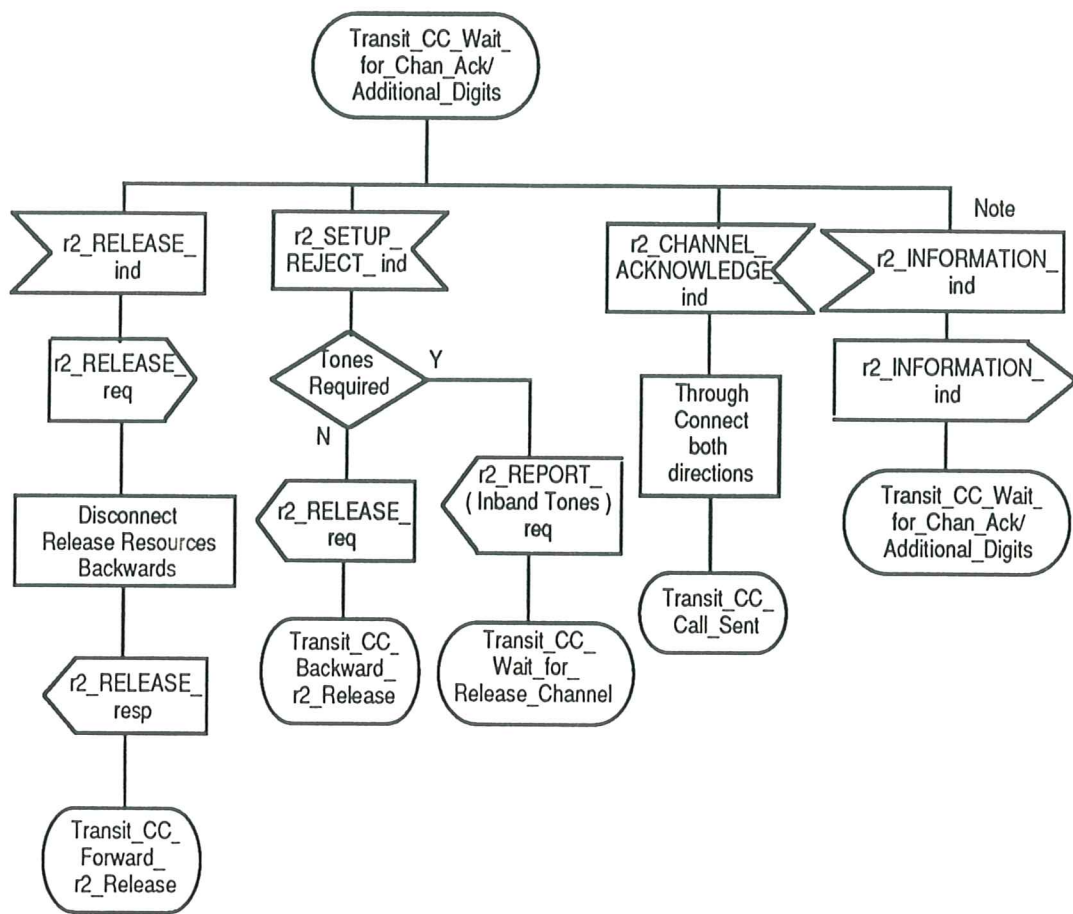


Figure 37 - Stage 2 SDL diagram for Transit CC functional entity (Part 1)



NOTE 117

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.

