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**Technical Report TRQ.2700: Requirements for  
signalling in access networks that support BICC**

ITU-T Q-series Recommendations – Supplement 39

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## **Supplement 39 to ITU-T Q-series Recommendations**

### **Technical Report TRQ.2700: Requirements for signalling in access networks that support BICC**

#### **Summary**

This Supplement to ITU-T Q-Series Recommendations is a technical report on the procedures, information flows and information elements needed for signalling in Access Networks that support Bearer Independent Call Control (BICC). It defines the requirements for signalling to control bearer connections and to relay call-related information across the Access Network.

#### **Source**

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### Technical Report TRQ.2700: Requirements for signalling in access networks that support BICC

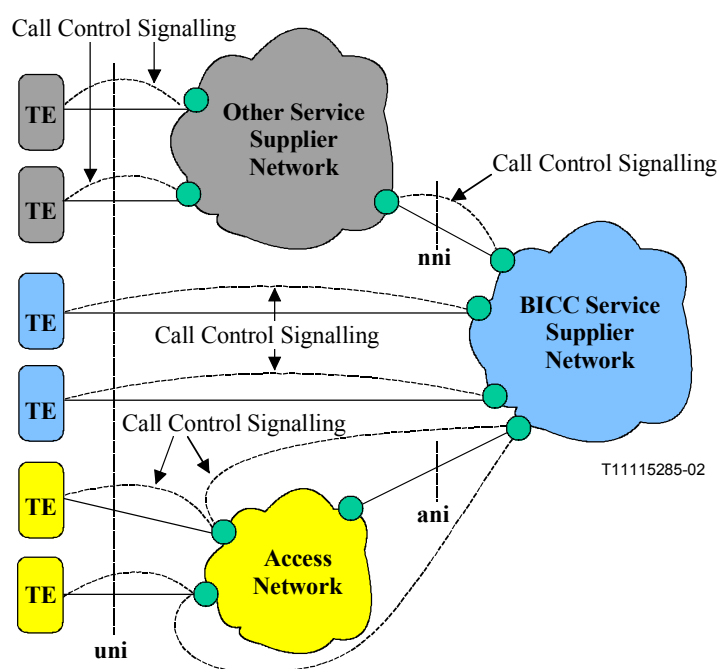
#### 1 Scope of signalling requirements for access networks that support BICC

BICC Access provides functional reference model, signalling flows, and requirements for signalling in Access Networks that support Bearer Independent Call Control.

Within the scope of the BICC access requirement are three types of access configurations, as seen from the perspective of the BICC network. These access configurations are:

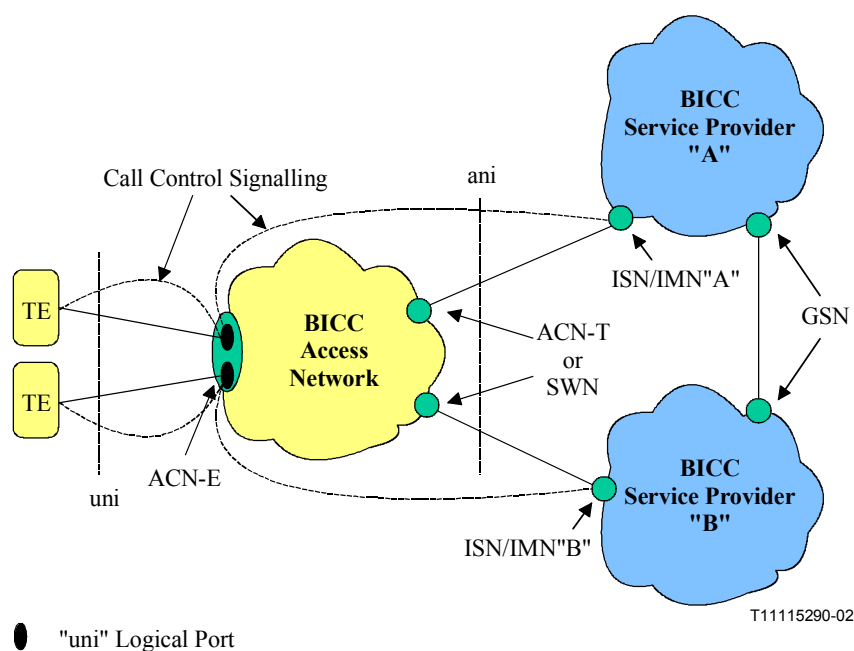
- 1) Direct User Network Interface Configuration (BICC connected to the uni);
- 2) Network to Network Interface Configuration (BICC connected to the nni); and
- 3) Indirect User Network Interface Configuration (BICC connected to the Access Network Interface (ani)).

These three access configurations are illustrated in Figure 1. Practical examples of access configuration 1 are DSS1 and analogue loop access to BICC. Practical examples of access configuration 2 are ISUP and SIP access to BICC, while practical examples of access configuration 3 are DSS1 and analogue loop access to BICC across a packet interface over Digital Subscriber Line (DSL) or Hybrid Fiber Coax (HFC) backbone.



**Figure 1 – Network topologies and reference points for BICC access**

This Supplement provides functional reference model, signalling flows, and requirements for the support of Access Networks in Bearer Independent Call Control. It extends Bearer Independent Call Control across the Access Network, which extends from the local serving node to the location where terminal equipment connects to the network.



**Figure 2 – BICC access network and scope**

In Figure 2, the two terminals representing two different users each served by a different BICC Service Provider. These two users are connected to the same ACN-E via separate Logical Ports. In Figure 2, the BICC Service Providers are attached to the BICC Access Network via separate Access Concentration Nodes – Transit (ACN-Ts) or Switching Nodes (SWNs). A single ACN-T or a single SWN could also be used. If an ACN-T is used, a bearer transport technology could be used within the Access Network that is different from the bearer transport technology used between the ACN-T and the BICC Service Provider Network.

Even though two independent BICC Service Providers are shown in Figure 1, the importance is that more than a single ISN/IMN should be allowed to have a signalling and transport relationship with an ACN-E. These ISN/IMNs may be in a single Service Provider Network domain or in separate Service Provider domains. A single User, however, would be associated with a single ISN/IMN.

The initial high-level requirements for the BICC access network include the following capabilities. Other capabilities such as transport over IP bearers are not precluded if they are already described for the BICC core network.

- 1) The following call control protocols shall be supported:
  - Analogue Loop,
  - DSS1,
  - DSS2.
- 2) The following bearer control protocols shall be supported:
  - DSS2 as specified in ITU-T Rec. Q.2931,
  - AAL Type 2 Signalling as specified in ITU-T Rec. Q.2630.2,
  - IPBCP as specified in ITU-T Rec. Q.1970.

Including other bearer protocols that may be supported by the BICC protocol.

- 3) Interworking with the following protocols shall be supported:
  - V5.1, V5.2.

## 2 References

The following is a list of informative references for Access Network signalling:

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- [6] ITU-T Recommendation Q.761 (1999), *Signalling System No. 7 – ISDN user part functional description*.
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- [14] ITU-T Recommendation Q.704 (1996), *Signalling network functions and messages*.
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- [22] ITU-T Recommendation Q.1902.3 (2001), *Bearer Independent Call Control protocol (Capability Set 2) and Signalling System No. 7 ISDN user part: Formats and codes*.

- [23] ITU-T Recommendation Q.1902.4 (2001), *Bearer Independent Call Control protocol (Capability Set 2): Basic call procedures.*
- [24] ITU-T Recommendation Q.1902.5 (2001), *Bearer Independent Call Control protocol (Capability Set 2): Exceptions to the application transport mechanism in the context of BICC.*
- [25] ITU-T Recommendation Q.1902.6 (2001), *Bearer Independent Call Control protocol (Capability Set 2): Generic signalling procedures for the support of the ISDN user part supplementary services and for bearer redirection.*
- [26] ITU-T Recommendation Q.2140 (1995), *B-ISDN ATM adaptation layer – Service specific coordination function for signalling at the network node interface (SSCF at NNI).*
- [27] ITU-T Recommendation Q.2150.0 (2001), *Generic signalling transport service.*
- [28] ITU-T Recommendation Q.2150.1 (2001), *Signalling transport converter on MTP3 and MTP3b.*
- [29] ITU-T Recommendation Q.2150.2 (2001), *Signalling transport converter on SSCOP and SSCOPMCE.*
- [30] ITU-T Recommendation Q.2210 (1996), *Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140.*
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- [34] ITU-T Recommendation Q.2932.1 (1996), *Digital subscriber signalling system No. 2 – Generic functional protocol: Core functions.*
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- [39] ITU-T Q-series Recommendations – Supplement 31 (2000), Technical Report TRQ.2141.0: *Signalling requirements for the support of narrowband services over broadband transport technologies – Capability set 2 (CS-2).*
- [40] ITU-T Q-series Recommendations – Supplement 32 (2000), Technical Report TRQ.2141.1: *Signalling requirements for the support of narrowband services via broadband transport technologies.*

## 3 Definitions

### 3.1 Definitions of Signalling Associations

The following signalling associations are applied in this Supplement.

**3.1.1 Call Control Signalling Association (CSM to CSM):** Is used to establish, modify, and release calls and services associated with those calls between the ACN-E and the ISN/IMN-A.

**3.1.2 Access Control Signalling Association (ACF-E to ACF-N):** Is used to insert, modify, and release bearer associations between the ACN-E and the ISN-A or between the ACN-E and the adjacent SN on the network side in case of the IMN configuration.

**3.1.3 Remote Media Control Signalling Association (RMCF-E to RMCF-N):** Is used to insert, modify, and remove tones and signals at the user port in ACN-E, and to respond to events detected at the user port in ACN-E that are associated with these tones and signals.

**3.1.4 Bearer Control Signalling Association (BCF to BCF):** Is used to establish, modify, and release the actual bearer transport connection between BIWFs that is controlled through the BCF in ACN-E and a BCF elsewhere in the BICC network.

### 3.2 Functional Model Definitions

Definitions of the items contained in the composite functional model are as follows:

**3.2.1 Access Concentration Node (ACN):** A functional entity that provides the interface between access facilities, such as analogue loop or ISDN, and the BICC Access Network. This functional entity may contain one or more call state relay models (CSM-R), at least one access control function (ACF), at least one remote media control function (RMCF), and one or more interworking functions (BIWFs) that contain Bearer Control Functions (BCFs). The CSM-R, RMCF, and BIWF interact with the access facilities and with their peers in the BICC Access Network or BICC broadband backbone network. The ACF interacts with its peers in the BICC Access Network. ACNs interact with other ACNs, within their own BICC Access Network domain, as well as with terminal equipment and with ISN/IMNs in the BICC broadband backbone network. Multiple bearer control relay functions BCF-Rs in an ACN's BIWF interact with the BCFs contained in other BIWF entities within the BICC access and BICC broadband backbone networks. The ACN-E is not bounded with respect to its physical location in this Supplement. It may be located at the customer premises or within the access facilities operated by the network service provider.

**3.2.2 Access Control Function (ACF):** The ACF is a functional entity which provides a neutral binding of multiple call control protocols to multiple bearer control protocols. It binds the access concentration node to the ISN/IMN across multiple bearer switching nodes. Three types of ACFs are used in the access network functional model: ACF-E, ACF-N, and ACF-T.

- The Access Control Edge Function (ACF-E) mediates between call control and bearer control to provide the requested resources for the call. It interacts with the ACF-N in ISN/IMN-A to obtain the appropriate access network resources under the control of ISN/IMN-A.
- The Access Control Nodal Function (ACF-N) mediates between call control and bearer control to provide the requested resources for the call. It interacts with the ACF-E in ACN-E and ACF-T to assign appropriate access network resources for the call.
- The Access Control Transit Function (ACF-T) allows the ISN/IMN to manage two different types of bearers across the access network. It interacts with the ACF-N in ISN/IMN-A to obtain the appropriate access network resources under the control of ISN/IMN-A. For example, ISN/IMN-A may designate an AAL 2 bearer between ACN-E and ACN-T, while it designates an IP bearer between ACN-T and a distant BIWF.

**3.2.3 Backbone Network Connection (BNC):** Represents the edge-to-edge transport connection within the backbone network, consisting of one or more Backbone Network Connection Links (BNCL). The Backbone Network Connection represents a segment of the end to end Network Bearer Connection (NBC).

**3.2.4 Backbone Network Connection Link (BNCL):** Represents the transport facility between two adjacent backbone network entities containing a bearer control function.

**3.2.5 Bearer Control Function (BCF):** Note that three types of BCFs are illustrated in the access network functional model: BCF-E, BCF-R and BCF-N.

- The Bearer Control Edge Function (BCF-E), provides the control of the bearer switching function and relays the bearer control signalling requests to next BCF in order to complete the edge-to-edge backbone network connection.
- The Bearer Control Relay Function (BCF-R) provides the control of the bearer switching function and relays the bearer control signalling requests to next BCF in order to complete the edge-to-edge backbone network connection
- The Bearer Control Nodal Function (BCF-N) provides the control of the bearer switching function, the communication capability with its associated call service function (CSF), and the signalling capability necessary to establish and release the backbone network connection to its peer (BCF-N).

**3.2.6 Bearer Control Segment (BCS):** Represents the signalling relationship between two adjacent Bearer Control Functional entities (BCF).

**3.2.7 Bearer Interworking Function (BIWF):** A functional entity that provides bearer control and media mapping/switching functions within the scope of a Serving Node (ISN) or Access Concentration Node (ACN). A BIWF contains one Bearer Control Nodal Function (BCF-N), or one Bearer Control Edge Function (BCF-E) and one or more MCFs and MMSFs, and is functionally equivalent to a Media Gateway that incorporates bearer control. See General Requirements documents for the definitions for MCF and MMSF.

**3.2.8 Call Service Function (CSF):** The CSF provides the service control nodal actions associated with the access service by interworking with access call control signalling and Bearer Independent Call Control (BICC) signalling. It signals to its peer (CSF) in the BICC network, or an ACN-E in the BICC Access Network, the characteristics of the call. It invokes, using the Call State Model (CSM), the Access Control Nodal Functions (ACF-N) and Remote Media Control Nodal Functions (RMCF-N) necessary to transport the call control signalling across the BICC broadband access network. It also invokes the Bearer Control Nodal Functions (BCF-N) necessary to transport the narrowband bearer service across the BICC broadband access network.

**3.2.9 Call State Model (CSM):** Note that two types of CSMs are illustrated in the above functional model, CSM-N, CSM-R.

- The Call State Model (CSM-N) provides the service control nodal actions associated with the access service by interworking with access call control signalling and Bearer Independent Call Control (BICC) signalling. It signals to its peer (CSM-N) the characteristics of the call, and invokes the Access Control Nodal Functions (ACF-N) and Remote Media Control Nodal Functions (RMCF-N) necessary to transport the call control signalling across the broadband backbone network. It also invokes the Bearer Control Nodal Functions (BCF-N) necessary to transport the narrowband bearer service across the broadband backbone network.
- The Call State Relay Model (CSM-R) provides the service transit actions necessary to establish and maintain a backbone network call and its associated bearer by relaying signalling between CSM-N and the terminal equipment.

**3.2.10 Interface Mediation Node (IMN):** A functional entity that provides the interface with the access network. This functional entity contains one or more call service nodal functions (CSF-N), the access control nodal function (ACF-N) and the remote media control nodal function (RMCF-N). The IMN has no direct control of an own bearer interworking function (BIWF) but controls remotely the BIWF in the access network via the RMCF-N and the ACF-N. The BIWF in the access network directly interacts with its peers within the broadband backbone network.

**3.2.11 Interface Serving Node (ISN):** A functional entity that provides the interface with ISDN, access, and broadband backbone networks. This functional entity contains one or more call service nodal functions (CSF-N), and one or more interworking functions (BIWF) which interact with the ISDN network and its peers within the BICC access and BICC broadband backbone networks. The ISN also includes the access control nodal function (ACF-N) and the remote media control nodal function (RMCF-N).

**3.2.12 Network Bearer Connection (NBC):** Is used to transport a user selected bearer service between two or more Terminal Equipment (TE).

**3.2.13 Remote Media Control Function (RMCF):** The RMCF is a functional entity that originates and terminates media gateway control commands. It provides a horizontal linkage between the ISN/IMN and ACN-E for the purpose of conveying media gateway control information between the CSM in the ISN/IMN and the port dedicated to the terminal on ACN-E. Two types of RMCFs are illustrated in the access network functional model: RMCF-E and RMCF-N.

- The Remote Media Control Edge Function (RMCF-E) conveys media control commands to and from the port dedicated to the terminal in ACN-E. It interacts with the RMCF-N in ISN/IMN-A to convey commands to and from the CSF in ISN/IMN-A.
- The Remote Media Control Nodal Function (RMCF-N) converts call control messages received from the CSM into media control commands. It interacts with the RMCF-E in ACN-E to convey media control commands to and from the port dedicated to the terminal. It may also interact with the BIWF in ISN-A to convey media control commands to and from the access termination in the BIWF.

**3.2.14 Serving Node (SN):** A generic term referring to ISN or IMN in this Supplement.

**3.2.15 Terminal Equipment (TE):** Represents the customer's access equipment used to request and terminate network associated connectivity services.

### **3.3 Definition of Signalling Flow Objects**

The following objects are the signalling objects to be carried in the information flow procedure definitions. These objects will be used in the set of information flows contained in this Supplement.

**3.3.1 Access Control Association Identifier (ACA-ID):** Is an information object that is unique between two ACF signalling entities.

**3.3.2 ACN Address:** A unique identifier within the domain of an ISN/IMN that references each ACN.

**3.3.3 Action ID:** Specifies the Access Control action to be performed.

**3.3.4 Bearer Control Segment ID (BCS-ID):** Identifies the signalling association between two logically adjacent bearer control entities.

**3.3.5 Bearer Control Unit Identifier (BCU-ID):** This signalling object uniquely identifies the BIWF control port and can be used to obtain the BIWF control address for vertical communications.

**3.3.6 Backbone Network Connect Characteristics (BNC Characteristics):** Identifies the selected BNC type (i.e. AAL 1 or AAL 2).

**3.3.7 Backbone Network Connection ID (BNC-ID):** Identifies the signalling association between the BCF-N in the ISN or the BCF in the adjacent SN on the network side in case of the IMN configuration and the BCF in the Access Concentration Node (ACN). This signalling object generically equates to the Virtual Channel Connection Identifier (VCCI) if an ATM Virtual Channel connection is established between ISNs or an AAL Type 2 Connection Identifier if an AAL Type 2 connection is established between ISNs. This identifier represents the relationship between paired BNCs.

**3.3.8 Backbone Network Connection Link ID (BNCL-ID):** Identifies the transport link between two ACNs, or between an ACN and a BIWF.

**3.3.9 bearer service characteristics:** This signalling object specifies the user specified bearer service that shall be provided between the requesting user and the terminating user. This signalling object is contained in the initial service request received from the requesting user and is carried within the initial service requests between access nodes and the terminating user. Example values are voiceband services, and circuit mode data.

**3.3.10 Called Party Address (Called-Party-Addr):** The address of the called user.

**3.3.11 Calling Party Address (Calling-Party-Addr):** The address of the calling user.

**3.3.12 Terminating Interworking Function Address (T-BIWF-Addr):** Identifies the address of the BCF-N within the terminating BIWF. At the bearer level similar to the called party address.

**3.3.13 Originating Interworking Function Address (O-BIWF-Addr):** Identifies the address of the BCF-N within the originating BIWF. At the bearer level similar to the calling party address.

**3.3.14 Connection-ID:** An indicator of the bearer resource being associated with the user at the "uni" side. The RMCF-E maps this value to the Logical Port Termination being monitored and controlled by the ISN/IMN.

**3.3.15 connection group identifier:** An indication sent by the ISN/IMN to the BCF that uniquely identifies a group of bearer resources within the BICC network that are dedicated to a specific purpose, e.g. private facilities dedicated to a customer.

**3.3.16 ISN/IMN address:** A unique identifier for each ISN/IMN in the BICC access and BICC broadband backbone network.

**3.3.17 logical port-ID:** An indication that designates the group of bearer terminations, and signalling associations contained within a "uni" interface.

**3.3.18 port operation:** The ISN/IMN to RMCF command to be executed on the termination.

**3.3.19 port event:** The event detected by the termination.

**3.3.20 signalling message:** The out-band signalling message between the ISN/IMN and the CSM-R.

**3.3.21 user ID:** A unique identifier within the domain of all ACNs and all ISN/IMNs of the user of the signalling association.

## **4 Abbreviations**

This Supplement uses the following abbreviations:

|       |                              |
|-------|------------------------------|
| AAL   | ATM Adaptation Layer         |
| ACA   | Access Control Association   |
| ACF   | Access Control Function      |
| ACF-E | Access Control Edge Function |

|        |   |
|--------|---|
| ACF-N  | Access Control Nodal Function                 |
| ACF-T  | Access Control Transit Function               |
| ACI    | Access Control Information                    |
| ACN-E  | Access Concentration Edge Node                |
| ACN-T  | Access Concentration Transit Node             |
| AN     | Access Network                                |
| ani    | access network interface                      |
| ANM    | Answer  |
| APM    | Application Transport Mechanism               |
| APP    | Application Transport Parameter               |
| ATM    | Asynchronous Transfer Mode                    |
| BC     | Bearer Control                                |
| BCF    | Bearer Control Function                       |
| BCF-E  | Bearer Control Edge Function                  |
| BCF-N  | Bearer Control Nodal Function                 |
| BCF-R  | Bearer Control Relay Function                 |
| BCS    | Bearer Control Segment                        |
| BCU-ID | Bearer Control Unit Identifier                |
| BICC   | Bearer Independent Call Control               |
| B-ISDN | Broadband Integrated Services Digital Network |
| BIWF   | Bearer Interworking Function                  |
| BNC    | Backbone Network Connection                   |
| BNCL   | Backbone Network Connection Link              |
| BRA    | ISDN Basic Rate Access                        |
| CBC    | Call Bearer Control                           |
| CC     | Call Control                                  |
| CMN    | Call Mediation Node                           |
| CSF    | Call Service Function                         |
| CSM    | Call State Model                              |
| CSM-N  | Call State Nodal Model                        |
| CSM-R  | Call State Relay Model                        |
| DSL    | Digital Subscriber Line                       |
| DSS1   | Digital Subscriber System No. 1               |
| DSS2   | Digital Subscriber System No. 2               |
| DTMF   | Dual Tone Multi-Frequency                     |
| FCS    | Frame Check Sequence                          |
| FE     | Functional Entity                             |

|          |  |
|----------|--|
| FSK      | Frequency Shift Keyed  |
| GSN      | Gateway Serving Node   |
| HDLC     | High-level Data Link Control   |
| HFC      | Hybrid Fiber Coax  |
| IAM      | Initial Address Message  |
| ID       | Identifier   |
| IE       | Information Element  |
| IMN      | Interface Mediation Node   |
| IP       | Internet Protocol  |
| IPBCP    | Internet Protocol Bearer Control Protocol  |
| ISDN     | Integrated Services Digital Network  |
| ISN      | Interface Serving Node   |
| ISUP     | ISDN User Part   |
| ITU-T    | International Telecommunication Union – Telecommunication Standardization Sector |
| kbit/s   | Kilobits per second  |
| LAPD     | Link Access Procedure on the D-channel   |
| LAPV5    | Link Access Protocol for the V5 Interface  |
| LAPV5-EF | LAPV5 Envelope Function sublayer   |
| LSP      | Label Switched Path  |
| MCF      | Media Control Function   |
| MF       | Multi-Frequency  |
| MFC      | Multi-Frequency Compelled  |
| MG       | Media Gateway  |
| MGC      | Media Gateway Controller   |
| MMSF     | Multi-Media Switching Function   |
| MPLS     | Multiprotocol Label Switching  |
| MTP      | Message Transfer Part  |
| NBC      | Network Bearer Connection  |
| nni      | network-to-network interface   |
| PABX     | Private Automatic Branch eXchange  |
| PL       | Permanent Line   |
| PRA      | ISDN Primary Rate Access   |
| PSTN     | Public Switched Telephone Network  |
| REL      | Release  |
| RLC      | Release Complete   |
| RMCF     | Remote Media Control Function  |

|          |  |
|----------|--|
| RMCF-E   | Remote Media Control Edge Function   |
| RMCF-N   | Remote Media Control Nodal Function  |
| RTP      | Real Time Protocol   |
| SAPI     | Service Access Point Identifier  |
| SCTP     | Stream Control Transmission Protocol   |
| SN       | Serving Node   |
| SSCF     | Service Specific Coordination Function   |
| SSCOP    | Service Specific Connection Oriented Protocol  |
| SSCOPMCE | Service Specific Connection Oriented Protocol in a Multi-link and Connectionless Environment |
| SWN      | Switching Node   |
| TE       | Terminal Equipment   |
| TEI      | Terminal Endpoint Identifier   |
| uni      | User to network interface  |
| V5       | Access Network (AN) Interface at The Digital Local Exchange                                  |
| VCCI     | Virtual Channel Connection Identifier  |

## 5 Functional Reference Model

The scope of Access Network signalling is depicted in Figure 3. The Access Network extends from the Interface Serving Node or Interface Mediation Node to the Access Concentration Edge Node (ACN-E). The access network architecture in Figure 3 illustrates the terminal Access Concentration Nodes (ACNs), and Interface Serving Node (ISN) or Interface Mediation Node (IMN). Refer to clause 3 for the definition of each of the functional entities.

The Access Concentration Node Edge (ACN-E) function contains a CSM Relay (CSM-R) function, a Remote Media Control Edge (RMCF) function, an Access Control Edge (ACF-E) function, and one or more Bearer Interworking Functions (BIWFs) that contain Bearer Control Edge (BCF-Es) functions. The CSM-R in the ACN-E relays call control signalling between the terminal equipment (TE) and the CSM in ISN/IMN-A. The RMCF-E in ACN-E has a peer-to-peer relationship with the RMCF-N in ISN/IMN-A. The ACF-E in the ACN-E has a peer-to-peer relationship with the ACF-N in ISN/IMN-A. The BCF in the ACN-E has a peer-to-peer relationship with the BCF in ACN-1.

The Access Concentration Node Edge Function (ACN-E) performs four functions.

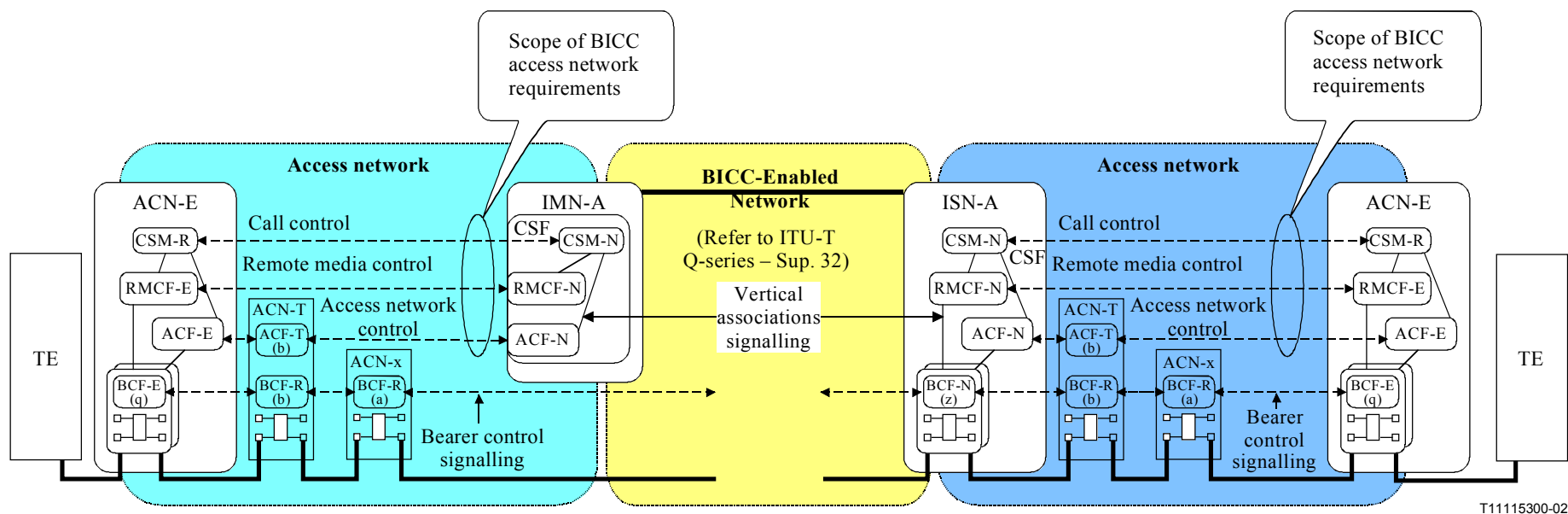
- 1) It relays, using CSM(R), call control signalling between the TE and the CSF-N in ISN/IMN-A with minimal interaction in the signalling flow. The CSM-R does not terminate signalling and does not provide services. It converts analogue loop signalling to/from a message-based protocol and forwards message-based protocols between the TE and the CSF-N.
- 2) It provides media gateway functionality using terminating and originating media gateway control commands via the Remote Media Control Edge Function (RMCF-E). The functions provided are:
  - Detect information sending tones, e.g. DTMF, MFC.
  - Generate information sending tones, e.g. DTMF, MFC.
  - Translate and apply the relevant signals and detect events at the TE. Insert, modify, and remove signals and respond to events associated with these signals.

- Optionally, generate audible tones as required.
- 3) It terminates and originates access control messages in ACF-E. The access control messages, at a minimum, are used to:
- manage concentration of channels within the ACN-E,
  - control the assignment of channels within the ACN-E.
- 4) It provides, using the Bearer Control Edge Function (BCF-E), the control of the bearer switching function and relays the bearer control signalling requests to the next BCF in order to complete the edge-to-edge backbone network connection.

The Access Concentration Nodes (ACN-x, ACN-w) perform the bearer switching function using the Bearer Control Relay Function (BCF-R). They provide the control of the bearer switching function and relay the bearer control signalling requests to the next BCF in order to complete the edge-to-edge backbone network connection.

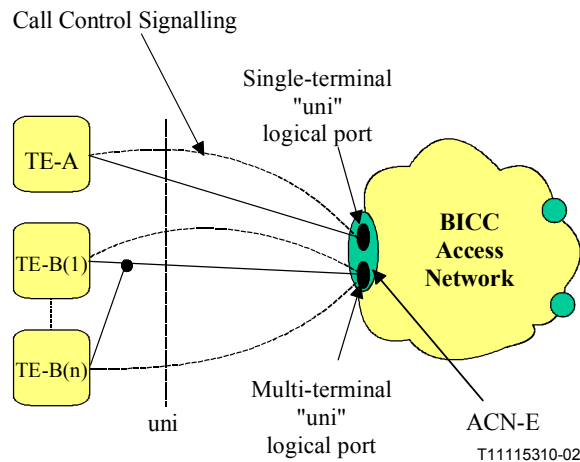
The Interface Serving Node (ISN-A) function contains the Call Service Function (CSF), the Bearer Interworking Function (BIWF) with Bearer Control Function, the Remote Media Control Function (RMCF), and the Access Control Function (ACF-N). The CSF in ISN-A controls the assignment of call associations for the access network. It interacts with the BCF-N to obtain access network resources for each call. The ACF-N executes instructions that control the access network resources. It terminates and originates access control messages. The RMCF-N forwards signals and receives event notifications from the RMCF-E that control actions at the user's port termination. The BCF-N controls the bearer switching function and relays the bearer control signalling requests to next BCF in order to complete the edge-to-edge backbone network connection.

The Interface Mediation Node (IMN-A) function contains the Call Service Function (CSF), the Remote Media Control Function (RMCF), and the Access Control Function (ACF-N). The CSF in IMN-A controls the assignment of call associations for the access network. It interacts with ACNs and other SNs in the BICC core network to identify bearer resources used for each call. It interacts with the ACNs to obtain access network resources for each call. The ACF-N executes instructions that control the access network resources. It terminates and originates access control messages. The RMCF-N forwards signals and receives event notifications from the RMCF-E that control actions at the user's port termination.



## 6 User Associated Logical Port Configurations

The user associated Logical Ports could be of two different types; Single Terminal Logical Ports; and Multi-Terminal Logical Ports (refer to Figure 4).



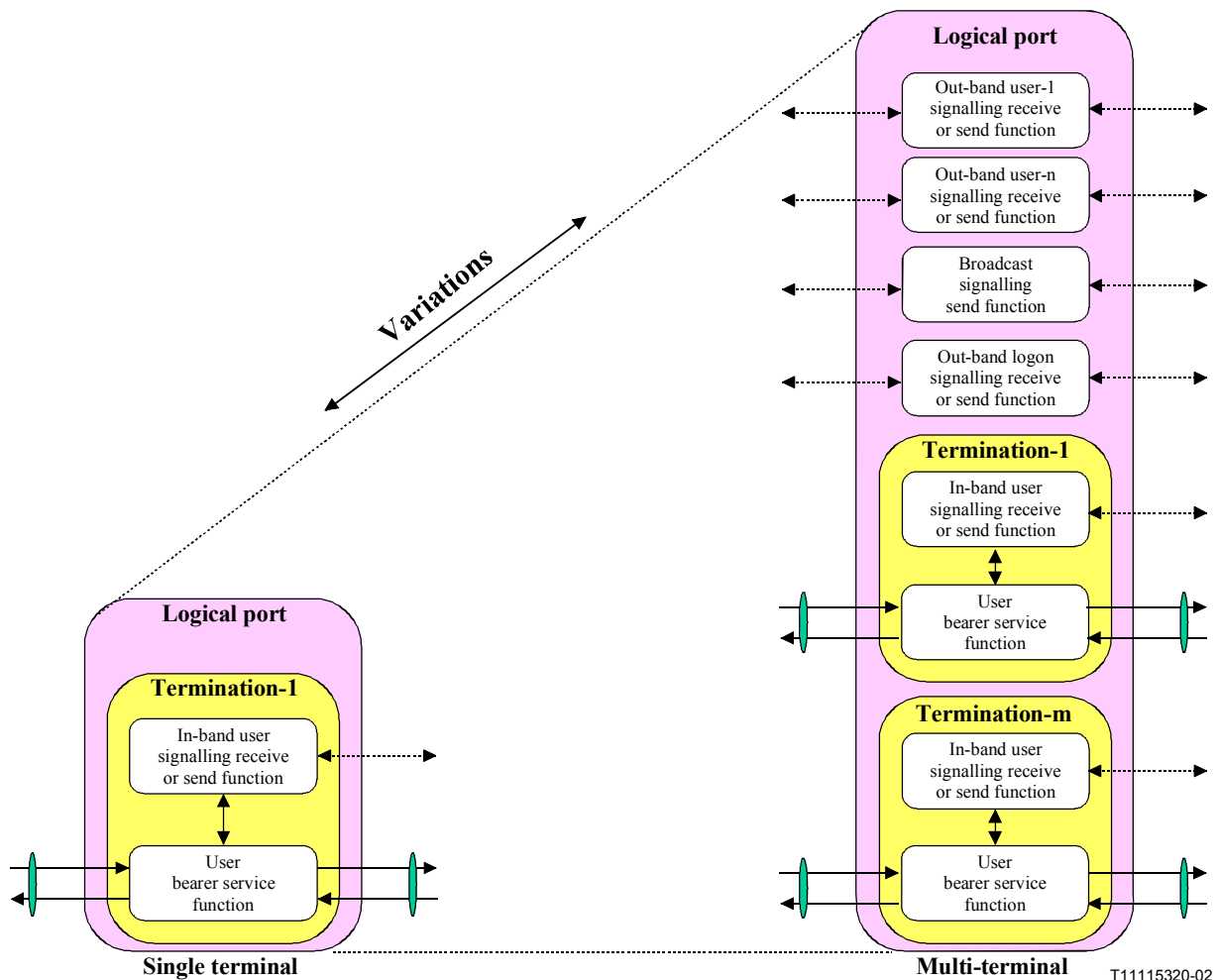
**Figure 4 – Multiple types of "uni" logical ports**

Figure 5 illustrates the great variance in user logical ports. Variations of the user logical ports include one or more bearer terminations, logical ports that may not have any out-band user signalling to logical ports that include one or more Out-Band user signalling, and logical ports that may or may not have a out-band Logon signalling capability. A out-band Logon signalling capability allows dynamic establishment of Out-Band signalling relationships between the terminal and the logical port. Two examples of the Out-Band Logon capability are the ISDN TEI assignment procedure and the B-ISDN Meta-Signalling procedure. Applying the logical port terminology to describe several existing user interfaces is shown below:

- ISDN Basic Rate Interface: Logical Port consists of 2 B-Channel Terminations, zero or one Out-Band Logon signalling capability, zero or more D-Channel Terminations, one or more Out-Band User signalling relationships, and zero to one broadcast signalling association.
- ISDN Primary Rate Interface: Logical Port consists of a single Out-Band User signalling relationship, and zero or more D-Channel terminations, and one or more B-Channel terminations up to a maximum of "n" times either 30 or 24 B-Channel terminations.
- Analogue Line: Logical Port consists of one termination. Signalling is carried In-Band.
- Analogue Trunk Group: Logical Port consists of multiple terminations. Each termination carries their own associated In-Band Signalling.

The above illustrates the large variation of user logical ports that could exist in an actual deployment of an Access Network. In each of the cases illustrated, the ISN/IMN would have the knowledge of the configuration to which the user has subscribed via the service profile. This allows admission control to correctly determine the actions to be taken when a bearer service request has been received. Each user connected to an ACN-E has at least one signalling relation with the CSF in the ISN/IMN.

As can be seen, two configuration types are illustrated by the previous examples: In-Band User Signalling and Out-Band User Signalling configurations.

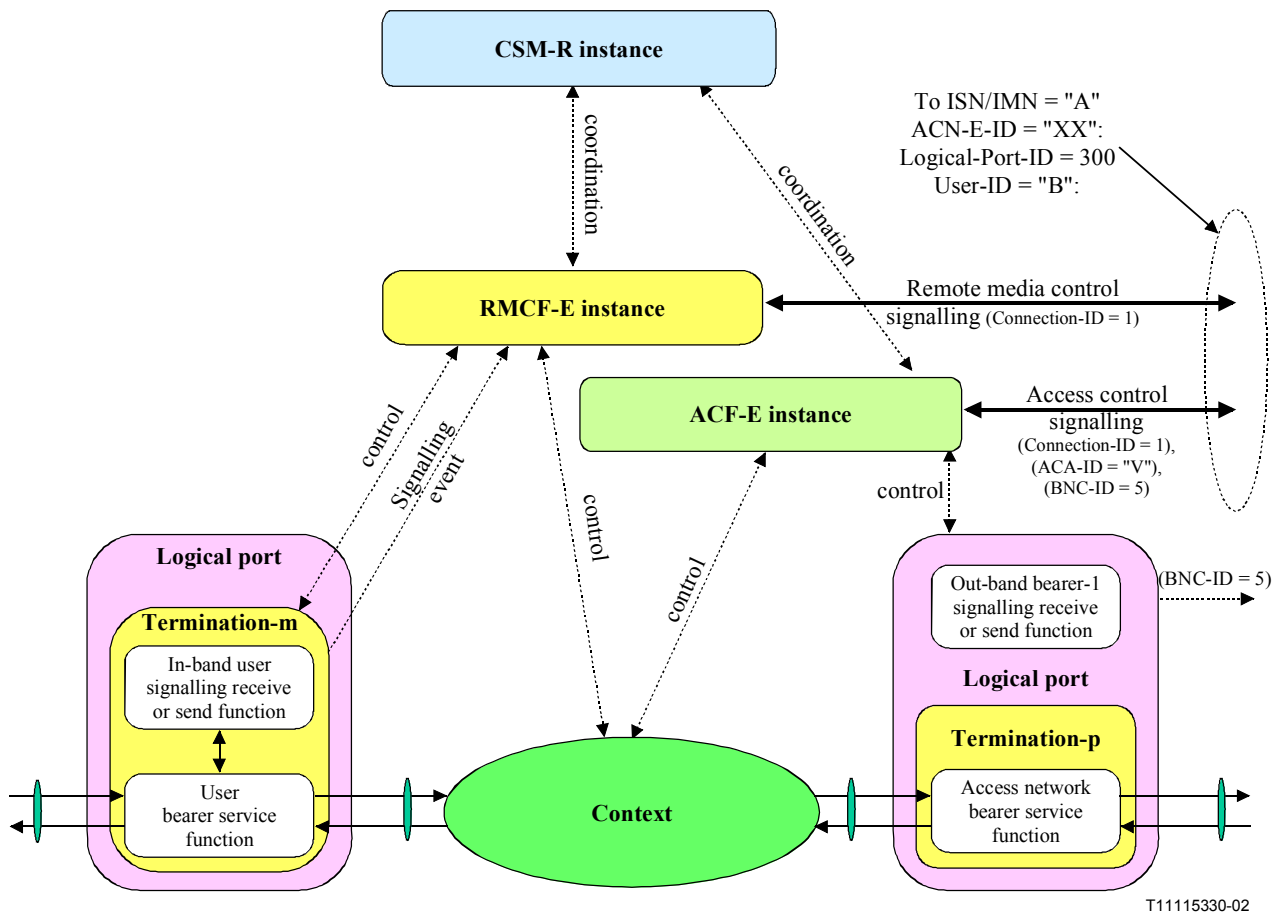


**Figure 5 – User logical port variations**

## 7 ACN-E control configurations

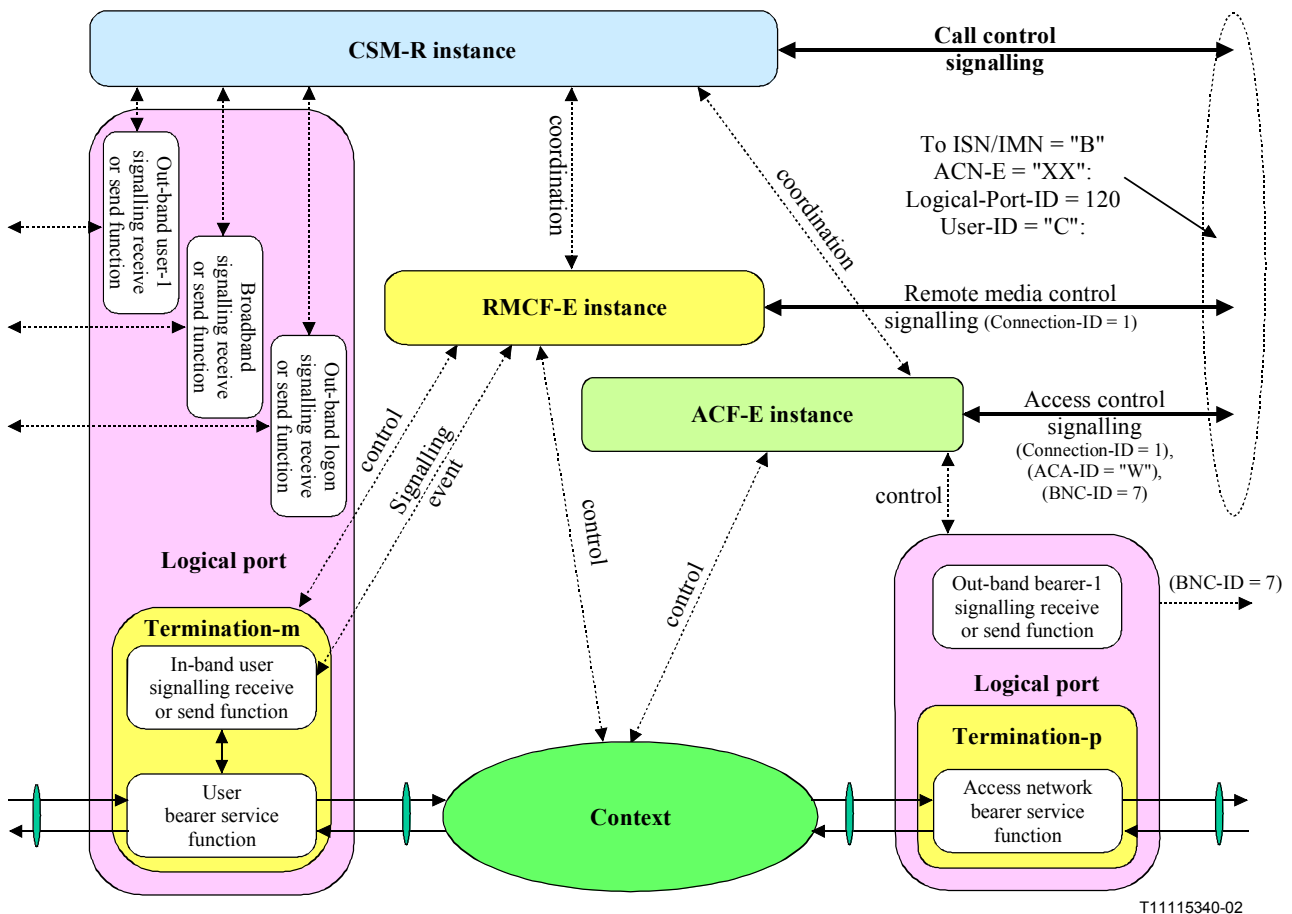
Figures 6 and 7, illustrate how the two basic Logical Port Types (In-Band User Signalling and Out-Band User Signalling) relate to the control elements within the ACN-E.