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

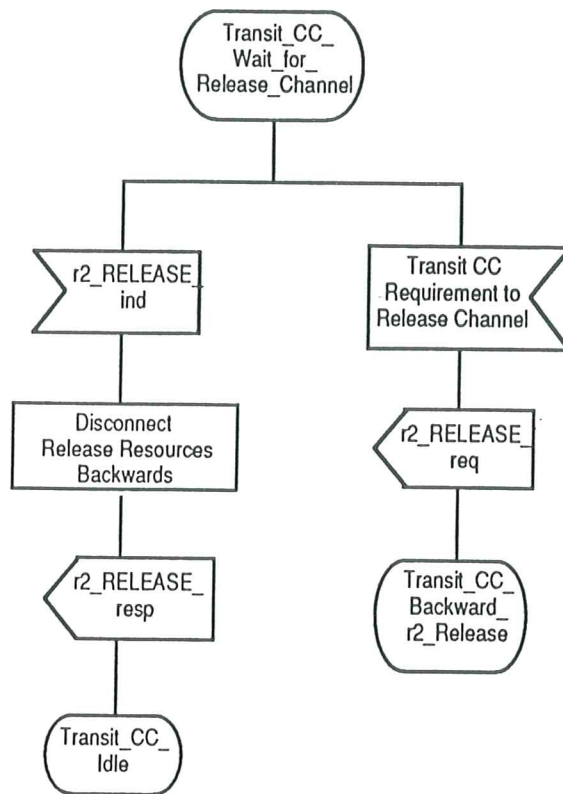


Figure 41 - Stage 2 SDL diagram for Transit CC functional entity (Part 5)

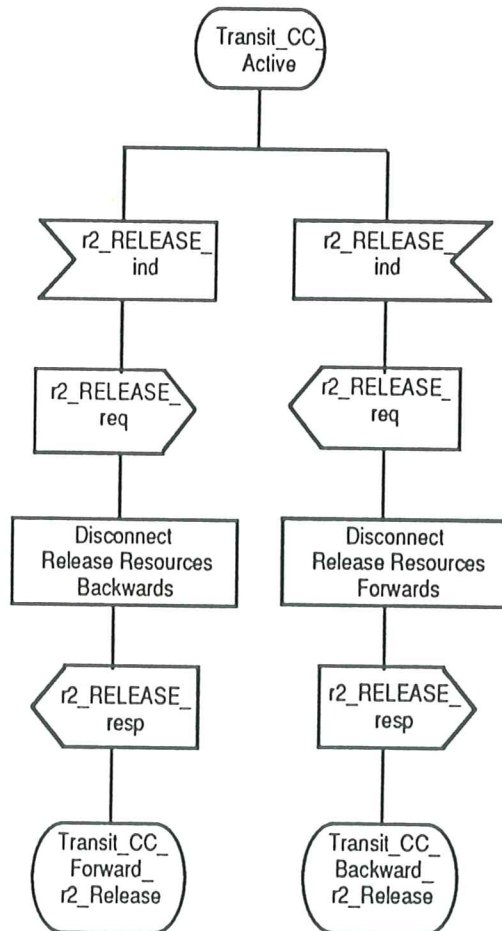


Figure 42 - Stage 2 SDL diagram for Transit CC functional entity (Part 6)

16.4 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 r1 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.

16.4.1 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_r1_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_r1_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_r1_Disconnect - Disconnection has been initiated, CC awaiting Destination CCA response.