Figure 6 illustrates the logical configuration in the ACN-E for In-Band User Signalling between the terminal equipment and the access network. Since all signalling events are carried in band within the termination, these events are conveyed to the ISN/IMN via the Remote Media Control Signalling relationship. The CSM-R provides the coordination between the RMCF-E and the ACF-E. In addition, the CSM-R determines the ISN/IMN to be notified of the signalling event. The RMCF-E controls the termination within the user logical port based on commands from the ISN/IMN. Some examples of these commands are; Apply Dial Tone, Collect "n" digits, Apply Ringing, Apply Announcement "Please Hang Up", etc. The ACF-E is used to establish the bearer transport connection between the ACN-E and the ISN/IMN. In the case of incoming connections, the RMCF-E selects the termination and selects the context to be used. It also modifies the communication configuration of the context after the ACF-E has completed the bearer transport connection between the ACN-E and the ISN/IMN after ring trip has been detected by the user's logical port termination. In the case of an outgoing connection, the ACN-E modifies the context communication configuration after the bearer transport connection between the ACN-E and the ISN/IMN is available and the RMCF-E indicates that the connection between the ACN-E and the User Terminal is also available for transmission.



**Figure 6 – ACN-E – Control configuration – In-band user call control**

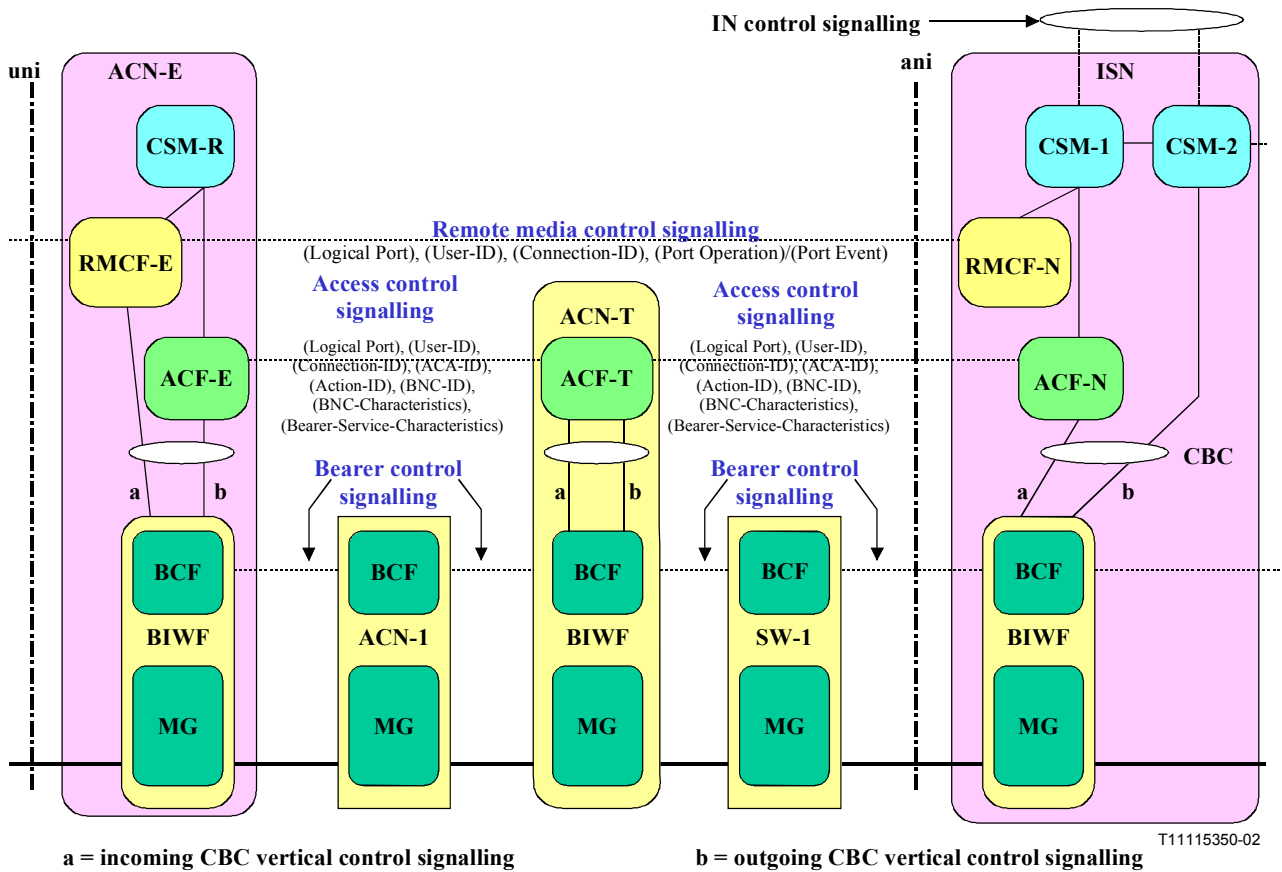
Figure 7 illustrates the logical configuration in the ACN-E for Out-Band User Signalling between the terminal equipment and the access network. The CSM-R provides the co-ordination between the RMCF-E and the ACF-E. In addition, the CSM-R determines the ISN/IMN to be notified of the signalling event and maps the incoming out-band signalling to the Call Control Signalling relationship. The action of the CSM-R relays the received signalling messages to the ISN/IMN via the Call Control Signalling relationship. The RMCF-E continues to detect signalling events that may be transmitted in-band within the termination and conveys these signals to the ISN/IMN. The RMCF-E controls the termination within the user logical port based on commands from the ISN/IMN. Some examples of these commands are; Apply Dial Tone, Collect "n" digits, Apply Ringing, Apply Announcement "Please Hang Up", etc. The ACF-E performs the tasks as indicated in the previous example.



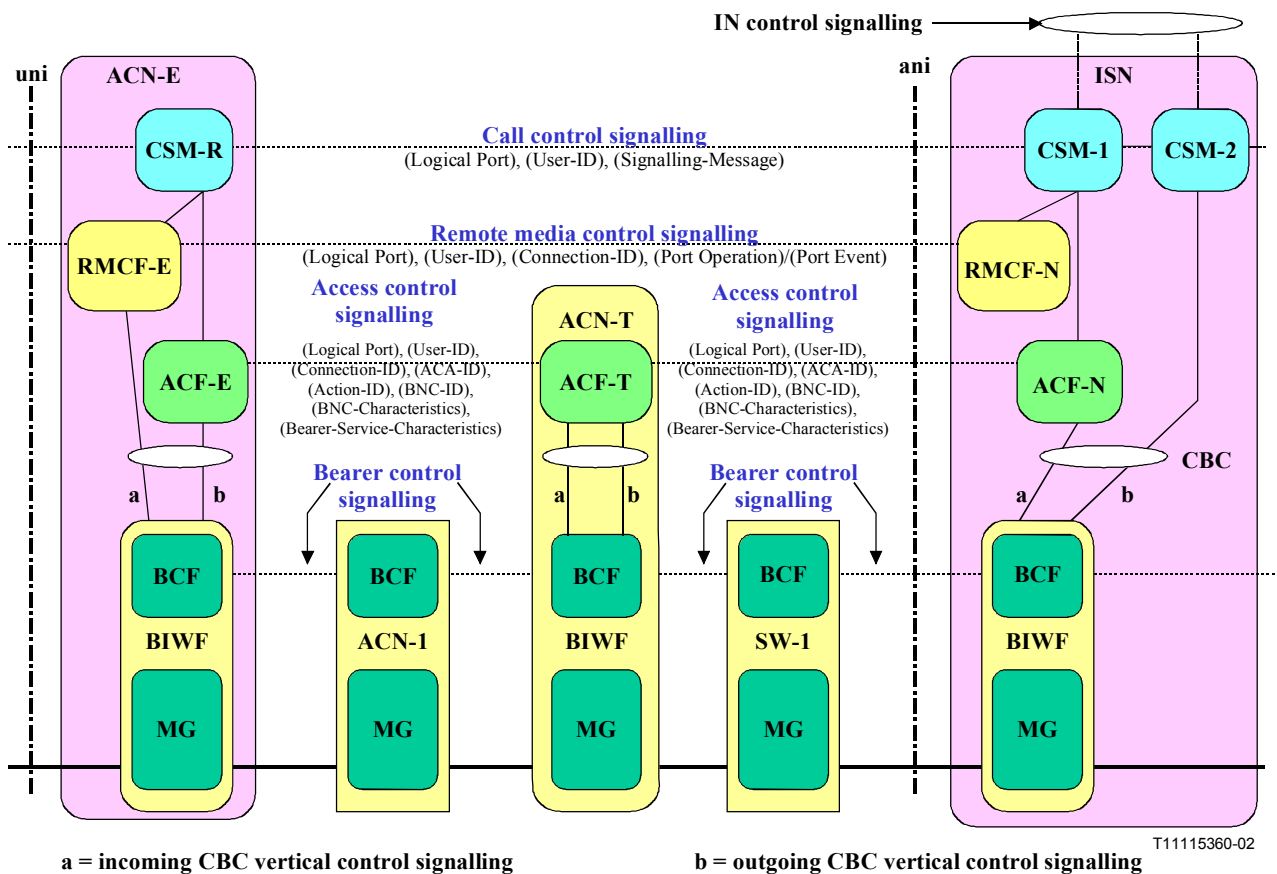
**Figure 7 – ACN-E – Control configuration – Out-band user call control**

## 8 BICC access network information objects

If an ACN-T is used, a bearer transport technology can be used within the Access Network that is different from the bearer transport technology used between the ACN-T and the BICC Service Provider Network. As an example, the Access Network may employ AAL 2 bearer transport technology while the ISN or adjacent SN at the network side in case of the IMN configuration supports IP bearer transport technology. The following figures illustrate the proposed BICC Access Network Information Objects for the two Logical Port Types.



**Figure 8 – BICC access network information objects – In-band user call control**



**Figure 9 – BICC access network information objects – Out-of-band user call control**

## 9 Information objects shown within reference models

The information objects illustrated in the previous figures are:

- User ID: A unique identifier within the domain of all ACNs and ISN/IMNs for the user of the signalling association.
- Connection-ID: An indicator of the bearer connection being associated with the user at the "uni" side. The RMCF-E maps this value to the Logical Port Termination being monitored and controlled by the ISN/IMN.
- Logical Port-ID: An indication that designates the group of bearer terminations, and signalling associations associated with a "uni" interface.
- ACA-ID: The Access Control Association Identifier. This information object is unique between two ACF signalling entities.
- Action ID: Specifies the Access Control action to be performed.
- Port Operation: The ISN/IMN to RMCF command to be executed on the termination.
- Port Event: The event detected by the termination.
- Signalling Message: The out-band signalling message between the ISN/IMN and the CSM-R.
- BNC-ID: References the bearer transport connection between two Access Control Functions (ACF).
- BNC Characteristics: References the type of bearer transport technology that should be employed by the BNC transport connection.

- **Bearer Service Characteristics:** Specifies the bearer service to be supported by the bearer transport connection between the ACN-E and the ISN or adjacent SN at the network side in case of the IMN configuration.

Additional address information objects such as ACN-E address and ISN/IMN addresses are also required. In addition, information objects such as the codec list information, selected codec information, and additional codec list information are supported as part of core BICC CS-2.

## **10 Access network information flow model**

The templates contained within this clause have been separated into these three configurations and are described in the following clauses (see 16.1 for the templates used in the information flows specific to the IMN configuration).

## **11 Indirect user network interface flow template**

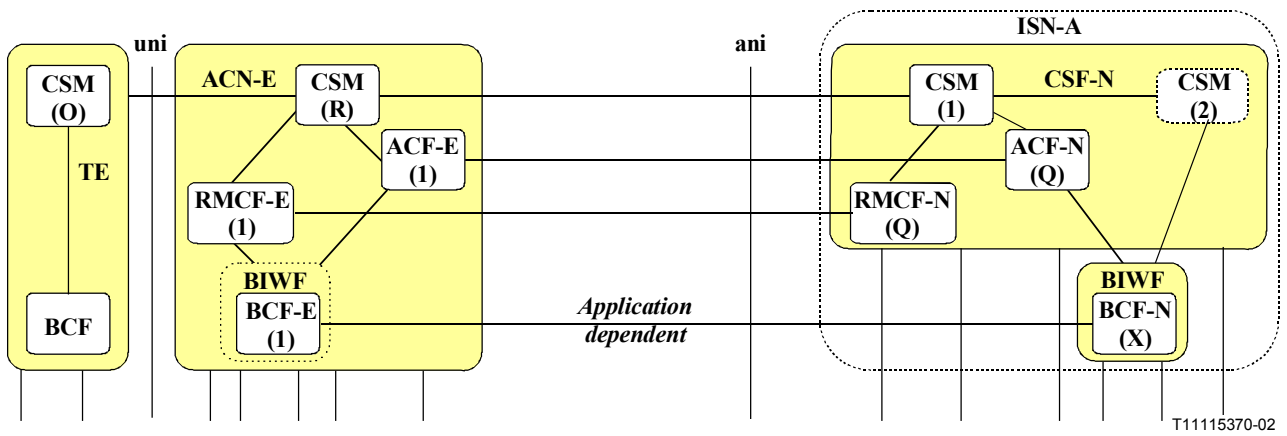
Note in Figure 8 the difference in the call control signalling path between the TE and the BICC network when an access network is employed. The signalling is not terminated within the access network but is forwarded to the BICC network by the access network node physically connected to the TE. This node could be associated with many TEs and act as a concentrator. For the purpose of this Supplement, the function of this node will be assumed to be a concentrator. The topology of the access network could be of multiple internal configurations. Three configurations have been identified. These are:

- 1) The direct concentrator configuration;
- 2) The indirect concentrator configuration; and
- 3) The Indirect concentrator with a transit access node configuration.

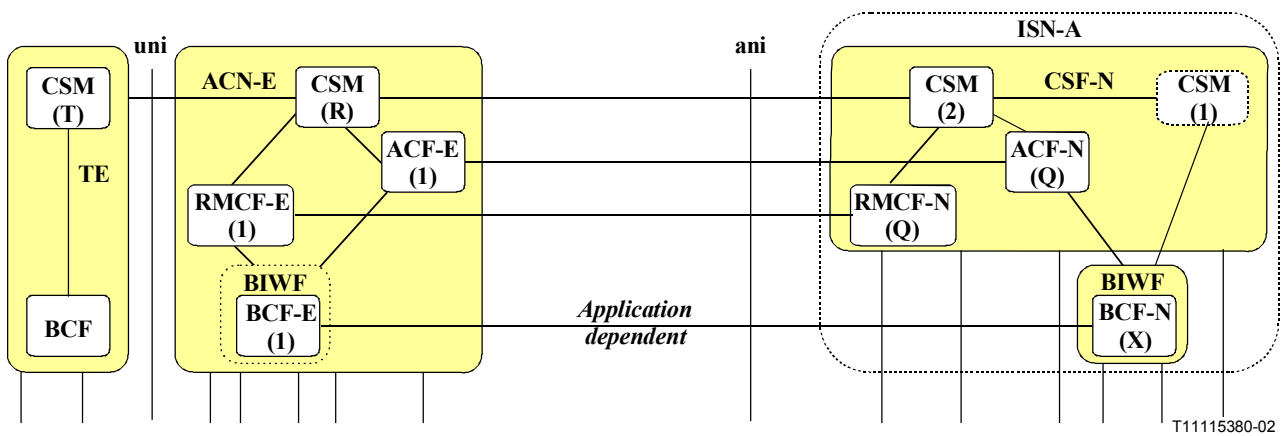
The following clauses contain the templates for these configurations.

## **12 Direct concentrator interface template**

Figures 10 and 11 illustrate the proposed template for a directly connected concentrator such as a V5 concentrator. The application-dependent relationship between the TE and the concentrator (ACN-E) illustrates the two terminal signalling protocol configurations that can exist (Integrated Call and Bearer Signalling, and Separated Call and Bearer Signalling). The application-dependent association between the ACN-E: BCF-E and the ISN: BCF-N depends on the method of establishment of the bearer channels between the BIWF and the ACN-E. The association will be needed if an explicit bearer control protocol is needed to establish the single bearer link. However, if the control protocol between the ACFs provides the capability of association of the end points on this link, then no association is required between the BCFs.



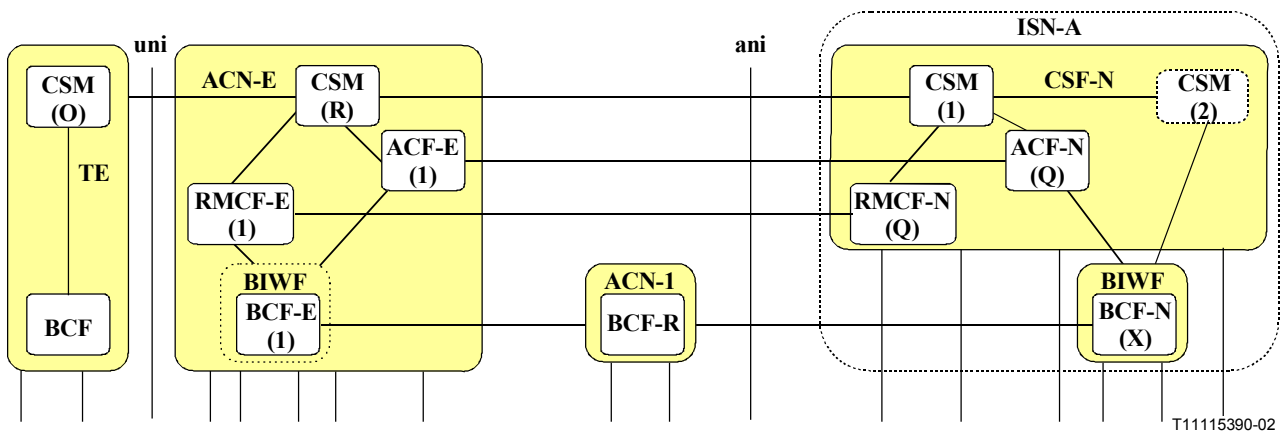
**Figure 10 – Indirect user network direct concentrator interface flow template – Origination**



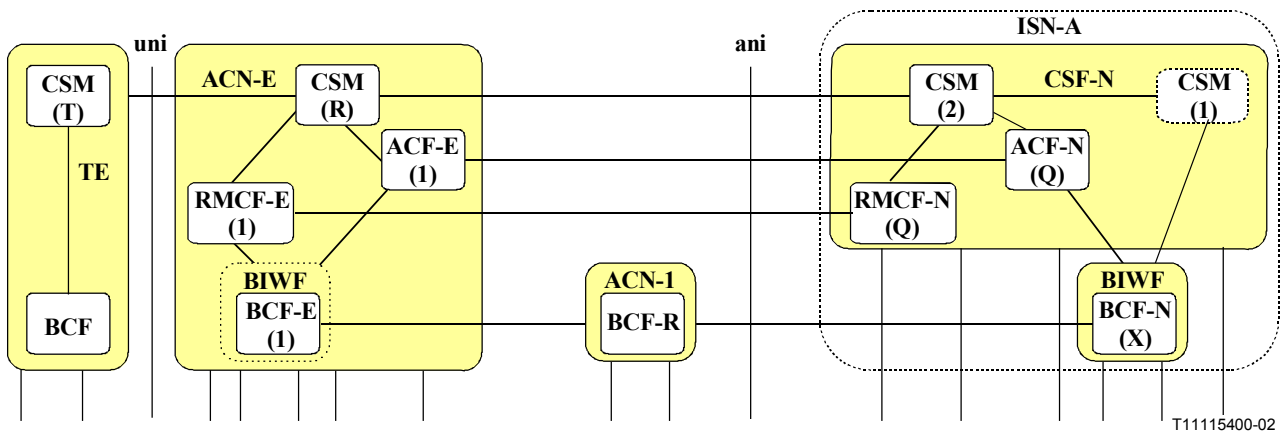
**Figure 11 – Indirect user network direct concentrator interface flow template – Termination**

### 13 Indirect concentrator interface flow template

This configuration is similar to the direct concentrator configuration with the exception that one or more bearer switching entities exist between the concentrator and the ISN. Figures 12 and 13 illustrate these configurations.