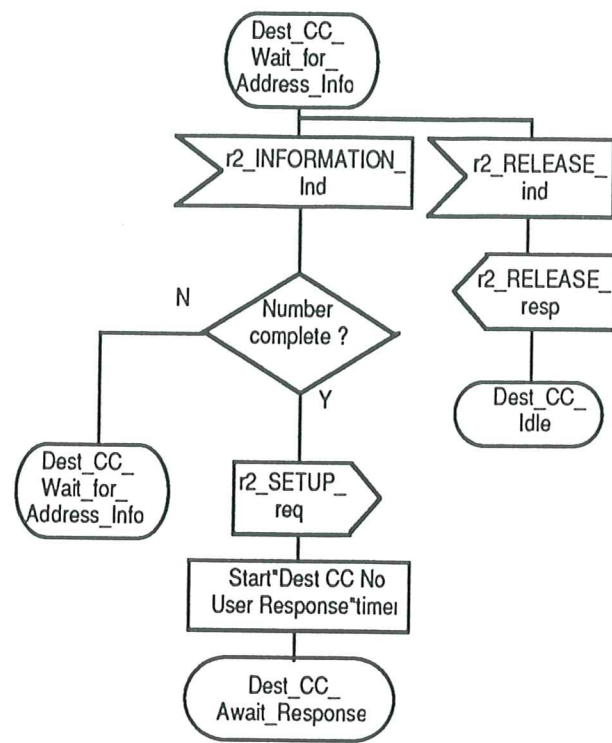
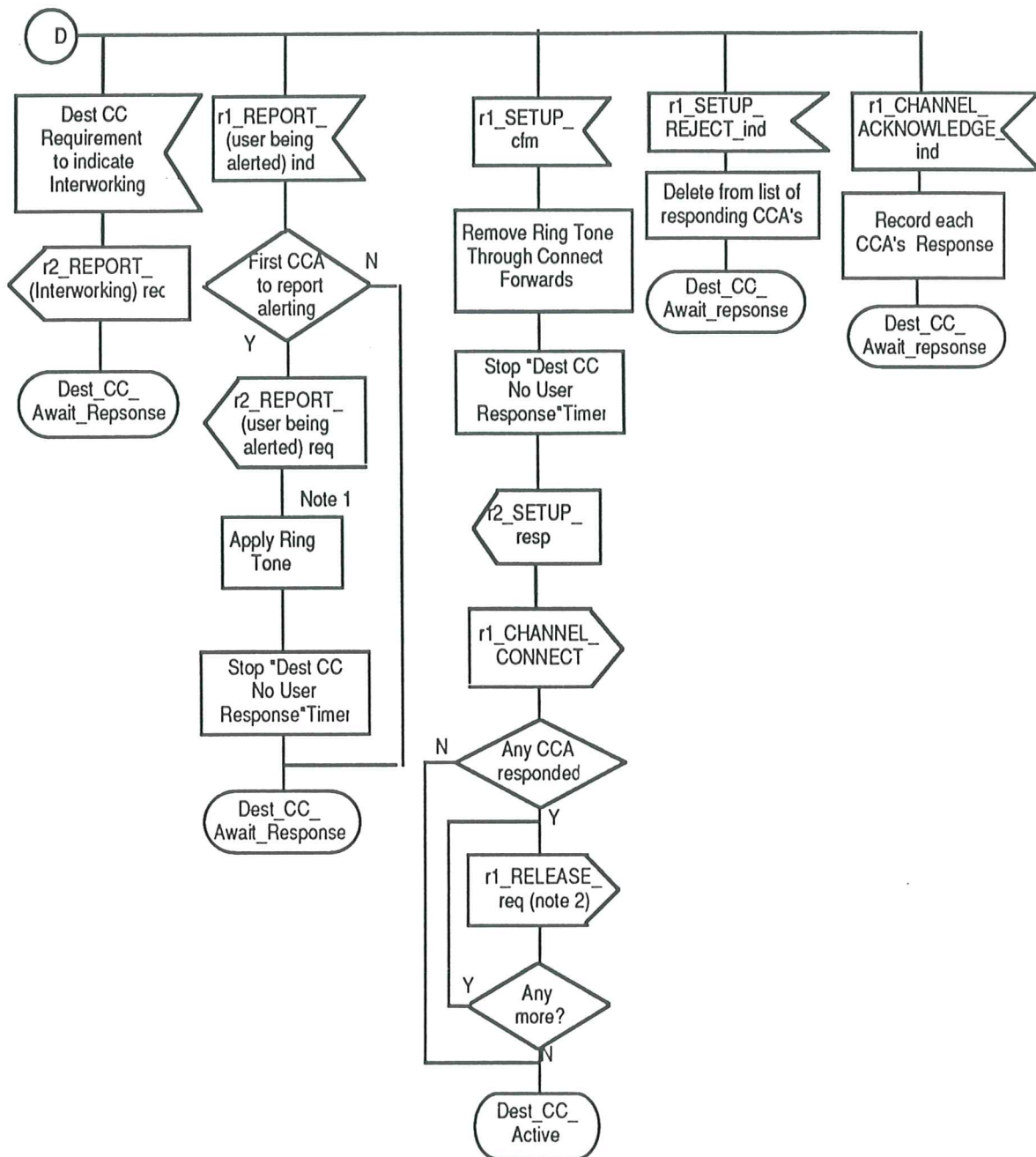


Figure 46 - Stage 2 SDL diagram for Destination CC functional entity (Part 2)



NOTE 123

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

NOTE 124

A separate state machine is generated (not shown) for each CCA to which an *r1_RELEASE_req* is sent. The separate state machine is cleared on receipt of an *r1_RELEASE_cfm*.