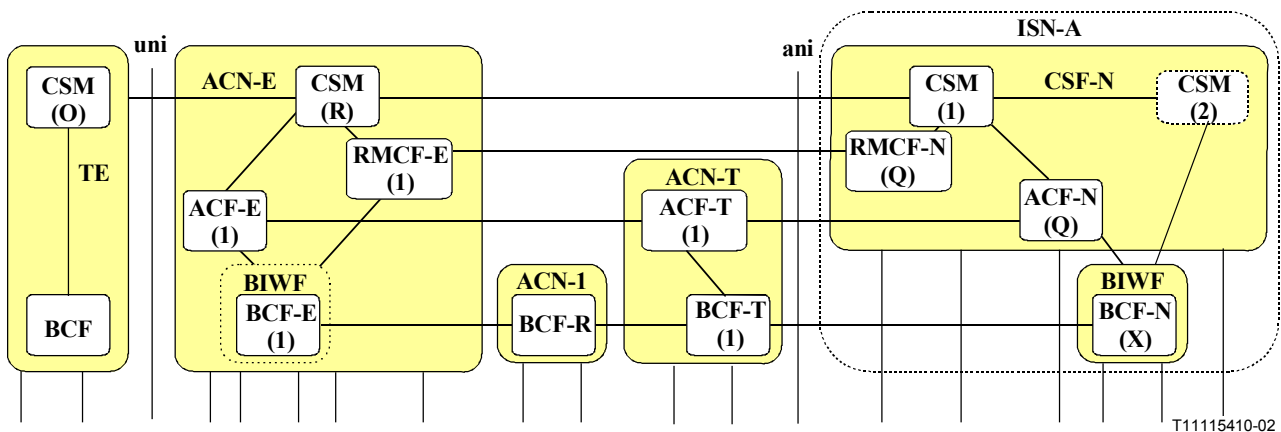
**Figure 12 – Indirect user network indirect concentrator interface flow template – Origination**



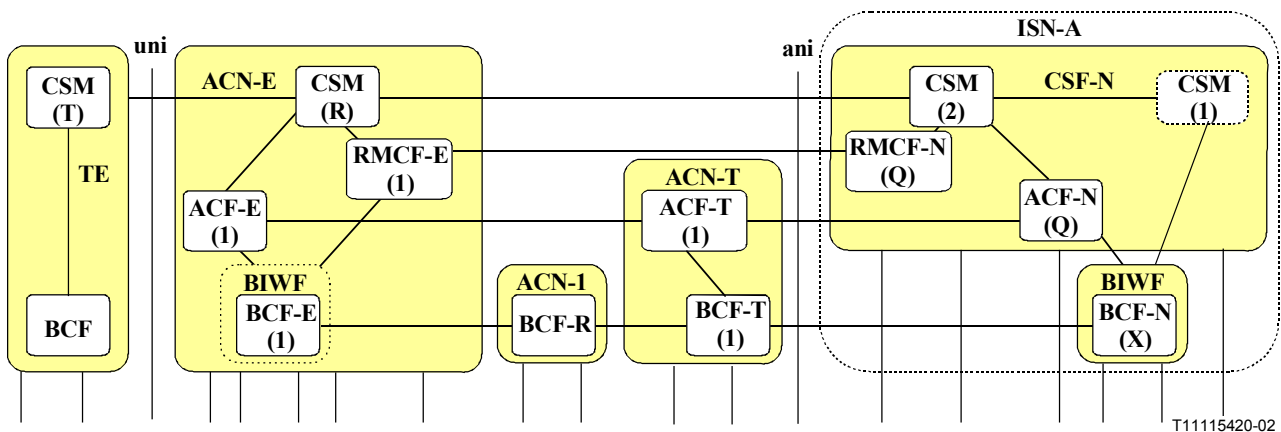
**Figure 13 – Indirect user network indirect concentrator interface flow template – Termination**

#### 14 Indirect concentrator with transit interface flow template

This configuration is similar to the indirect concentrator with the addition of a transit access network node that contains an ACF-T function and BCF-T function. The information flow templates for this configuration are shown in Figures 14 and 15.



**Figure 14 – Indirect user network indirect concentrator transit interface flow template – Origination**



**Figure 15 – Indirect user network indirect concentrator transit interface flow template – Termination**

## 15 Access network information flows

The access network information flows that are provided in these technical requirements illustrate basic normal call establishment and release in the access network. They do not illustrate reuse of an idle bearer, codec negotiation, or tunnelled bearers. The requirements in BICC Capability Set 1, ITU-T Q-series – Supplement 16, and BICC Capability Set 2, ITU-T Q-series – Supplement 32, apply to the access network including requirements for idle bearer, codec negotiation, and tunnelled bearers.

The information flows in this clause include both horizontal and vertical messages. Horizontal messages are communications between peer functional entities. Vertical messages are communications between non-peer functional entities. Vertical messages and horizontal messages that cross an open interface, depicted as lines crossing between shaded boxes in the figures, require a protocol description. Vertical messages and horizontal messages that do not cross an open interface, depicted by line between entities within the shaded boxes, do not require protocol description.

The information flows illustrate communications for both two types of terminals:

- 1) stimulus-based terminals; and
- 2) function-based terminals. Stimulus-based terminals include mainly analogue lines, e.g. loop start, ground start, loop reverse battery, and some ISDN terminals.

Function-based terminals include primarily ISDN and B-ISDN terminals. Some of the characteristics used to distinguish terminals for the purpose of illustrating the requirements are as follows:

- 1) Stimulus-based terminals convey digits individually, convey dial tone, audible ringing, and answer in the bearer path.
- 2) Function-based terminals convey digits en-bloc, convey dial tone, audible ringing, and answer indications in messages.

It is recognized that most terminals will use a hybrid of stimulus and function capabilities. Accordingly, the actual information flows may be a hybrid of those illustrated in this Supplement.

The information flows indicate that call control is used between CSMs for both types of terminals. The signalling channel is assumed to be provisioned between peer CSMs for the purposes of these requirements. The signalling channel, however, may be established on demand using a higher-layer protocol. The information flows require that call control messaging be conveyed between peer CSMs. The call control messaging is intended to be the protocol used by various terminals, for example in Q.931 and Q.2931. The specification of these control messages is outside the scope of this Supplement. Some media control messaging must be provided for most types of analogue loops when in-band information cannot be conveyed across the bearer technology. This messaging is illustrated in the figures for stimulus-based terminals using media control information flows.

Some bases are applied to the signalling flows. They apply to both stimulus-based and function-based terminal equipment unless otherwise indicated (see clause 16 for additional or deviating bases specific to the IMN configuration).

- 1) There are assumed to be no changes to call control signalling, either in Q.931 and Q.2931, or stimulus-based signalling used for analogue loops.
- 2) There are assumed to be no changes to bearer control signalling, either in Q.2931 and Q.2630.1, or Internet Protocol.
- 3) Digits are collected and dial tone is applied at the Access Concentration Node for originating calls, regardless of bearer technology.
- 4) Ringing is applied at the Access Concentration Node for terminating calls, regardless of bearer technology.

- 5) Control of power ringing for terminating calls occurs in the ACN-E.
- 6) Control of audible ringing for terminating calls is on the access side of the ISN-A, unless PABX terminal equipment supplies audible ringing from the terminal.
- 7) After the ACFs have enabled the call and bearer connections, they are removed from the signalling interactions at the earliest opportunity. The exception to this is when a subsequent action relates to a previous action that involved the ACF, e.g. removal of dial tone after bearer cut-through when the ACF was previously involved in applying dial tone.
- 8) For originating call flows, the Connection Available indicates that the access connection is established and the call is proceeding.
- 9) For analogue loops and ISDN lines, call control logic resides in ISN/IMN-A rather than in ACN-E.
- 10) The PROGRESS message may be present, progressing from the destination end toward the origination end of the connection, in any of the message flows for ISDN and B-ISDN. The PROGRESS message is not illustrated.
- 11) It is expected that flows with codec negotiation, with reuse of an idle bearer, and tunnelled bearers also apply to the BICC access environment. Accordingly, the information flows for such scenarios included in ITU-T Q-series – Supplement 32 are directly applicable to the access and are not illustrated.
- 12) An attempt is made to provide horizontal flows and vertical flows that are common across the access scenarios. This would reduce the logic required, particularly at the ACN.

### **15.1 Description of access network information flows**

The access network information flow descriptions are divided into stages that are combined to describe the messaging requirements for normal call establishment and normal call release. The stages are titled call admission, bearer establishment, call establishment, call release and bearer release.

The call admission stage describes all information flows starting with receipt of a request for a new call through and including the point when complete number or address information is received by the Call Service Function (CSF) that controls the call.

The bearer establishment stage describes all information flows between the receipt of complete address information and the point when the CSF that controls the call is informed that the bearer is established.

The call establishment stage begins when the CSF is notified that the bearer is established and terminates when the ANSWER message is passed across the access network.

The call release stage begins with receipt by the CSF of a release request, from either the network or the terminal. The stage ends when the CSF receives confirmation that the terminal and the network have released the call. The Access Network Normal Release Information Flows assume that the CSM in the ISN/IMN, which is the entity within the access network that has visibility to call control signalling, initiates release of the call and of the bearer. The CSM in the ISN/IMN determines if the bearer may be released, based on service options that may be enabled for the access interface. The ACF in the ISN/IMN is assumed to know the creator and owner of the BNC-ID associated with the call, i.e. either the ACN-E or the BIWFX. The ACF in the ISN/IMN initiates information flows to release the BNC.

The bearer release stage begins when the CSF requests release of the BNC and ends when the BNC is released. The User-ID that is used in access network bearer establishment has no meaning in the context of the idle bearer. The User-ID has meaning for bearers being established, for bearers that are active, and for bearers that are being released.

### **15.1.1 Definition of action identifier (Backward/forward bearer establishment)**

The ACN-T and the ACN-E do not require awareness of the direction of call establishment. The meaning of backward and forward bearer establishment, therefore, is defined in the context of the BICC Access Network. The initiation of bearer establishment begins in ISN/IMN-A, therefore, whereas the BICC indicators are relative to the direction of call establishment, the BICC access network indicators are relative to the direction to or from the ACN-E.

- Forward setup is the direction from ISN-A to ACN-E or from an SN at the network side to ACN-E in case of the IMN configuration.
- Backward setup is the direction from ACN-E to ISN-A or to an SN at the network side in case of the IMN configuration.

In the case of ACN-E to ACN-E, or intra-ISN/IMN, bearer establishment the ACF in ISN/IMN coordinates the forward/backward indicators.

## **15.2 Access network information flows for stimulus terminals on the ISN**

The information flows for stimulus terminals apply to analogue loops. It is recognized that many non-analogue terminals work in hybrid modes that include some aspects of the stimulus information flows.

### **15.2.1 Terminal originated – Forward bearer setup**

The information flows for stimulus terminal origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call Admission – Terminal originated – Stimulus-based in Figure 16.
- 2-a) Bearer Establishment – ISN-A to ACN-E in Figure 18 (ActionID = Forward Setup), or
- 2-b) Bearer Establishment – Through ACN-T – ISN-A to ACN-E in Figure 21 (ActionID = Forward Setup).
- 3) Call Establishment – Terminal originated – Stimulus-based in Figure 24.

### **15.2.2 Terminal originated – Backward bearer setup**

The information flows for stimulus terminal origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call Admission – Terminal originated – Stimulus-based in Figure 16.
- 2-a) Bearer Establishment – ACN-E to ISN-A in Figure 19 (ActionID = Backward Setup), or
- 2-b) Bearer Establishment – Through ACN-T – ACN-E to ISN-A in Figure 22 (ActionID = Backward Setup).
- 3) Call Establishment – Terminal originated – Stimulus-based in Figure 24.

### **15.2.3 Network originated – Backward bearer setup**

The information flows for stimulus Network origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call Admission – Network originated – Stimulus-based in Figure 17.
- 2-a) Bearer Establishment – ACN-E to ISN-A in Figure 19 (ActionID = Backward Setup), or
- 2-b) Bearer Establishment – Through ACN-T – ACN-E to ISN-A in Figure 22 (ActionID = Backward Setup).
- 3) Call Establishment – Network originated – Stimulus-based in Figure 25.

#### **15.2.4 Network originated – Forward bearer setup**

The information flows for stimulus Network origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call Admission – Network originated – Stimulus-based in Figure 17.
- 2-a) Bearer Establishment – ISN-A to ACN-E in Figure 18 (ActionID = Forward Setup) , or
- 2-b) Bearer Establishment – Through ACN-T – ISN-A to ACN-E in Figure 21 (ActionID = Forward Setup).
- 3) Call Establishment – Network originated – Stimulus-based in Figure 25.

#### **15.2.5 Terminal originated – Intra-ISN Call – Stimulus-based**

The information flows for stimulus terminal origination and Intra-ISN connection with both backward and forward bearer setup are described by the sequential application of five flows.

- 1) Call Admission – Terminal originated – Stimulus-based in Figure 16.
- 2) Call Admission – Network originated – Stimulus-based in Figure 17.
- 3) Bearer Establishment – ACN-E to ACN-E in Figure 20. (ActionID = Backward Setup or Forward Setup).
- 4) Intra-ISN Call Establishment – Terminating ACN-E – Stimulus-based in Figure 27.
- 5) Call Establishment – Terminal originated – Stimulus-based in Figure 25.

NOTE 1 – Omit cut-through information flows.

NOTE 2 – Certain functionality such as audible ringing, busy tone, and congestion tone must be supported in the ACN-E if the intra-ISN proposal is to be supported by the network. Otherwise, the network will support intra-ISN calls using the same information flows and functional capabilities that are used for inter-ISN calls.

#### **15.2.6 Terminal released – ISN-A owned BNC**

The information flows for stimulus terminal release and BNC ownership by ISN-A are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 28.
- 2-a) Bearer release – ISN-A owned in Figure 30, or
- 2-b) Bearer release through ACN-T – ISN-A to ACN-E in Figure 32.

#### **15.2.7 Terminal released – ACN-E owned BNC**

The information flows for stimulus terminal release and BNC ownership by ACN-E are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 28.
- 2-a) Bearer release – ACN-E owned in Figure 31, or
- 2-b) Bearer release through ACN-T – ACN-E to ISN-A in Figure 33.

#### **15.2.8 Network released – ISN-A owned BNC**

The information flows for stimulus Network release and BNC ownership by ISN-A are described by the sequential application of two flows:

- 1) Call release – Network released in Figure 29.
- 2-a) Bearer release – ISN-A owned in Figure 30, or
- 2-b) Bearer release through ACN-T – ISN-A to ACN-E in Figure 32.

### **15.2.9 Network released – ACN-E owned BNC**

The information flows for stimulus Network release and BNC ownership by ACN-E are described by the sequential application of two flows:

- 1) Call release – Network released in Figure 29.
- 2-a) Bearer release – ACN-E owned in Figure 31, or
- 2-b) Bearer release through ACN-T – ACN-E to ISN-A in Figure 33.

## 15.3 Call admission

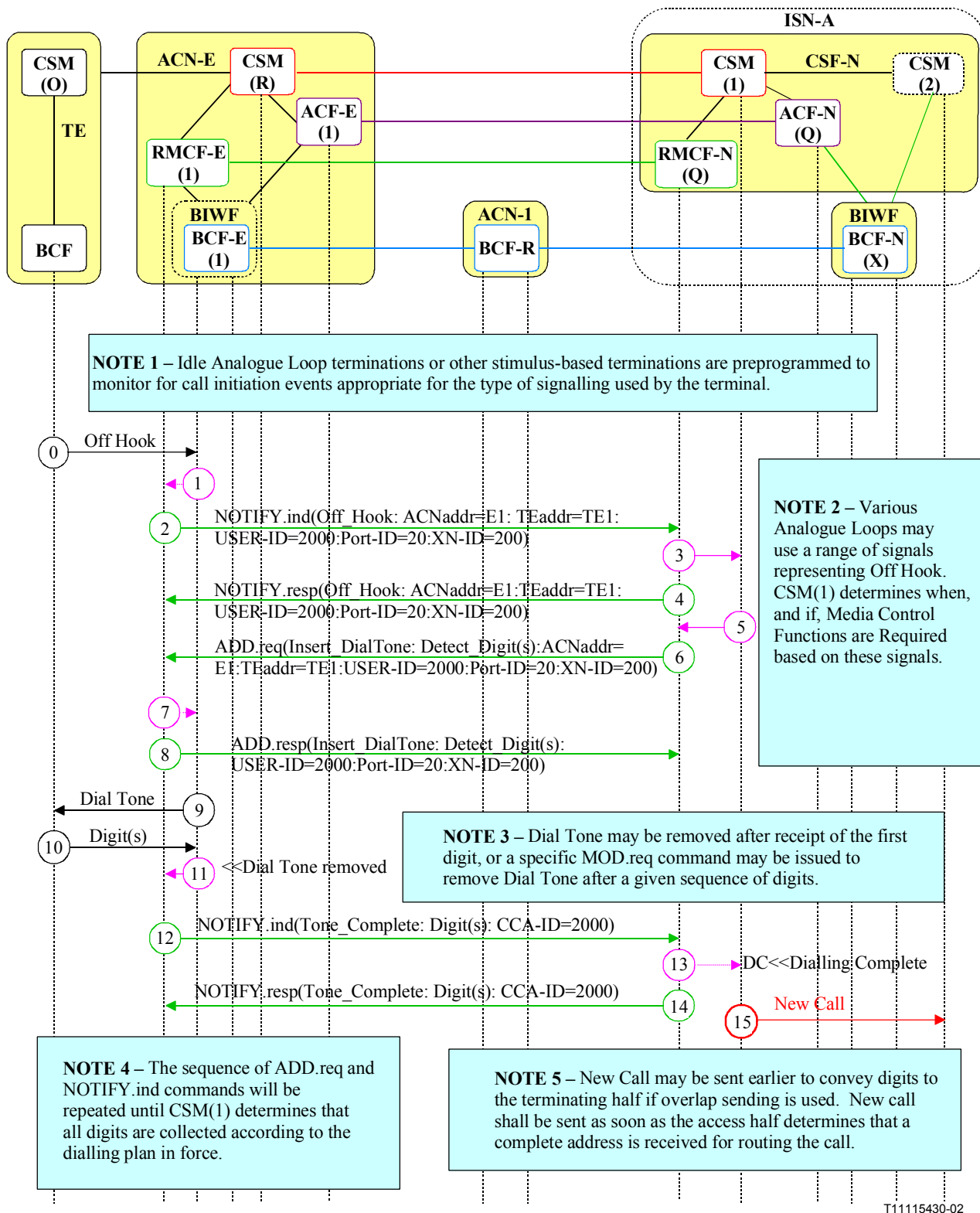


Figure 16 – Call admission – Terminal originated – Stimulus-based

### 15.3.1 Call admission – Terminal originated – Stimulus-based

The information flows and functional entity actions illustrated in Figure 16 are described in the following numbered paragraphs. The call admission stage describes all information flows starting with receipt of a request for a new call through and including the point when complete number or address information is received by CSM(1). It precedes the bearer establishment stage. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |  |
|---|----------------------------|--|
| 0 | Off Hook                   | TE to ACN-E                            |
|   | <u>Address Information</u> | <u>Control information</u><br>Off-hook |
|   |                            | <u>Bearer information</u>              |

---

**Initiation of information flow:** A user associated with the TE requests a connection from an analogue line.

**Processing upon receipt:** When the ACN's RMCF-E receives this information flow, it sends primitives to RMCF-N containing descriptors for analogue line, terminal address including port and channel. The descriptors are provisioned attributes of the port that is dedicated to the terminal equipment within the ACN-E.

NOTE – Media gateway functions that convert Time Division to Asynchronous Transfer Mode, and Dial Pulse to DTMF may be present in the ACN-E. These functions are not illustrated or described. They are not part of these requirements, yet are internal to the functions of the ACN-E.