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

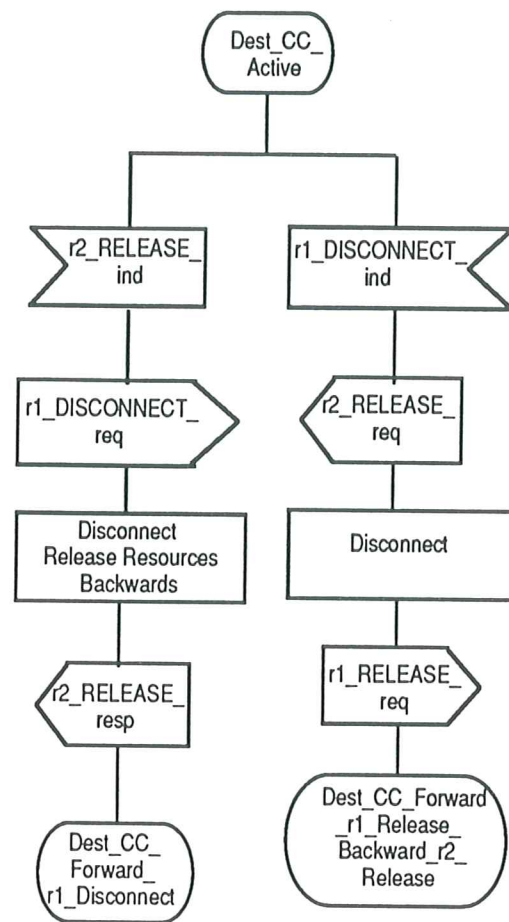


Figure 50 - Stage 2 SDL diagram for Destination CC functional entity (Part 6)

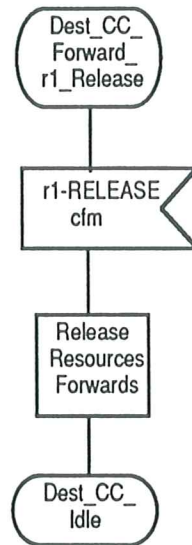


Figure 53 - Stage 2 SDL diagram for Destination CC functional entity (Part 9)

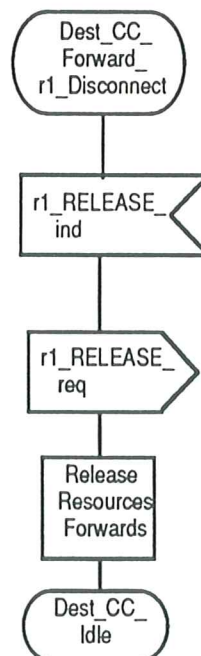


Figure 54 - Stage 2 SDL diagram for Destination CC functional entity (Part 10)

16.5.2 Destination CCA SDL diagrams

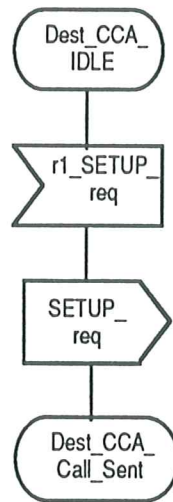


Figure 55 - Stage 2 SDL diagram for Destination CCA functional entity (Part 1)

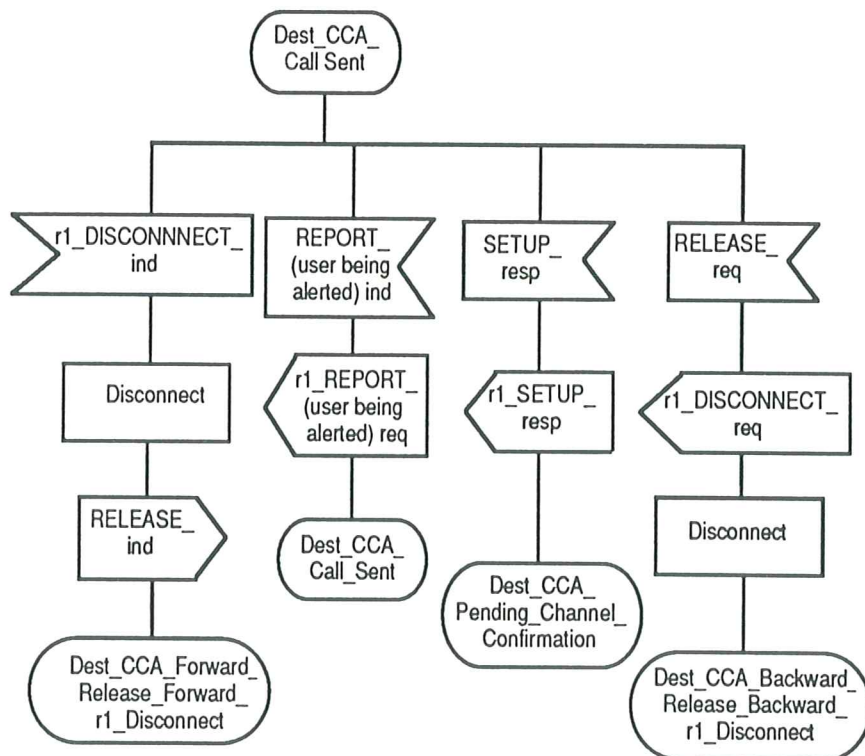


Figure 56 - Stage 2 SDL diagram for Destination CCA functional entity (Part 2)

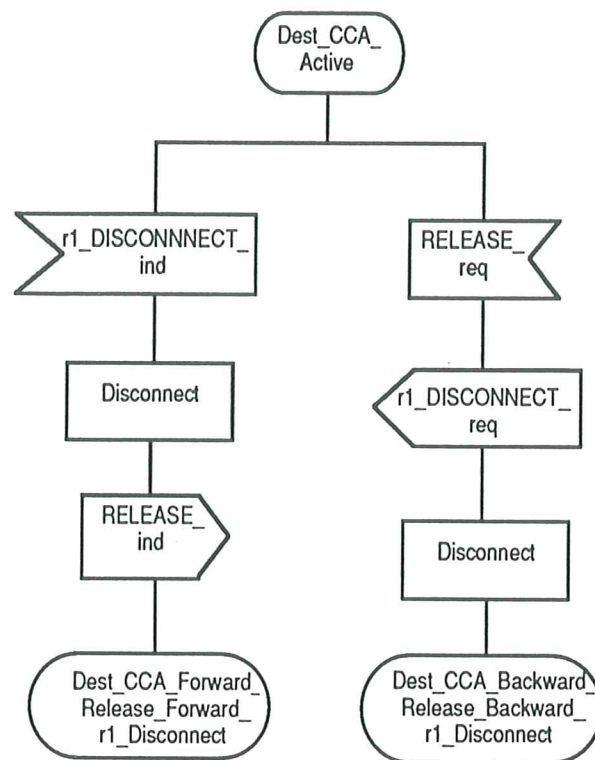


Figure 58 - Stage 2 SDL diagram for Destination CCA functional entity (Part 4)

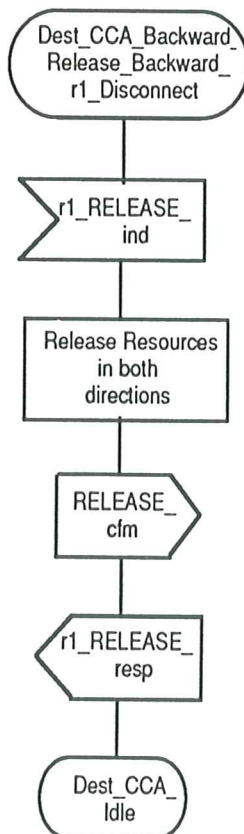


Figure 59 - Stage 2 SDL diagram for Destination CCA functional entity (Part 5)