---

|   |  |   |
|---|--|---|
| 2 | NOTIFY.ind(Off_Hook)   | RMCF-E to RMCF-N  |
|   | <u>Address Information</u><br>(Calling-Party-Addr) = TE1,<br>(Terminal Addr) = TE1,<br>(Terminal Port) = P1,<br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>NOTE – USER-ID must be unique<br>within the domain of the CSM in ISN-A.<br>It can be provisioned or issued by ISN. |
|   |  | <u>Bearer information</u>   |

---

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(1) containing descriptors for the change in state of the analogue line, the ACN address, and the TE address. It registers its USER-ID with ISN-A's CSM(1).

CSM(1) authenticates the service request, and issues primitives to RMCF-N to generate dial tone and enable digit collection. Other actions may be taken depending on the type of terminal equipment that is attached to ACN-E's port.

CSM(1) prepares to establish the context and terminations for the terminating half of ISN-A.

It knows the status of the analogue line and other attributes of the requested connection, such as serving ACN Address, preferred connection group, type of analogue line, and service options. The CSM(1) marks the line as unavailable for other connections and holds-off requests for dial tone from the line. It determines the bearer interworking function (BIWF = x) to be used to carry the new Access connection between ACN-E and ISN(A). It issues information flows toward the access control function (ACF-N) in order to determine if a pre-established idle Access network connection exists between it and ACN-E. It indicates the preferred setup option, either Forward or Backward Bearer Connection.

---

|   |  |   |
|---|--|---|
| 4 | NOTIFY.resp(Off_Hook)  | RMCF-N to RMCF-E  |
|   | <u>Address Information</u><br>(Calling-Party-Addr) = TE1,<br>(Terminal Addr) = TE1,<br>(Terminal Port) = P1,<br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200 |
|   |  | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

---

|   |  |   |
|---|--|---|
| 6 | ADD.req (Insert_DialTone)(Detect_Digits)   | RMCF-N to RMCF-E  |
|   | <u>Address Information</u><br>(Terminal Addr) = TE1,<br>(Port Addr) = P1,<br>CN Address) = E1, | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Detect_Digit(s),<br>Primitive = Insert_DialTone, |
|   |  | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** ACN-E's RMCF passes instructions to the BIWF to insert dial tone on the analogue loop termination and to attach an appropriate digit detector, e.g. dial pulse or DTMF. It awaits the receipt of digits.

---

|   |                            |   |
|---|----------------------------|---|
| 8 | ADD.resp                   | RMCF-E to RMCF-N  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Detect_Digit(s),<br>Primitive = Insert_DialTone, |
|   |                            | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** ISN-A's RMCF awaits further instructions.

---

|   |                            |   |
|---|----------------------------|---|
| 9 | Dial Tone                  | ACN-E to TE                             |
|   | <u>Address Information</u> | <u>Control information</u><br>Dial Tone |
|   |                            | <u>Bearer information</u>               |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The terminal equipment begins dialling, sending digits.

---

|    |                                      |  |
|----|--------------------------------------|--|
| 10 | Digit(s)                             | TE to CSM(R)                           |
|    | <u>Address Information</u><br>Digits | <u>Control information</u><br>Off-hook |
|    |                                      | <u>Bearer information</u>              |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** ACN-E removes dial tone, based on the dialling plan in force. This may be after the first digit is received, or after multiple digits are received under the direction of CSM(1). ACN-E passes the dialled digits to CSM(1) over the RMCF signalling association. This may require conversion of dial pulses to DTMF in ACN-E.

|  |  |                           |
|--|--|---------------------------|
| 12   | NOTIFY.ind(Tone_Complete)(Digits)  | RMCF-E to RMCF-N          |
| <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200. | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(1) containing descriptors for the change in state of the analogue line. It indicates that digits are received and either requests instructions to remove dial tone, or indicates that dial tone is removed based on previously received or provisioned instructions.

CSM(1) determines when dialling is completed and may indicate to the ACN-E that the digit detector may be removed. Other actions may be taken depending on the type of terminal equipment that is attached to ACN-E's port.

|  |   |                           |
|--|---|---------------------------|
| 14   | NOTIFY.resp(Tone_Off)(Digits)   | RMCF-N to RMCF-E          |
| <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200 | <u>Bearer information</u> |

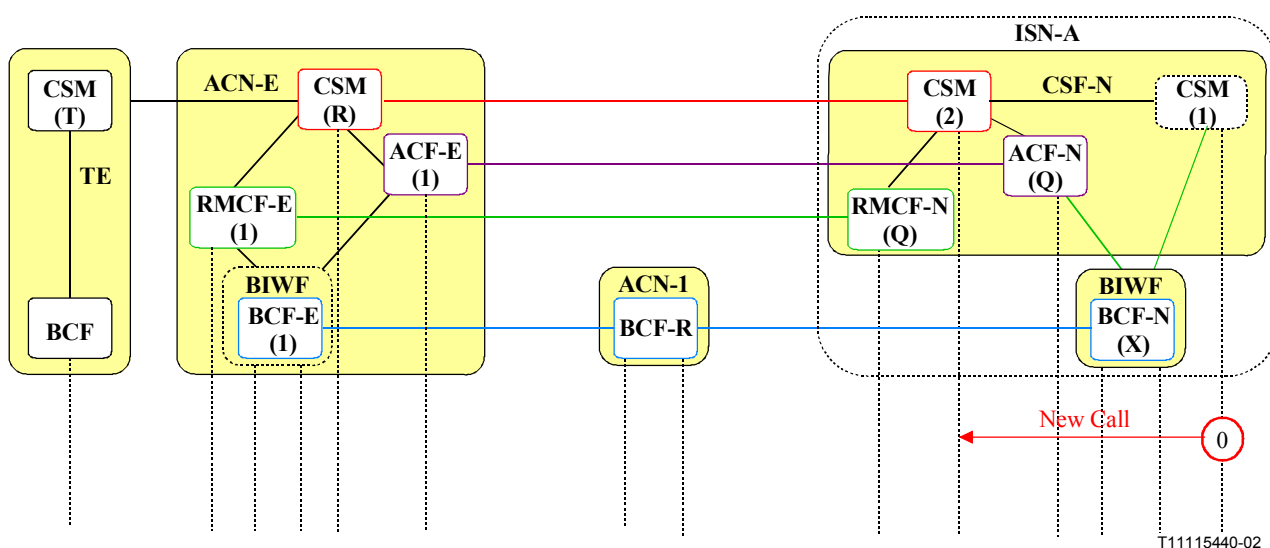
**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|                            |                            |                           |
|----------------------------|----------------------------|---------------------------|
| 15                         | New Call                   | CSM(1) to CSM(2)          |
| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 14. For overlap sending, earlier messages may have been sent to CSM(2) to convey dialled digits for route analysis.

**Processing upon receipt:** CSM(2) prepares to establish the context and terminations in the terminating half of ISN-A.



**Figure 17 – Call admission – Network originated – Stimulus-based**

### 15.3.2 Call admission – Network originated – Stimulus-based

The information flows and functional entity actions illustrated in Figure 17 are described in the following numbered paragraphs. The call admission stage describes all information flows starting with receipt of a request for a new call through and including the point when complete number or address information is received by CSM(2). It precedes the bearer establishment stage. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |  |
|---|----------------------------|--|
| 0 | New Call                   | CSM(1) to CSM(2)                                     |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

---

**Initiation of information flow:** A connection to an analogue line is requested by the network.

**Processing upon receipt:** CSM(2) prepares to establish the context and terminations for the terminating half of ISN-A.

It knows the status of the analogue line and other attributes of the requested connection, such as serving ACN Address, preferred connection group, type of analogue line, and service options. The CSM(2) marks the line as unavailable for other connections and holds-off requests for dial tone from the line. The selected ISN(A)'s CSF-N assigns a unique USER-ID of 2000. It determines the bearer interworking function (BIWF = x) to be used to carry the new Access connection between ACN-E and ISN(A). It issues information flows toward the access control function (ACF-N) in order to determine if a pre-established idle Access network connection exists between it and ACN-E. It indicates the preferred setup option, either Forward or Backward Bearer Connection.

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## 15.4 Bearer establishment

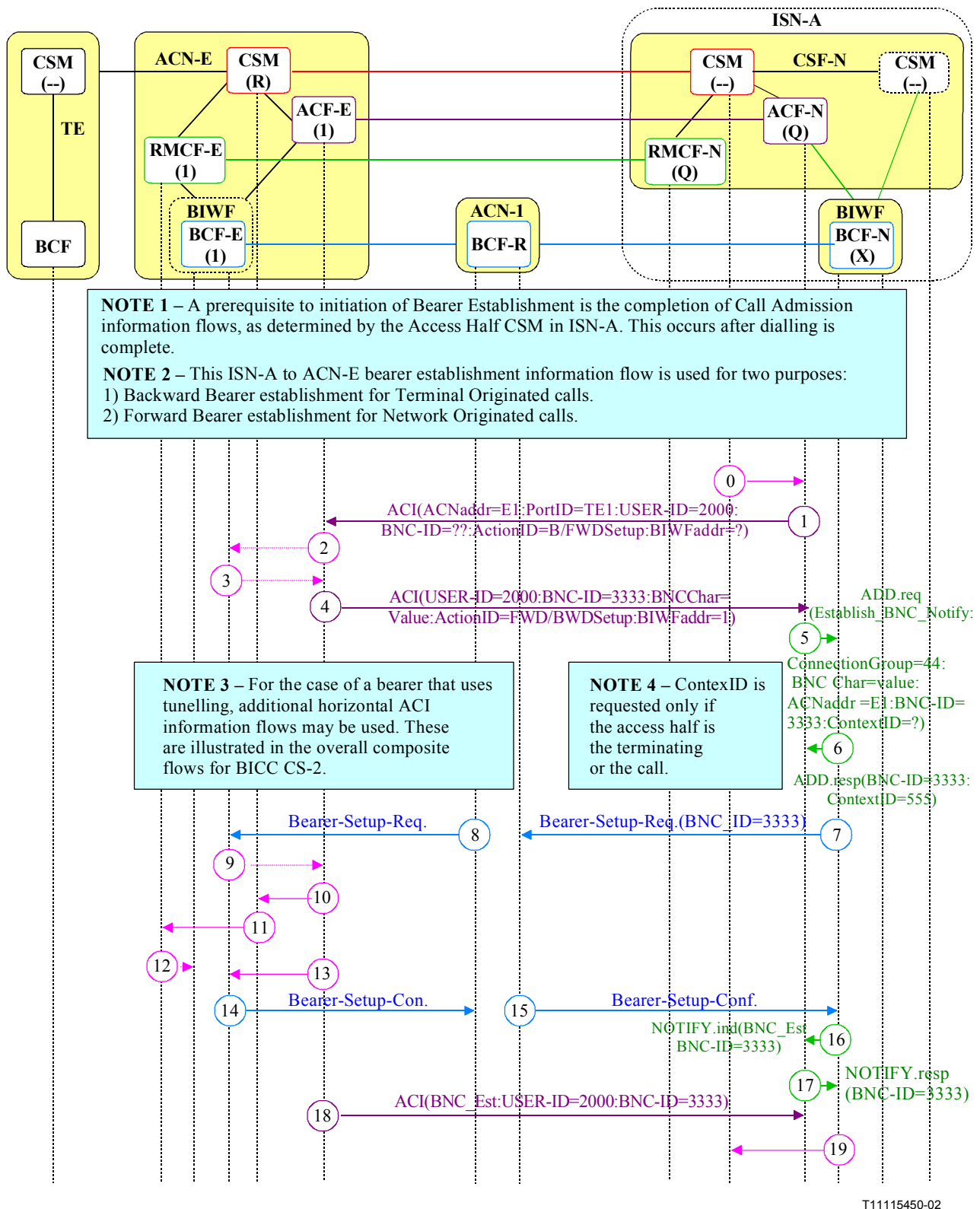


Figure 18 – Bearer establishment – ISN-A to ACN-E – Terminal independent

### 15.4.1 Bearer establishment – ISN-A to ACN-E – Terminal independent

The information flows and functional entity actions illustrated in Figure 18 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

#### 0 CSM(1/2) to ACF-N

##### Address Information

(ACN Address) = E1,  
(Called-Party-Addr) = TE1,  
(Calling-Party-Addr) = if provisioned,  
BIWFAddr = ?

##### Control information

USER-ID = 2000,  
Port-ID = 20,  
Connection ID = 200  
Primitive = Connect Forward/Backward

##### Bearer information

Connection Group = 44  
Bearer Service Characteristics  
BNC Characteristics = value

**Initiation of information flow:** CSM(1) or CSM(2) receives a request from a terminal or the network to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** When ACF-N receives this information flow, it constructs a request for a BNC-ID and BIWF Address. It sends the request to ACF-E. The request also contains BNC Characteristics, the ACN address, the Connection Group for use by BCF-E to provide bearer setup information.

---

#### 1 ACI (BNC\_Request) ACF-N to ACF-E

##### Address Information

(ACN Address) = E1,  
(Called-Party-Addr) = TE1,  
  
BIWF Address = ?

##### Control information

ACA-ID = 800,  
USER-ID = 2000,  
Port-ID = 20,  
Connection ID = 200,  
Primitive = (BNC\_Request)  
Primitive = Connect Forward/Backward

##### Bearer information

BNC-ID = ???  
Connection Group = 44  
Bearer Service Characteristics  
BNC Characteristics = value

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACN's ACF-E receives this information flow, it requests a BNC-ID from BCF-E and determines a BIWF = E1 to be used for the bearer connection. It may request reservation of the termination to TE1 in ACN-E, as well as any other resources required for the connection in ACN-E. It may also hold-off dial tone requests from TE1.

The BIWF's BCF-E determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3333. It constructs a response to ACF-E with the requested Access network parameters. The bearer BNCL characteristics contained in information flow 4 were determined from the Bearer Service Information contained in information flow 1.

ACF-E sends an ACI to ACF-N containing the BNC-ID = 3333, and BNCL characteristics.

---

#### 4 ACI (Establish\_BNC) ACF-E to ACF-N

##### Address Information

BIWF Addr = E1

##### Control information

ACA-ID = 800,  
USER-ID = 2000,  
Port-ID = 20,  
Connection ID = 200,  
Primitive = Establish\_BNC

##### Bearer information

BNC Characteristics = value  
BNC-ID = 3333  
BCNL Characteristics

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow, initiates information flow 5 toward the selected bearer interworking function BIWfX in order to request a bearer connection with the requested characteristics and a BNC-ID = 3333, Connection Group = 44 with instructions to establish a BNC. It provides the BNCL Characteristics and requests a ContextID. The interface serving node awaits the commitment information flow from the selected bearer interworking function.

---

|          |  |   |
|----------|--|---|
| <b>5</b> | <b>ADD.req (Establish_BNC_Notify)</b>                    | <b>ACF-N to BIWfX</b>   |
|          | <u><b>Address Information</b></u><br>(ACN Address) = E1, | <u><b>Control information</b></u><br>Port-ID = 20,<br>ContextID = ???<br>Primitive = Establish_BNC_Notify                           |
|          |  | <u><b>Bearer information</b></u><br>BNC-ID: = 3333,<br>Connection Group = 44<br>BNCL Characteristics<br>BNC Characteristics = value |

---

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The BIWF's BCF-N validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(X) and ACN(E1). BIWfX, based on Connection Group 44, proceeds to establish the requested Access network connection by issuing information flow 7 toward the selected ACN(E1). The BNC-ID = 3333 is inserted to carry across the bearer access connection for association with the call in ACN(E1). The bearer BNCL characteristics contained in information flow 5 were determined from the Bearer Service Information contained in information flow 4. BCF-N responds to ACF-N with the ContextID = 555.

---

|          |                                   |   |
|----------|-----------------------------------|---|
| <b>6</b> | <b>ADD.resp</b>                   | <b>BIWfX to ACF-N</b>   |
|          | <u><b>Address Information</b></u> | <u><b>Control information</b></u><br>Port-ID = 20,<br>Primitive = Establish_BNC_Notify      |
|          |                                   | <u><b>Bearer information</b></u><br>BNC-ID = 333<br>ContextID = 555<br>BNCL Characteristics |

---

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** When ACF-N receives this information flow it may notify ISN-A's CSM(1) or CSM(2) that the BNC-ID = 3333 and ContextID = 555 are assigned.

---

|          |   |  |
|----------|---|--|
| <b>7</b> | <b>Bearer-Setup.Req</b>   | <b>BIWf(x) to ACN(1)</b>   |
|          | <u><b>Address Information</b></u><br>(ACN Address) = E1,<br>BIWF Addr = x | <u><b>Control information</b></u><br>BCS-ID = "15",  |
|          |   | <u><b>Bearer information</b></u><br>BNC-ID: = 3333,<br>BNCL-ID = 1004,<br>{BNCL Characteristics} |

---

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The selected access node validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(X) and ACN(E1). The access node issues information flow 8 towards ACN(E1). The BNC-ID = 3333 is conveyed across the bearer access connection for association with the call in ACN(E1). Information flow (8)'s link information was determined from the link information received in information flow 7. ACN(1) awaits the commitment information from ACN(E1).

|   |  |  |  |
|---|--|--|--|
| 8 | Bearer-Setup.Req   | ACN(1) to ACN(E1)                            |  |
|   | <u>Address Information</u><br>(ACN Address) = E1,<br>BIWF Addr = x | <u>Control information</u><br>BCS-ID = "27", | <u>Bearer information</u><br>BNC-ID: = 3333,<br>BNCL-ID = 1003,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Access Control function that a bearer has been established between ISN-A and ACN-E with BNC-ID = 3333. This is done in information flow 9. ACN-E may cut-through the access network to the terminal.

ACF-E correlates the bearer with the terminal information received in information flow 1, ACI. The associated Access Control function correlates the incoming bearer request with the incoming call request using BNC-ID = 3333 and USER-ID = 2000. ACF-E issues a notification response to BCF-E. It awaits further notification of changes to the bearer.

BCF-E issues information flow 14 toward Access Node 1 to confirm the bearer establishment, and to complete establishment of the bearer in the reverse direction.

The Access Control function in ACN(E) notifies the ACF-N in ISN-A that the BNC is established in an ACI message. ACN-E may cut-through the new Access network connection to the terminal, if not already completed.

|    |                            |   |  |
|----|----------------------------|---|--|
| 14 | Bearer-Setup.Connect       | BCF-E to ACN(1)                             |  |
|    | <u>Address Information</u> | <u>Control information</u><br>BCS-ID = "27" | <u>Bearer information</u><br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** The access node notes the confirmation of the establishment request and issues information flow 15 toward BIWfX.

|    |                            |   |  |
|----|----------------------------|---|--|
| 15 | Bearer-Setup.Connect       | ACN(1) to BIWfX                             |  |
|    | <u>Address Information</u> | <u>Control information</u><br>BCS-ID = "15" | <u>Bearer information</u><br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** The Bearer Interworking Function records the establishment of the Access connection, and issues information flow 16 notifying its associated access control function that the requested bearer setup is complete and connection is established.

|    |                              |  |  |
|----|------------------------------|--|--|
| 16 | NOTIFY.ind (BNC_Established) | BIWfX to ACF-N   |  |
|    | <u>Address Information</u>   | <u>Control information</u><br>Port-ID = 20,<br>Primitive = BNC_Established | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** When ACF-N receives this information flow it notifies CSM in ISN-A that the BNC-ID = 3333 is established and that ContextID = 555 is assigned to the local terminations, as determined from information flow 6. It issues a notification response to BCF-N. It awaits further notification of changes to the bearer.

CSM in ISN-A updates the call state. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use.