17. ALLOCATION OF FUNCTIONAL ENTITIES TO PHYSICAL ENTITIES

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

Functional Entities		Scenarios					
1. Intra-PTN Call (note 3)	1.1	TE	PTNX — — — — (note 1) — — — — PTNX				TE
	1.2	TE	PTNX				TE
	1.3	TE	PTNX	PTNX — — — — (note 1) — — — — PTNX	PTNX	PTNX	TE
	(note 2) 1.4	TE	PTNX	PTNX		PTNX	TE
2. Outgoing Call to other network	2.1	TE	PTNX — — (note 1) — — PTNX				
	2.2	TE	PTNX		PTNX		
	(note 2) 2.3	TE	PTNX	PTNX	PTNX		
3. Incoming Call from other network	3.1					PTNX — — (note 1) — — PTNX	TE
	3.2					PTNX	TE
	(note 2) 3.3					PTNX	TE
4. PTN Transit Call	4.1			PTNX (note 1) PTNX			
	4.2			PTNX	PTNX		
	(note 2) 4.3			PTNX	PTNX	PTNX	
	(note 2) 4.4			PTNX	PTNX	PTNX	

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 collocated

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)

Table 10. Allocation of FEs to physical entities

APPENDIX A

(informative)

RELATIONSHIP TO CORRESPONDING ETS STANDARDS / CCITT RECOMMENDATIONS

The circuit mode basic services for PTNs specified in this Standard complement and are compatible with the corresponding services for public ISDNs as specified by ETSI (ETS.....). There are no Stage 2 descriptions within ETSI for the circuit mode basic services for the public ISDNs. There is however a CCITT Rec. Q.71 (Blue Book). There are significant differences in the style and layout of this Standard in comparison with the corresponding ETSs and CCITT Recommendations. 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. ETSI has a separate Stage 1 ETS for each service.
3. This Standard specifies services at Stage 1 in line with OSI principles, by means of primitives transferred across service access points. ETSI Stage 1 specifications are in terms of information flows at the S/T and T reference points.
4. Subaddressing is an optional part of basic services in a PTN, whereas ETSI treats it as a supplementary service.
5. Multiple subscriber number is an optional part of basic services in a PTN, whereas ETSI treats 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 user to the network of its 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. Those supplementary services are concerned only with the presentation of the number from the network to the served PTN user.
9. This Standard has been written in accordance with ETSI presentation rules for Standards, and as a result there are considerable deviations from the style and layout of the corresponding ETSs, which were not changed in style from Recommendations to Standards until after this Standard was drafted.
10. For the Stage 2 description there is no comparable ETSI Standard; comparison is only possible with CCITT Rec. Q.71. This is difficult because CCITT Rec. Q.71 is not written as a Standard. The PTN Basic Call at Stage 2 is a compatible superset of the Basic Call within a public ISDN as defined in CCITT Rec. Q.71, and so there are extra information flows in the Basic Call of the PTN; this however does not affect the interworking of the Basic Services between the PTN and the public ISDNs.

APPENDIX B

(informative)

LIST OF ACRONYMS

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

APPENDIX C

(informative)

REFERENCES

ECMA Standard and Technical Report

- ECMA TR/44 An Architectural Framework for Private Networks
- ECMA ... Specification, Functional model and information flows for Identification supplementary services in Private Telecommunication Networks (ISSD)

ETSI

- ETS - uuuuu Integrated Services Digital Network (ISDN) Direct Dialling In (DDI) supplementary service Functional Capabilities and Information Flows
- ETS - vvvvv Integrated Services Digital Network (ISDN) Calling Line Identification Presentation (CLIP) supplementary service Functional Capabilities and Information Flows
- ETS - wwwww Integrated Services Digital Network (ISDN) Connected Line Identification Presentation (COLP) supplementary service Functional Capabilities and Information Flows
- ETS - sssss Integrated Services Digital Network (ISDN) Subaddressing supplementary service Functional Capabilities and Information Flows

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.75 Packet-switched Signalling Systems between Public Networks providing Data Transmission services
- X.31 Support of Packet Mode Terminal Equipment by an ISDN