---

|    |                            |  |
|----|----------------------------|--|
| 17 | NOTIFY.resp                | ACF-N to BCF-N   |
|    | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = BNC_Established |
|    |                            | <u>Bearer information</u><br>BNC-ID: = 3333                                |

**Initiation of information flow:** Processing of information flow 16.

**Processing upon receipt:** BCF-N records the response. It waits further instructions from the ACF-N or BCF-E.

---

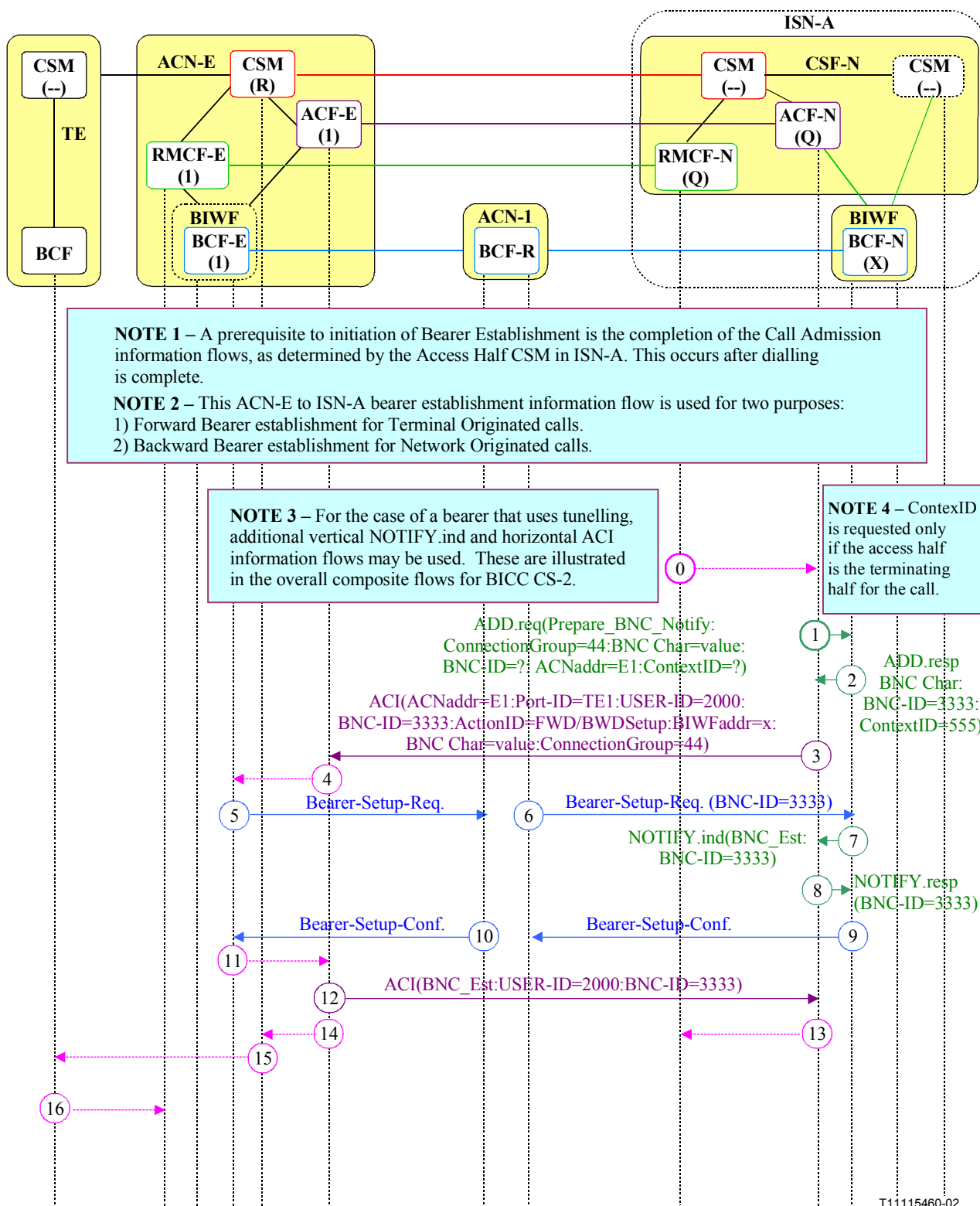
|    |                            |   |
|----|----------------------------|---|
| 18 | ACI (BNC_Established)      | ACF-E to ACF-N  |
|    | <u>Address Information</u> | <u>Control information</u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>BNC_Established |
|    |                            | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flows 8 and 9.

**Processing upon receipt:** When the ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It notifies CSM in ISN-A.

CSM in INS-A updates the call state. CSM in ISN-A exchanges information with the opposite half of ISN-A indicating that the connection is available. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use.

---



**Figure 19 – Bearer establishment – ACN-E to ISN-A – Terminal independent**

#### 15.4.2 Bearer establishment – ACN-E to ISN-A – Terminal independent

The information flows and functional entity actions illustrated in Figure 19 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |   |  |  |
|---|---|--|--|
| 0 | CSM(1/2) to ACF-N   |  |  |
|   | <b><u>Address Information</u></b><br>(ACN Address) = E1,<br>(Called-Party-Addr) = TE1,<br><br>(Calling-Party-Addr) = if provisioned | <b><u>Control information</u></b><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Connect Backward/Forward | <b><u>Bearer information</u></b><br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** CSM(1) or CSM(2) receives a request from a terminal or the network to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** When ACF-N receives this information flow, it constructs a request to the BCF-N containing BNC Characteristics, the ACN address, the Connection Group. BCF-N is requested to provide bearer setup information including BNC-ID, and ContextID.

---

|   |  |  |   |                |
|---|--|--|---|----------------|
| 1 | ADD.req(Prepare_BNC_Notify)                              |  |   | ACF-N to BIWFx |
|   | <b><u>Address Information</u></b><br>(ACN Address) = E1, | <b><u>Control information</u></b><br>Port-ID = 20,<br>Primitive = Prepare_BNC_Notify<br>Primitive = Connect Backward/Forward | <b><u>Bearer information</u></b><br>BNC-ID: = ?,<br>ContextID = ?<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |                |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The BIWF's BCF-N determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3333, a Context ID of 555, and selects a bearer based on Connection Group 44. It constructs a response to ACF-N with the requested Access network parameters and issues information flow 2 toward ACF-N. The bearer BNCL characteristics contained in information flow 2 were determined from the Bearer Service Information contained in information flow 1. The ACF-N awaits the commitment information flow from the selected BCF-N.

---

|   |                                   |  |   |                |
|---|-----------------------------------|--|---|----------------|
| 2 | ADD.resp                          |  |   | BIWFx to ACF-N |
|   | <b><u>Address Information</u></b> | <b><u>Control information</u></b><br>Port-ID = 20,<br>Primitive = Prepare_BNC_Notify | <b><u>Bearer information</u></b><br>BNC-ID = 3333<br>ContextID = 555<br>BNCL Characteristics = values |                |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** When ACF-N receives this information flow it may notify CSM in ISN-A that the BNC-ID = 3333 and ContextID = 555 are assigned. It issues information flow 3 toward the selected terminating ACN(E1). The USER-ID = 2000 and BNC-ID = 3333, BIWFaddr = x, TEaddr = TE1 including port and channel are inserted in the ACI for association between the call and the bearer in ACN(E1). It awaits confirmation of the bearer access connection from ACN-E.

CSM in ISN-A may indicate that the context is assigned to the opposite half of the CSF.

| 3 | ACI (Establish_BNC)  | ACF-N to ACF-E   |
|---|--|--|
|   | <u><b>Address Information</b></u><br>(ACN Address) = E1,<br>(Called-Party-Addr) = TE1,<br><br>BIWF Address = x | <u><b>Control information</b></u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Establish_BNC<br>Primitive = Connect Backward/Forward |
|   |  | <u><b>Bearer information</b></u><br>BNC-ID = 3333<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value  |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** When the ACN's ACF-E receives this information flow, it notes a pending connection for TE1. It requests reservation of the termination to TE1 in ACN-E and holds-off dial tone requests from TE1. It then requests BCF-E to initiate a connection with parameters provided by BCF-N in flow 2.

The access node validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(X) and ACN(E1). BCF-E initiates an access bearer connection with the parameters provided in information flow 3, and selects a bearer based on Connection Group 44. The BNC-ID = 3333 is conveyed across the bearer access connection for association with the call in BIWFx. Information flow (5)'s link information was determined from the link information received in information flow 3. ACN(E1) awaits the bearer commitment information from ACN(1).

| 5 | Bearer-Setup.Req                                   | ACN(E1) to ACN(1)   |
|---|--|---|
|   | <u><b>Address Information</b></u><br>BIWF Addr = x | <u><b>Control information</b></u><br>BCS-ID = "27",   |
|   |  | <u><b>Bearer information</b></u><br>BNC-ID: = 3333,<br>BNCL-ID = 1003,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The access node issues information flow 6 towards BIWF(X). Information flow (6)'s link information was determined from the link information received in information flow 5. ACN (1) awaits the bearer commitment information from BIWF(x).

| 6 | Bearer-Setup.Req                                   | ACN(1) to BIWF(x)   |
|---|--|---|
|   | <u><b>Address Information</b></u><br>BIWF Addr = x | <u><b>Control information</b></u><br>BCS-ID = "15",   |
|   |  | <u><b>Bearer information</b></u><br>BNC-ID: = 3333,<br>BNCL-ID = 1004,<br>{BNCL Characteristics}, |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Access Control function that a bearer has been established between ISN-A and ACN-E with a BNC-ID = 3333. This is done in information flow 7. It may also indicate that the ContextID = 555 is used, if it has not already done so. BIWF(x) initiates flow 9 confirming bearer setup.

---

|   |                                |   |
|---|--------------------------------|---|
| 7 | NOTIFY.ind(BNC_Established)    | BIWf <sub>x</sub> to ACF-N  |
|   | <u>Address Information</u><br> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = BNC Established<br>ContextID = 555 |
|   |                                | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The Access Control function correlates the incoming bearer request with the call request using BNC-ID = 3333 and USER-ID = 2000. ACF-N issues a notification response to BCF-N. It awaits further notification of changes to the bearer.

---

|   |                                |  |
|---|--------------------------------|--|
| 8 | NOTIFY.resp (BNC_Established)  | ACF-N to BIWf <sub>x</sub>   |
|   | <u>Address Information</u><br> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = BNC_Established |
|   |                                | <u>Bearer information</u><br>BNC-ID = 3333                                 |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** BIWf(x) notes the response.

---

|   |                                |  |
|---|--------------------------------|--|
| 9 | Bearer-Setup.Confirm           | BIWf <sub>x</sub> to ACN(1)                  |
|   | <u>Address Information</u><br> | <u>Control information</u><br>BCS-ID = "15"  |
|   |                                | <u>Bearer information</u><br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The access node notes the confirmation of the establishment request and issues information flow 10 toward Access Node E1.

---

|    |                                |  |
|----|--------------------------------|--|
| 10 | Bearer-Setup.Confirm           | ACN(1) to BCF-E                              |
|    | <u>Address Information</u><br> | <u>Control information</u><br>BCS-ID = "27"  |
|    |                                | <u>Bearer information</u><br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** The BCF-E records the establishment of the Access connection and notifies its associated access control function that the requested bearer setup is complete and the BNC is established.

The Access Control function in ACN(E) notifies the ACF-N in ISN-A that the BNC is established in an ACI message. ACN-E may cut-through the new Access network connection to the terminal, if not already completed.

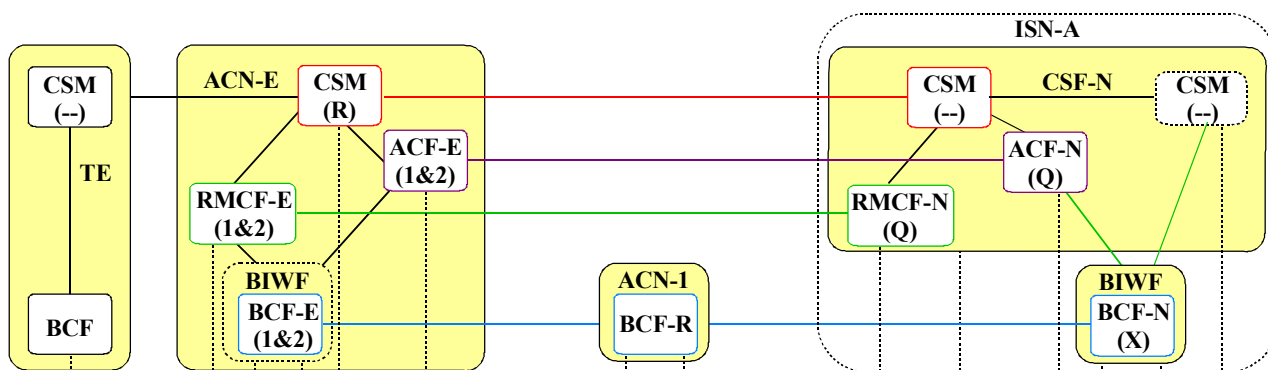
---

|    |                                |   |
|----|--------------------------------|---|
| 12 | ACI (BNC_Established)          | ACF-E to ACF-N  |
|    | <u>Address Information</u><br> | <u>Control information</u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>BNC_Established |
|    |                                | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** When the ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It notifies CSM in ISN-A.

CSM in ISN-A updates the call state. CSM in ISN-A exchanges information with the opposite half of ISN-A indicating that the connection is available. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use.



**NOTE 1** – A prerequisite to initiation of Bearer Establishment is the completion of Call Admission information flows, as determined by the Access Half CSM in ISN-A. This occurs after dialling is complete.

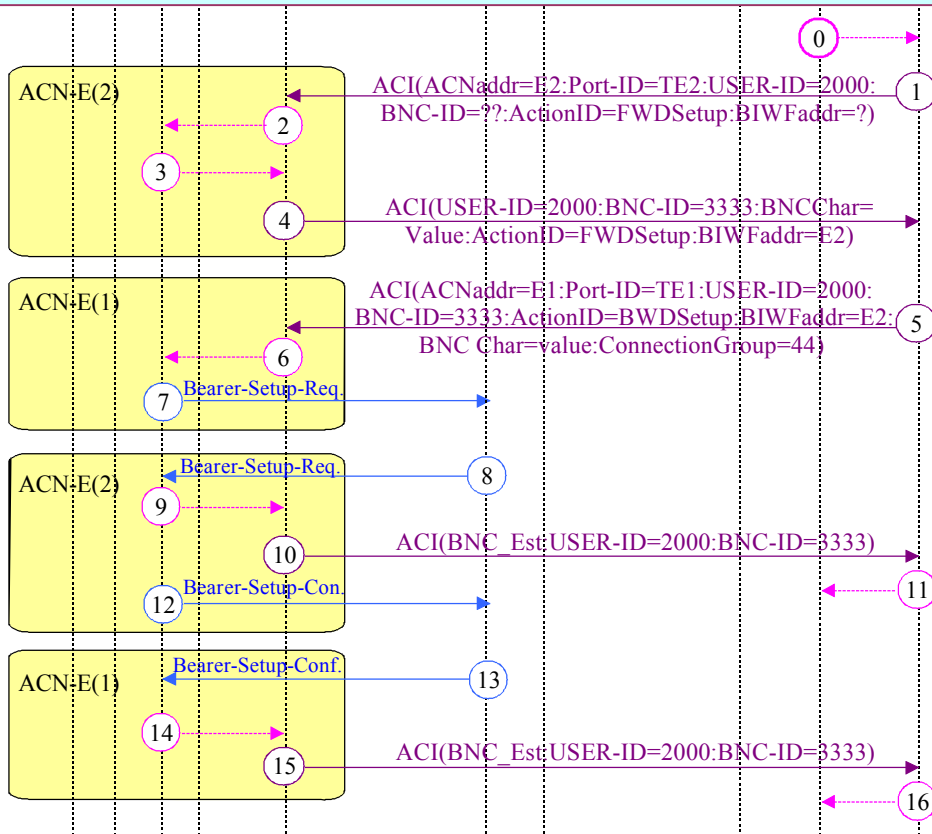
**NOTE 2** – This ACN-E to ACN-E bearer establishment information flow is used for two purposes:

1) Forward Bearer establishment from ACN-E(1) to ACN-E(2).

2) Backward Bearer establishment from ACN-E(2) to ACN-E(1).

For Bearer Establishment from ACN-E(2) to ACN-E(1) the same information flows are used, however, all instances of E1 or E(1) are replaced with E2 or E(2), and vice versa.

**NOTE 3** – For the case of a bearer that uses tunneling, additional horizontal ACI information flows may be used. These are illustrated in the overall composite flows for BICC CS-2.



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**Figure 20 – Bearer establishment – ACN-E to ACN-E – Terminal independent**

### 15.4.3 Bearer establishment – ACN-E(1) to ACN-E(2) – Terminal independent

The information flows and functional entity actions illustrated in Figure 20 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. Forward Bearer Establishment to ACN-E(2) is selected followed by backward bearer establishment to ACN-E(1). The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |   |   |  |
|---|---|---|--|
| 0 | CSM(2) to ACF-N   |   |  |
|   | <b><u>Address Information</u></b><br>(ACN Address) = E2(E1),<br>(Called-Party-Addr) = TE2(TE1),<br><br>(Calling-Party-Addr) = if provisioned,<br>BIWFAddr = ? | <b><u>Control information</u></b><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Connect Forward | <b><u>Bearer information</u></b><br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** CSM(1) or CSM(2) receives a request from a terminal or the network to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** When ACF-N receives this information flow, it constructs a request for a BNC-ID and BIWF Address. It sends the request to the ACF-E that will be the destination of the bearer setup to obtain the destination BIWF address. The request also contains BNC Characteristics, the ACN address, the Connection Group for use by BCF-E to provide bearer setup information.

---

|   |  |   |  |
|---|--|---|--|
| 1 | ACI (BNC_Request)  | ACF-N to ACF-E(2)   |  |
|   | <b><u>Address Information</u></b><br>(ACN Address) = E2,<br>(Called-Party-Addr) = TE2,<br><br>BIWF Address = ? | <b><u>Control information</u></b><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = (BNC_Request)<br>Primitive = Connect Forward | <b><u>Bearer information</u></b><br>BNC-ID = ???<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACN's ACF-E receives this information flow, it requests a BNC-ID from BCF-E and determines a BIWF = E2 address to be used for the bearer connection. It may request reservation of the termination to TE2 in ACN-E2, as well as any other resources required for the connection in ACN-E2. It may also hold-off dial tone requests from TE2.

The BIWF's BCF-E determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3333. It constructs a response to ACF-E with the requested Access network parameters. The bearer BNCL characteristics contained in information flow 4 were determined from the Bearer Service Information contained in information flow 1.

ACF-E sends an ACI to ACF-N containing the BNC-ID = 3333, and BNCL characteristics.

|   |  |   |
|---|--|---|
| 4 | ACI (Establish_BNC)                          | ACF-E(2) to ACF-N   |
|   | <u>Address Information</u><br>BIWF Addr = E2 | <u>Control information</u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Establish_BNC |
|   |  | <u>Bearer information</u><br>BNC Characteristics = value<br>BNC-ID = 3333<br>BCNL Characteristics                                   |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow, it initiates information flow 5 toward the originating ACN-E1 in order to request a bearer connection with the requested characteristics and a USER-ID = 2000, BNC-ID = 3333, Connection Group = 44 with instructions to establish a BNC. It provides the BNCL Characteristics. The interface serving node awaits the commitment information flow from the selected bearer interworking functions in ACN(E1) and ACN(E2).

|   |   |   |
|---|---|---|
| 5 | ACI (BNC_Establish)   | ACF-N to ACF-E(1)   |
|   | <u>Address Information</u><br>(ACN Address) = E1,<br>(Called-Party-Addr) = TE1, | <u>Control information</u><br>ACA-ID = 900,<br>USER-ID = 3000,<br>Port-ID = 30,<br>Connection ID = 300<br>Primitive = (BNC_Establish)<br>Primitive = Connect Backward |
|   |   | <u>Bearer information</u><br>BNC-ID = 3333<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value                                  |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** When the ACN's ACF-E receives this information flow, it requests a bearer setup in the backward direction from the selected bearer interworking function BIWF(E1). It may request reservation of the termination to TE1 in ACN-E1. It may also hold-off dial tone requests from TE1.

The BIWF's BCF-E establishes the requested bearer connection.

|   |  |  |
|---|--|--|
| 7 | Bearer-Setup.Req                                 | ACN(E1) to ACN(1)  |
|   | <u>Address Information</u><br>BIWF Addr = E2(E1) | <u>Control information</u><br>BCS-ID = "27",   |
|   |  | <u>Bearer information</u><br>BNC-ID: = 3333,<br>BNCL-ID = 1003,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The access node issues information flow 8 toward BIWF(E2). Information flow (8)'s link information was determined from the link information received in information flow 7. ACN (1) awaits the bearer commitment information from BIWF(E2).

|   |   |   |  |
|---|---|---|--|
| 8 | Bearer-Setup.Req  | ACN(1) to ACN(E2)                             |  |
|   | <u>Address Information</u><br>(ACN Address) = E2(E1),<br>BIWF Addr = E2(E1) | <u>Control information</u><br>BCS-ID = "207", | <u>Bearer information</u><br>BNC-ID: = 3333,<br>BNCL-ID = 1007,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Access Control function that a bearer has been established between ISN-A and ACN-E with BNC-ID = 3333. This is done in information flow 9. ACN-E may cut-through the access network to the terminal.

ACF-E correlates the bearer with the terminal information received in information flow 1, ACI. The associated Access Control function correlates the incoming bearer request with the incoming call request using BNC-ID = 3333 and USER-ID = 2000. ACF-E issues a notification response to BCF-E. ACN-E awaits further notification of changes to the bearer.

BCF-E issues information flow 9 toward Access Node 1 to confirm the bearer establishment, and to complete establishment of the bearer in the reverse direction.

The Access Control function in ACN(E) notifies the ACF-N in ISN-A that the BNC is established in an ACI message. ACN-E may cut-through the new Access network connection to the terminal, if not already completed.

|    |                            |   |  |
|----|----------------------------|---|--|
| 10 | ACI (BNC_Established)      | ACF-E(2) to ACF-N   |  |
|    | <u>Address Information</u> | <u>Control information</u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>BNC_Established | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flows 8 and 9.

**Processing upon receipt:** When the ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It notifies CSM in ISN-A.

CSM in ISN-A updates the call state. CSM in ISN-A exchanges information with the opposite half of ISN-A indicating that the connection is available. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use.

|    |                            |  |  |
|----|----------------------------|--|--|
| 12 | Bearer-Setup.Connect       | ACN(E2) to ACN(1)                            |  |
|    | <u>Address Information</u> | <u>Control information</u><br>BCS-ID = "207" | <u>Bearer information</u><br>BNCL-ID = 1007, |

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** The access node notes the confirmation of the establishment request and issues information flow 10 toward BIWF(E1).

---

|    |                            |   |  |
|----|----------------------------|---|--|
| 13 | Bearer-Setup.Confirm       | ACN(1) to ACN(E1)                           |  |
|    | <u>Address Information</u> | <u>Control information</u><br>BCS-ID = "27" | <u>Bearer information</u><br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** The BCF-E records the establishment of the Access connection and notifies its associated access control function that the requested bearer setup is complete and the BNC is established.

The Access Control function in ACN(E) notifies the ACF-N in ISN-A that the BNC is established in an ACI message. ACN-E may cut-through the new Access network connection to the terminal, if not already completed.

---

|    |                            |   |  |
|----|----------------------------|---|--|
| 15 | ACI (BNC_Established)      | ACF-E(1) to ACF-N   |  |
|    | <u>Address Information</u> | <u>Control information</u><br>ACA-ID = 900,<br>USER-ID = 3000,<br>Port-ID = 30,<br>Connection ID = 300<br>BNC_Established | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** When the ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It notifies CSM in ISN-A.

CSM in ISN-A updates the call state. CSM in ISN-A exchanges information with the opposite half of ISN-A indicating that the connection is available. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use.

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#### Access network bearer Cut-through at the ACN-T:

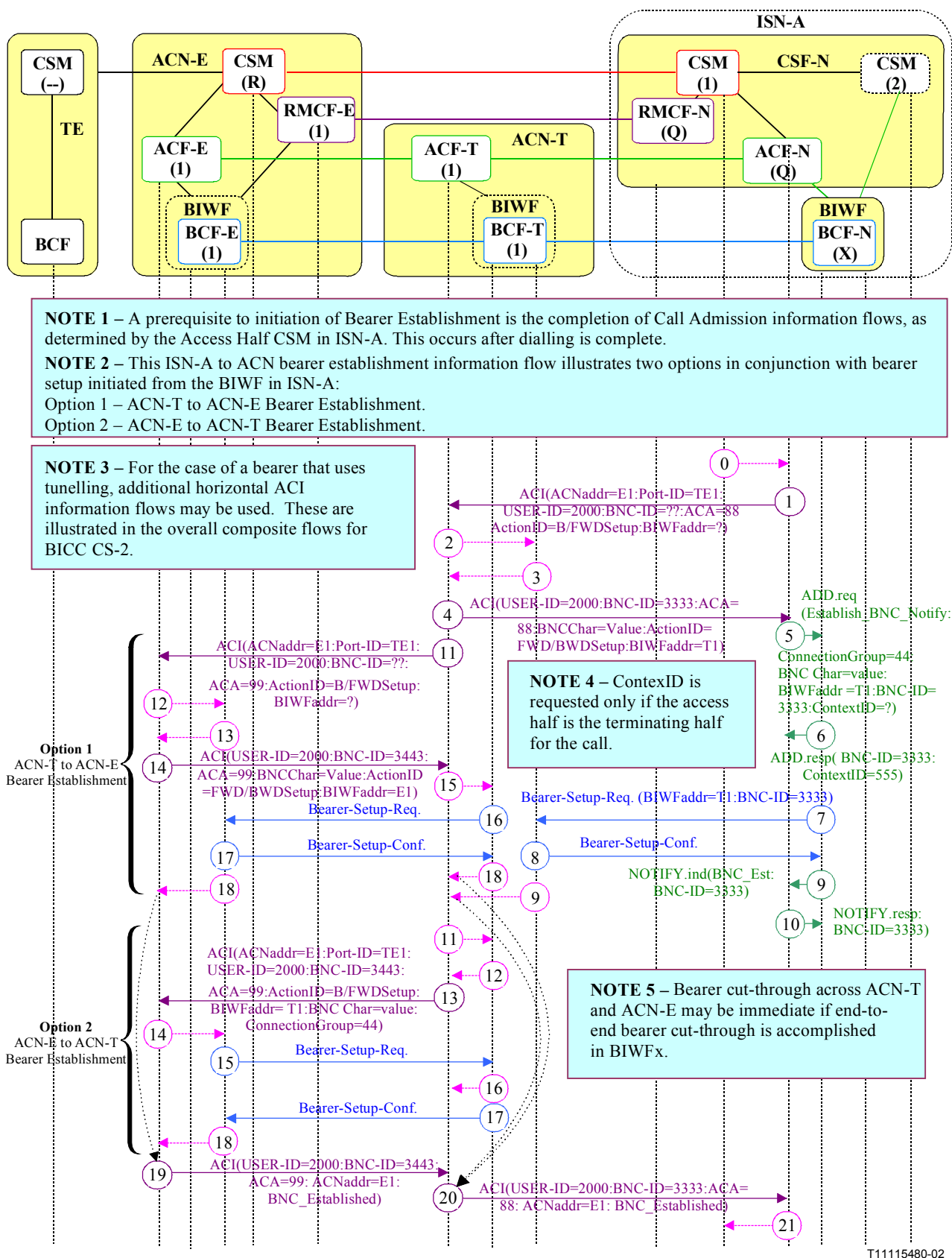
- Cut-through always occurs on the user side of ISN-A, ACN-T, or ACN-E. This means that the remote media protocol is used to control cut-through in ACN-Es and that the vertical CBC protocol is used to control cut-through in BIWFX, while the access control protocol is used to control bearer cut-through at ACN-Ts.
- Information flows addressed to BIWFX, ACN-T, or ACN are used to accomplish bearer cut-through. For example access control information (ACI) addressed to ACN-T with a cut-through (forward, backward, or forward/backward) parameter will initiate cut-through.
- Cut-through across an ACN-T or an ACN-E may be immediate, or may be provisioned in the network, if end-to-end cut-through is controlled in BIWFX.
- End-to-end bearer cut-through is part of the Call Establishment information flows rather than Bearer Establishment information flows. This is because receipt of ANSWER in the call control protocol is typically used to initiate end-to-end bearer cut-through.
- End-to-end bearer cut-through occurs only when the CSM in ISN/IMN-A is notified that the bearer is established across the access network.
- Cut-through on ANSWER is described in the BICC Access Network requirements baseline. Cut-through occurs in both directions when ANSWER is detected at the terminating ISN/IMN. Cut-through is delayed in the forward direction until ANSWER is detected at the originating ISN/IMN.

- CSM in ISN/IMN-A is notified of bearer connectivity across the access network to ACN-E by ACF-N. Two information flows are received by ACF-N to trigger this notification. The first information flow is the access control response indicating bearer continuity. It is received from ACN-E and is cascaded through the intermediate ACNs to affirm bearer availability at all intermediate points. The second information flow is the local response, from BCF-N (not applicable to the IMN configuration). It indicates that the termination and context are available.

#### **Operation of ACN-T:**

- The ACN-T contains routing tables that allow it to route messages to the subtending ACNs, e.g. ACN-Es and ACN-Ts, in the BICC Access Network as well as to ISN/IMNs in which domain the access nodes are configured.
- The ACN-T reads and reacts to the contents of all access control messages regardless of the destination address. e.g. ISN/IMN, ACN-E or ACN-T. Actions at the ACN-T may include routing of the contents to the final destination, e.g. ACF-E or ACF-N, and initiation of actions related to the bearer within ACN-T.
- The ACN-T contains tables that contain information about BIWFs and their capabilities within its domain. It may also contain information regarding capabilities of BIWFs in ACN-Es that subtend from the ACN-T.

Although the information flows for the ACN-T are based on an access network configured with an ISN, they also apply, with modifications described in clause 16, to the access network configured with an IMN.



**Figure 21 – Bearer establishment through ACN-T – ISN-A to ACN-E – Terminal independent**

#### 15.4.4 Bearer establishment through ACN-T – ISN-A to ACN-E – Terminal independent

The information flows and functional entity actions illustrated in Figure 21 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |  |  |  |
|---|--|--|--|
| 0 | CSM(1) to ACF-N  |  |  |
|   | <b><u>Address Information</u></b><br>ACN Address = E1,<br>Logical Port ID = TE1,<br>Connection ID = 200, | <b><u>Control information</u></b><br>User-ID = 2000,<br>Primitive = Connect Forward/Backward<br>Primitive = Cut-through Forward/Backward | <b><u>Bearer information</u></b><br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** CSM(1) receives a request from a terminal or from the network to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** When ACF-N receives this information flow, it constructs a request for a BNC-ID and BIWF Address. It sends the request to ACF-T. The request also contains BNC Characteristics, the ACN address, the Connection Group for use by BCF-T to provide bearer setup information.

---

|   |   |  |  |  |  |  |
|---|---|--|--|--|--|--|
| 1 | ACI (BNC_Request)   |  |  | ACF-N to ACF-T   |  |  |
|   | <b><u>Address Information</u></b><br>ACN Address = E1,<br>Logical Port-ID = TE1,<br>User-ID = 2000,<br>Connection ID = 200,<br>ISN Address = ISN1 | <b><u>Control information</u></b><br>ACA-ID = 88,<br>BIWF Address = ?<br>Primitive = (BNC_Request)<br>Primitive = Connect Forward/Backward<br>Primitive = Cut-through Forward/Backward |  | <b><u>Bearer information</u></b><br>BNC-ID = ???<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |  |  |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-T receives this information flow, it requests a BNC-ID from BCF-T and determines a BIWF address = T1 to be used for the bearer connection.

The BIWF's BCF-T determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3333. It constructs a response to ACF-T with the requested Access network parameters. The bearer BNCL characteristics contained in information flow 4 were determined from the Bearer Service Information contained in information flow 1.

ACF-T sends a response to ACF-N containing the BNC-ID = 3333, BIWFaddr = T1 and BNCL characteristics.

##### For Option 1:

ACF-T constructs a request for a BNC-ID and BIWF Address. It sends the request to ACF-E. The request also contains BNC Characteristics, the ACN address = E1, the Connection Group for use by BCF-E to provide bearer setup information.

##### For Option 2:

ACF-T constructs a request to the BCF-T containing BNC Characteristics, the ACN address, the Connection Group. BCF-T is requested to provide bearer setup information including BNC-ID.

BCF-T determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3443 and selects a bearer based on Bearer Service Characteristics and Connection Group 44. It constructs a response to ACF-T with the requested Access network parameters.

ACF-T then issues information flow 11 toward ACF-E. Information flow 11 contains the bearer setup information and a request to establish the bearer. The bearer BNCL characteristics contained in information flow 11 were determined from the Bearer Service Information contained in information flow 1.

|   |  |  |
|---|--|--|
| 4 | ACI (Establish_BNC)  | ACF-T to ACF-N   |
|   | <u>Address Information</u><br>ACF Address = ISN1,<br>ACN Address = T1, | <u>Control information</u><br>ACA-ID = 88,<br>BIWF Addr = T1,<br>Primitive = Establish_BNC   |
|   |  | <u>Bearer information</u><br>BNC-ID = 3333<br>Connection Group = 44<br>BNC Characteristics = value<br>BCNL Characteristics = value |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow it initiates information flow 5 toward the BCF-N in order to request a bearer connection with the requested bearer characteristics, BNC-ID = 3333, optional Connection Group = 44 with instructions to establish a BNC. It provides the BNCL Characteristics and requests a ContextID. The interface serving node awaits the commitment information flow from the selected bearer control function.

|                            |   |   |
|----------------------------|---|---|
| 5                          | ADD.req (Establish_BNC_Notify)  | ACF-N to BCF-N  |
| <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u>   |
| BIWF Address = N1          | BIWFaddr = T1,<br>ContextID = ???<br>Primitive = Establish_BNC_Notify | BNC-ID: = 3333,<br>Connection Group = 44<br>BNCL Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The BCF-N validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(X) and BIWF(T1). BCF-N, based on Connection Group 44, proceeds to establish the requested Access network connection by issuing information flow 7 toward the selected BCF-T. The BNC-ID = 3333 is inserted to carry across the bearer access connection for association with the call in ACN-T. The bearer BNCL characteristics contained in information flow 5 were determined from the Bearer Service Information contained in information flow 4. BCF-N responds to ACF-N with the ContextID = 555.

BCF-N awaits the bearer confirmation information from BCF-T.

|   |  |   |  |
|---|--|---|--|
| 6 | ADD.resp   | BCF-N to ACF-N  |  |
|   | <u>Address Information</u><br>ACF Address = ISN1 | <u>Control information</u><br>ContextID = 555<br>Primitive = Establish BNC Notify | <u>Bearer information</u><br>BNC-ID = 3333<br>BNCL Characteristics |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** When ACF-N receives this information flow it may notify ISN-A's CSM(1) that the BNC-ID = 3333 and ContextID = 555 are assigned.

|   |   |  |
|---|---|--|
| 7 | <b>Bearer-Setup.Reg</b>                             | <b>BCF-N to BCF-T</b>  |
|   | <u><b>Address Information</b></u><br>BIWF Addr = T1 | <u><b>Control information</b></u><br>BCS-ID = "15",  |
|   |   | <u><b>Bearer information</b></u><br>BNC-ID: = 3333,<br>BNCL-ID = 1004,<br>{BNCL Characteristics} |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** BCF-T records the establishment of the Access connection and may notify its associated access control function of the request. It may issue an information flow toward BCF-N establishing the reverse path or confirming the establishment of a bidirectional bearer. The return information flow s link information was determined from the link information received in information flow 7.

|   |  |   |
|---|--|---|
| 8 | <b>Bearer-Setup.Connect</b>                        | <b>BCT-T to BCF-N</b>                               |
|   | <u><b>Address Information</b></u><br>BIWF Addr = x | <u><b>Control information</b></u><br>BCS-ID = "15"  |
|   |  | <u><b>Bearer information</b></u><br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** BCF-N records the establishment of the Access connection, and issues information flow 9 notifying its associated access control function that the requested bearer setup is complete.

|   |   |  |
|---|---|--|
| 9 | <b>NOTIFY.ind (BNC_Established)</b>                     | <b>BCF-N to ACF-N</b>  |
|   | <u><b>Address Information</b></u><br>ACF Address = ISN1 | <u><b>Control information</b></u><br>Primitive = BNC_Established |
|   |   | <u><b>Bearer information</b></u><br>BNC-ID = 3333                |

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** When ACF-N receives this information flow it awaits a confirmation from ACN-T that the bearer to ACN-E is established. It then notifies CSM in ISN-A that the BNC-ID = 3333 is established and that ContextID = 555 is assigned to the local terminations, as determined from information flow 6. It issues a notification response to BCF-N and awaits further notification of changes to the bearer.

CSM in ISN-A updates the call state. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use.

|    |  |  |
|----|--|--|
| 10 | <b>NOTIFY.resp</b>                                     | <b>ACF-N to BCF-N</b>  |
|    | <u><b>Address Information</b></u><br>BIWF Address = N1 | <u><b>Control information</b></u><br>Primitive = BNC_Established |
|    |  | <u><b>Bearer information</b></u><br>BNC-ID: = 3333               |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** BCF-N records the response. It awaits further instructions from the ACF-N or BCF-T.

| 11(1) | ACI (BNC_Request)   | ACF-T to ACF-E   |
|-------|---|--|
|       | <u><b>Address Information</b></u><br>ACN Address = E1,<br>Logical Port-ID = TE1,<br>User-ID = 2000,<br>Connection ID = 200,<br>ACN Address = T1 | <u><b>Control information</b></u><br>ACA-ID = 99,<br>BIWF Address = ?<br>Primitive = (BNC_Request)<br>Primitive = Connect Forward/Backward<br>Primitive = Cut-through Forward/Backward |
|       |   | <u><b>Bearer information</b></u><br>BNC-ID = ???<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value   |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When the ACF-E receives this information flow, it requests a BNC-ID from BCF-E and determines a BIWF = E1 to be used for the bearer connection.

The BCF-E determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3443. It constructs a response to ACF-E with the requested Access network parameters. The bearer BNCL characteristics contained in information flow 4 were determined from the Bearer Service Information contained in information flow 1.

ACF-E sends information to ACF-T containing the BNC-ID = 3443, BIWFaddr = E1 and BNCL characteristics.

ACN-E may request reservation of the termination to TE1 in ACN-E, as well as any other resources required for the connection in ACN-E. It may also hold-off dial tone requests from TE1. These functions, however, are requirements of the remote media control.

| 14(1) | ACI (Establish_BNC)   | ACF-E to ACF-T   |
|-------|---|--|
|       | <u><b>Address Information</b></u><br>ACN Address = T1,<br>User-ID = 2000,<br>Logical Port-ID = TE1,<br>Connection ID = 200,<br>ACN Address = E1 | <u><b>Control information</b></u><br>ACA-ID = 99,<br>BIWF Addr = E1,<br>Primitive = Establish_BNC        |
|       |   | <u><b>Bearer information</b></u><br>BNC Characteristics = value<br>BNC-ID = 3443<br>BCNL Characteristics |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** When the ACF-T receives this information flow it initiates information flow 15 toward the selected bearer control function BCF-T with the requested bearer characteristics, a BNC-ID = 3443, and a Connection Group = 44 in order to request a bearer connection. It provides the BNCL Characteristics.

BCF-T validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(T1) and BIWF(E1). BCF-T, based on Connection Group 44, proceeds to establish the requested Access network connection by issuing information flow 16 toward the selected BCF-E. The BNC-ID = 3443 is inserted to carry across the bearer access connection for association with the call in ACN-E. The bearer BNCL characteristics contained in information flow 16 were determined from the Bearer Service Information contained in information flow 14.

BCF-T awaits the confirmation information from BCF-E.

|       |  |  |
|-------|--|--|
| 16(1) | Bearer-Setup.Reg                             | BCF-T to BCF-E   |
|       | <u>Address Information</u><br>BIWF Addr = E1 | <u>Control information</u><br>BCS-ID = "27",   |
|       |  | <u>Bearer information</u><br>BNC-ID: = 3443,<br>BNCL-ID = 1003,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** BCF-E records the establishment of the Access connection and may notify its associated access control function of the requested bearer setup. It may issue an information flow toward BCF-T establishing the reverse path or confirming the establishment of a bidirectional bearer. The return information flow's link information was determined from the link information received in information flow 16.

ACF-E notifies ACF-T that the BNC is established.

|       |  |  |
|-------|--|--|
| 17(1) | Bearer-Setup.Connect                         | BCF-E to BCF-T                               |
|       | <u>Address Information</u><br>BIWF Addr = T1 | <u>Control information</u><br>BCS-ID = "27"  |
|       |  | <u>Bearer information</u><br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 16.

**Processing upon receipt:** BCF-T records the establishment of the Access connection, and may issue an information flow notifying its associated access control function that the requested bearer setup is complete and connection is established.

ACF-T returns information toward ISN-A after receiving confirmation, from ACF-E (Option 2) and/or BCF-T (Option 1), indicating that the bearer connection is established to ACN-E. It includes the identification address of ACN-E as part of the response to indicate the source of the information.

|       |   |  |
|-------|---|--|
| 13(2) | ACI (Establish_BNC)   | ACF-T to ACF-E   |
|       | <u>Address Information</u><br>ACN Address = E1,<br>User-ID = 2000,<br>Logical Port-ID = TE1,<br>Connection ID = 200,<br>BIWF Address = T1 | <u>Control information</u><br>ACA-ID = 99,<br>Primitive = Establish_BNC,<br>Primitive = Connect Backward/Forward                     |
|       |   | <u>Bearer information</u><br>BNC-ID = 3443<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** Processing of information flow 12, in which BCF-T determined that no existing idle Access connection meets the requirements. It assigned a unique BNC-ID of 3443. The bearer service characteristics and BNC characteristics contained in information flow 13 were determined from the Bearer Service Information contained in information flow 1.

**Processing upon receipt:** When the ACN's ACF-E receives this information flow, it notes a pending connection for TE1. It then requests BCF-E to initiate a connection with parameters provided in flow 11 by BCF-T.

The access node validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(E1) and BIWF(T1). BCF-E initiates an access bearer connection with the parameters provided in information flow 11, and selects a bearer based on Connection Group 44. The BNC-ID = 3443 is conveyed across the bearer access connection for association with the call in BCF-T. Information flow (14)'s link information was determined from the link information received in information flow 12.

ACN-E awaits the bearer commitment information from ACN-T. ACN-E may also request reservation of the termination to TE1 and may hold-off dial tone requests from TE1, although this function is a requirement of the remote media control protocol.

|       |   |   |
|-------|---|---|
| 15(2) | <b>Bearer-Setup.Req</b>                             | <b>BCF-E to BCF-T</b>   |
|       | <u><b>Address Information</b></u><br>BIWF Addr = T1 | <u><b>Control information</b></u><br>BCS-ID = "27",   |
|       |   | <u><b>Bearer information</b></u><br>BNC-ID: = 3333,<br>BNCL-ID = 1003,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** BCF-T records the establishment of the Access connection and may notify its associated access control function of the requested bearer setup. It may issue an information flow toward BCF-E establishing the reverse path or confirming the establishment of a bidirectional bearer. The access node issues information flow 16 toward BCF-E. Information flow (17)'s link information was determined from the link information received in information flow 15.

|       |   |  |
|-------|---|--|
| 17(2) | <b>Bearer-Setup.Confirm</b>                         | <b>BCF-T to BCF-E</b>                              |
|       | <u><b>Address Information</b></u><br>BIWF Addr = E1 | <u><b>Control information</b></u><br>BCS-ID = "27" |
|       |   | <u><b>Bearer information</b></u><br>BNC-ID = 1003, |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** The BCF-E records the establishment of the Access connection and notifies its associated access control function that the requested bearer setup is complete and the BNC is established.

ACF-E notifies ACF-T that the BNC is established.

ACN-E may cut through the new Access network connection to the terminal, if not already completed, although cut-through to the terminal is controlled by remote media information flows.

|    |   |  |
|----|---|--|
| 19 | <b>ACI (BNC_Established)</b>  | <b>ACF-E to ACF-T</b>  |
|    | <u><b>Address Information</b></u><br>ACN Address = T1,<br>User-ID = 2000,<br>Logical Port-ID = TE1,<br>Connection ID = 200,<br>ACN Address = E1 | <u><b>Control information</b></u><br>ACA-ID = 99,<br>Primitive = BNC_Established |
|    |   | <u><b>Bearer information</b></u><br>BNC-ID = 3443<br>BCNL Characteristics        |

**Initiation of information flow:** Processing of information flow(s) 18 and flow 9, notifications of bearer establishment in the ACN-E and the ACN-T.

**Processing upon receipt:** When ACF-T receives this information flow it notifies ACF-N in ISN-A that the BNC to ACN-E is established by forwarding information flow 20 that contains the ACN-E address. It awaits further notification of changes to the bearer.

**Address Information**

ACF Address = ISN1,  
User-ID = 2000,  
Logical Port-ID = TE1,  
Connection ID = 200,  
ACN Address = E1

**Control information**

ACA-ID = 88,  
Primitive = BNC\_Established

**Bearer information**

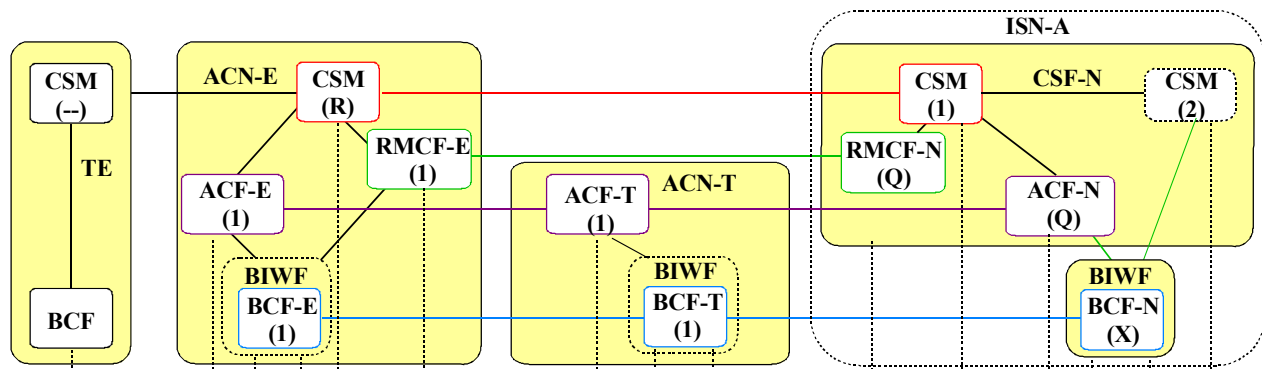
BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 19.

**Processing upon receipt:** When ACF-N receives this information flow it awaits a confirmation from BCF-N that the bearer to ACN-T is established. It then notifies CSM in ISN-A that the BNC-ID = 3333 is established and that ContextID = 555 is assigned to the local terminations, as determined from information flow 6. It awaits further notification of changes to the bearer.

CSM in ISN-A updates the call state. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use. It may send cut-through instructions to ACN-T if it has not already done so, or if cut-through in ACN-T is not controlled by the ANSWER procedures.

---



**NOTE 1** – A prerequisite to initiation of Bearer Establishment is the completion of the Call Admission flows, as determined by the Access Half CSM in ISN-A. This occurs after dialling is complete.

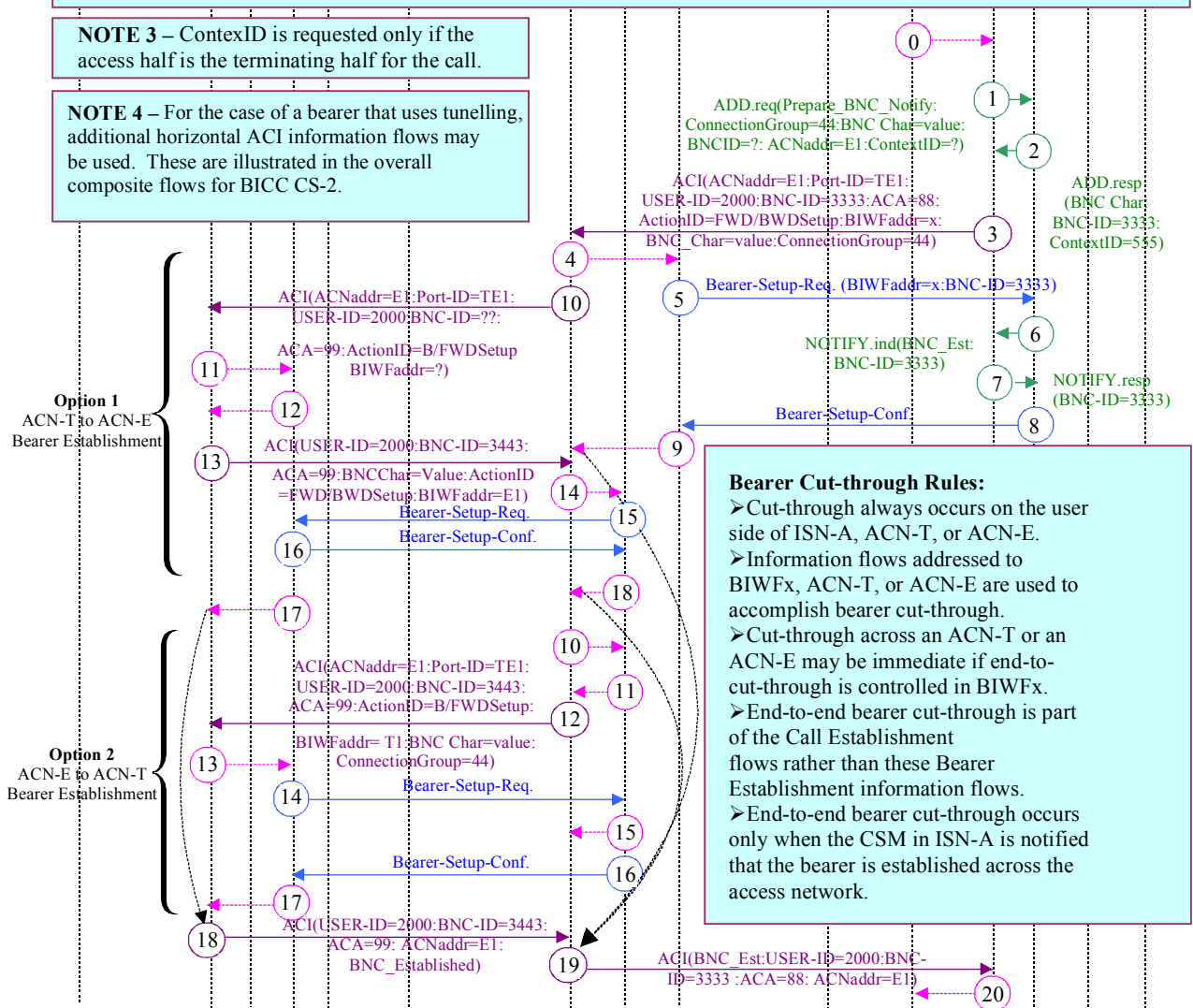
**NOTE 2** – This ACN to ISN-A bearer establishment information flow illustrates two options in conjunction with bearer setup initiated from the domain of ACN-E and ACN-T:

Option 1 – ACN-T to ACN-E Bearer Establishment.

Option 2 – ACN-E to ACN-T Bearer Establishment.

**NOTE 3** – ContextID is requested only if the access half is the terminating half for the call.

**NOTE 4** – For the case of a bearer that uses tunnelling, additional horizontal ACI information flows may be used. These are illustrated in the overall composite flows for BICC CS-2.



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**Figure 22 – Bearer establishment through ACN-T – ACN-E to ISN-A – Terminal independent**

### 15.4.5 Bearer establishment through ACN-T – ACN-E to ISN-A – Terminal independent

The information flows and functional entity actions illustrated in Figure 22 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |   |  |  |
|---|---|--|--|
| 0 | CSM(1) to ACF-N   |  |  |
|   | <b><u>Address Information</u></b><br>Logical Port ID = TE1,<br>Connection ID = 200,<br>ACN Address = E1 | <b><u>Control information</u></b><br>User-ID = 2000,<br>Primitive = Connect Forward/Backward<br>Primitive = Cut-through<br>Forward/Backward/Both | <b><u>Bearer information</u></b><br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** CSM(1) receives a request from a terminal or the network to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** When ACF-N receives this information flow, it constructs a request to the BCF-N containing BNC Characteristics, the ACN address, the Connection Group. BCF-N is requested to provide bearer setup information including BNC-ID, and ContextID.

---

|   |  |  |   |
|---|--|--|---|
| 1 | ADD.req (Prepare_BNC_Notify)                           |  | ACF-N to BCF-N  |
|   | <b><u>Address Information</u></b><br>BIWF Address = N1 | <b><u>Control information</u></b><br>BIWFAddr = ???,<br>ContextID = ???,<br>Primitive = Prepare_BNC_Notify | <b><u>Bearer information</u></b><br>BNC-ID: = ???<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The BIWF's BCF-N determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3333, a Context ID of 555, and selects a bearer based on Connection Group 44. It constructs a response to ACF-N with the requested Access network parameters and issues information flow 2 toward ACF-N. The bearer BNCL characteristics contained in information flow 2 were determined from the Bearer Service Information contained in information flow 1. The ACF-N awaits the commitment information flow from the selected BCF-N.

---

|   |   |  |   |
|---|---|--|---|
| 2 | ADD.resp  |  | BCF-N to ACF-N  |
|   | <b><u>Address Information</u></b><br>ACF Address = ISN1 | <b><u>Control information</u></b><br>BIWF Addr = x,<br>ContextID = 555<br>Primitive = Prepare_BNC_Notify | <b><u>Bearer information</u></b><br>BNC-ID = 3333<br>BNC Characteristics = value<br>BNCL Characteristics = values |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When ACF-N receives this information flow it may notify CSM in ISN-A that the BNC-ID = 3333 and ContextID = 555 are assigned. It issues information flow 4 toward the selected terminating ACF-E. The User-ID = 2000, BNC-ID = 3333, BIWFAddr = x, Logical Port ID = TE1, and Connection ID are inserted in the information for association between the call and the bearer in ACN-T and in ACN-E. It awaits confirmation of the bearer access connection from ACF-E.

CSM in ISN-A may indicate that the context is assigned to the opposite half of the CSF.

| 3 | ACI (Establish_BNC)  | ACF-N to ACF-T   |
|---|--|--|
|   | <u>Address Information</u><br>ACN Address = E1,<br>Logical Port-ID = TE1,<br>User-ID = 2000,<br>Connection ID = 200,<br>ISN Address = ISN1 | <u>Control information</u><br>ACA-ID = 88,<br>BIWF Address = x,<br>Primitive = (Establish_BNC)<br>Primitive = Connect Backward/Forward<br>Primitive = Cut-through Forward/Backward |
|   |  | <u>Bearer information</u><br>BNC-ID = 3333<br>Connection Group = 44<br>BNC Characteristics = value<br>BCNL Characteristics = value   |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** When the ACN's ACF-T receives this information flow, it validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(T1) and BIWF(X). It requests BCF-T to initiate a connection with parameters provided in flow 2 by BCF-N.

BCF-T initiates an access bearer connection with the parameters provided in information flow 3, and selects a bearer based on BNC Characteristics, BNCL Characteristics, and Connection Group 44. The BNC-ID = 3333 is conveyed across the bearer access connection for association with the call in BCF-N. Information flow (5)'s link information was determined from the link information received in information flow 3. BCF-T awaits the bearer commitment information from BCF-N.

#### For Option 1:

ACF-T constructs a request for a BNC-ID and BIWF Address. It sends the request to ACF-E. The request also contains BNC Characteristics, the ACN address = E1, the Connection Group for use by BCF-E to provide bearer setup information.

#### For Option 2:

ACF-T constructs a request to the BCF-T containing BNC Characteristics, the ACN address, the Connection Group. BCF-T is requested to provide bearer setup information including BNC-ID.

BCF-T determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3443 and selects a bearer based on Bearer Service Characteristics and Connection Group 44. It constructs a response to ACF-T with the requested Access network parameters.

ACF-T then issues information flow 11 toward ACF-E. Information flow 11 contains the bearer setup information and a request to establish the bearer. The bearer BNCL characteristics contained in information flow 11 were determined from the Bearer Service Information contained in information flow 1.

| 5 | Bearer-Setup.Req                            | BCF-T to BCF-N   |
|---|---|--|
|   | <u>Address Information</u><br>BIWF Addr = x | <u>Control information</u><br>BCS-ID = "15",   |
|   |   | <u>Bearer information</u><br>BNC-ID: = 3333,<br>BNCL-ID = 1004,<br>{BNCL Characteristics}, |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Access Control function that a bearer has been established between ISN-A and ACN-T with a BNC-ID = 3333. This is done in information flow 6. It may also indicate that the ContextID = 555 is used, if it has not already done so. It may issue an information flow toward BCF-T establishing the reverse path or confirming the establishment of a bidirectional bearer. The return information flow's link information was determined from the link information received in information flow 3.

|   |  |  |
|---|--|--|
| 6 | NOTIFY.ind (BNC_Established)                     | BCF-N to ACF-N   |
|   | <u>Address Information</u><br>ACF Address = ISN1 | <u>Control information</u><br>Primitive = BNC Established<br>ContextID = 555 |
|   |  | <u>Bearer information</u><br>BNC-ID = 3333                                   |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The Access Control function correlates the incoming bearer request with the call request using BNC-ID = 3333. ACF-N issues a notification response to BCF-N. It awaits further notification of changes to the bearer.

|   |   |   |
|---|---|---|
| 7 | NOTIFY.resp (BNC_Established)                   | ACF-N to BCF-N  |
|   | <u>Address Information</u><br>BIWF Address = N1 | <u>Control information</u><br>Primitive = BNC_Established |
|   |   | <u>Bearer information</u><br>BNC-ID = 3333                |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** BCF-N notes the response.

|   |  |  |
|---|--|--|
| 8 | Bearer-Setup.Confirm                         | BCF-N to BCF-T                               |
|   | <u>Address Information</u><br>BIWF Addr = T1 | <u>Control information</u><br>BCS-ID = "15"  |
|   |  | <u>Bearer information</u><br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The BCF-T records the establishment of the Access connection and notifies its associated access control function ACF-T that the requested bearer setup is complete and the BNC is established.

The Access Control function ACF-T in ACN-T notifies the ACF-N in ISN-A that the BNC is established after receiving confirmation, from ACF-E (Option 2) and/or BCF-T (Option 1), that the bearer is connected through ACN-E. It returns the ACN-E address as part of the response to indicate the source of the information.

#### 10-18 Option 1 and Option 2 Information Flows between ACN-T and ACN-E

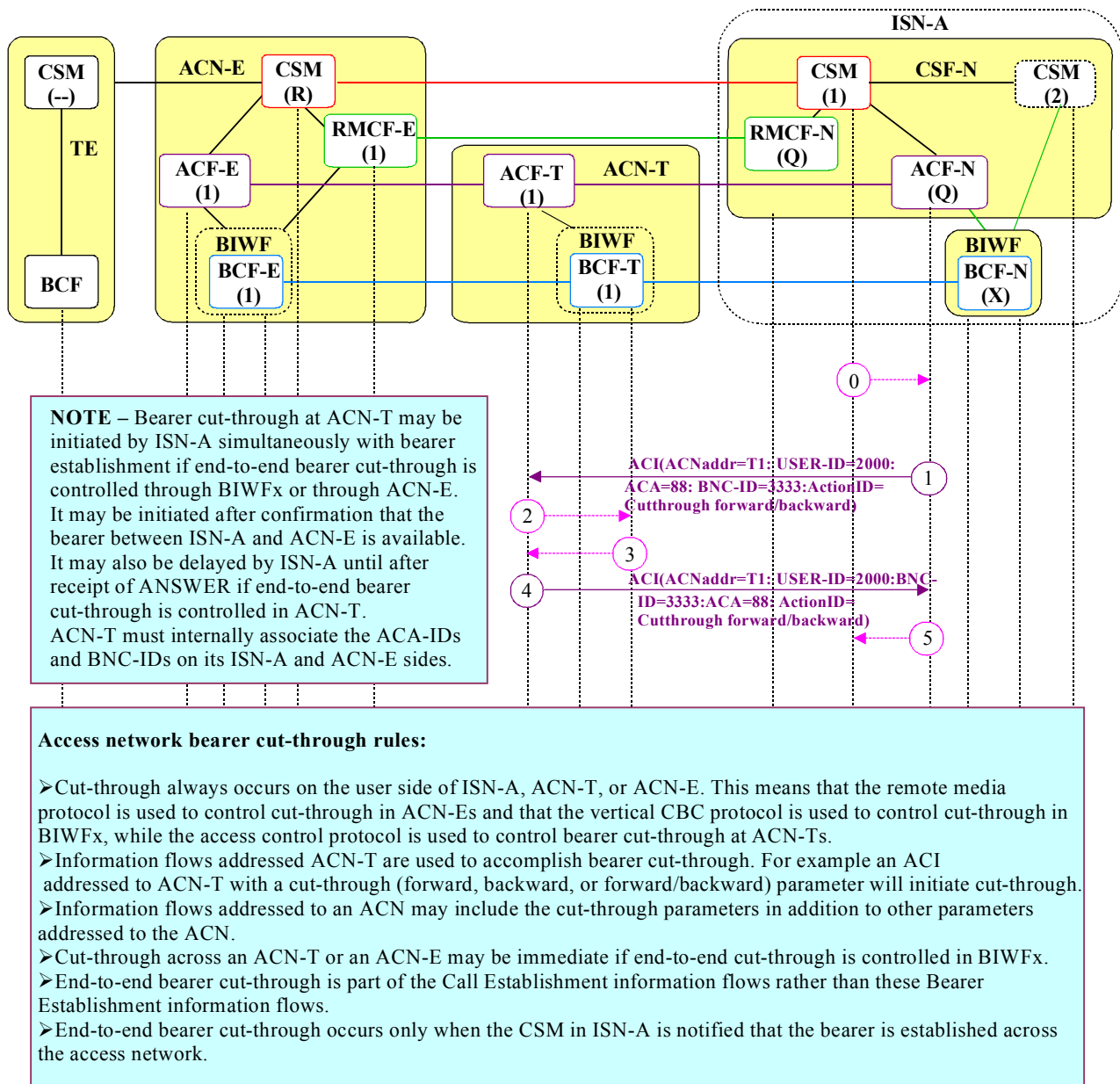
The information flows between ACN-T and ACN-E for both option 1 and option 2 are equivalent to those previously described.

|    |  |   |
|----|--|---|
| 19 | ACI (BNC_Established)  | ACF-T to ACF-N  |
|    | <u>Address Information</u><br>ACF Address = ISN1,<br>User-ID = 2000,<br>Logical Port-ID = TE1,<br>Connection ID = 200,<br>ACN Address = E1 | <u>Control information</u><br>ACA-ID = 88,<br>Primitive = BNC_Established |
|    |  | <u>Bearer information</u><br>BNC-ID = 3333                                |

**Initiation of information flow:** Processing of information flow(s) 18 and flow 9, bearer establishment in the ACN-E and the ACN-T.

**Processing upon receipt:** When the ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It awaits a confirmation from BCF-N that the context is assigned. It then notifies CSM in ISN-A that the BNC-ID = 3333 is established and that ContextID = 555 is assigned to the local terminations, as determined from information flows 2 or 6. It awaits further notification of changes to the bearer.

CSM in ISN-A updates the call state. CSM in ISN-A exchanges information with the opposite half of ISN-A indicating that the connection is available. It begins to send and receive appropriate control signals to/from CSM(R), according to the call control protocol that is in use. It may send cut-through instructions to ACN-T if it has not already done so, or if cut-through in ACN-T is not controlled by the ANSWER procedures.



T11115500-02

**Figure 23 – Bearer cut-through in ACN-T – Terminal independent**

#### 15.4.6 Bearer cut-through in ACN-T – Terminal independent

The information flows and functional entity actions illustrated in Figure 23 are described in the following numbered paragraphs. The bearer cut-through information flows follow the bearer establishment information flows and precede the call establishment information flows. Bearer cut-through, however, may begin during the bearer establishment stage. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |  |  |                           |
|---|--|--|---------------------------|
| 0 | CSM(1) to ACF-N  |  |                           |
|   | <u>Address Information</u>   | <u>Control information</u>                                 | <u>Bearer information</u> |
|   | Logical Port-ID = TE1,<br>Connection ID = 200,<br>ACN Address = T1 | User-ID = 2000,<br>Primitive = Cutthrough Forward/Backward | BNC-ID = 3333             |

**Initiation of information flow:** CSM(1) determines that the bearer in a transit ACN-T should be connected through either one or both directions, forward and/or backward.

**Processing upon receipt:** When ACF-N receives this information flow, it constructs a request to cut through the bearer in a transit ACN-T. It includes the ACN address, User-ID, ACA-ID, BNC-ID, and the primitives indicating the direction of cut-through. for a BNC-ID and BIWF Address. It sends the request to ACF-T.

---

|   |                                      |  |                           |
|---|--------------------------------------|--|---------------------------|
| 1 | ACI (Cutthrough_BNC)                 |  | ACF-N to ACF-T            |
|   | <u>Address Information</u>           | <u>Control information</u>                                   | <u>Bearer information</u> |
|   | ACN Address = T1,<br>User-ID = 2000, | ACA-ID = 88,<br>Primitive = Cutthrough Forward/Backward/Both | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-T receives this information flow, it requests that BCF-T cut through the BNC-ID = 3333 to the associated BNC-ID = 3443 on the "BCF-E side" of BCF-T.

BCF-T responds to ACF-T when the action is complete.

ACF-T responds to ACF-N that the action is complete.

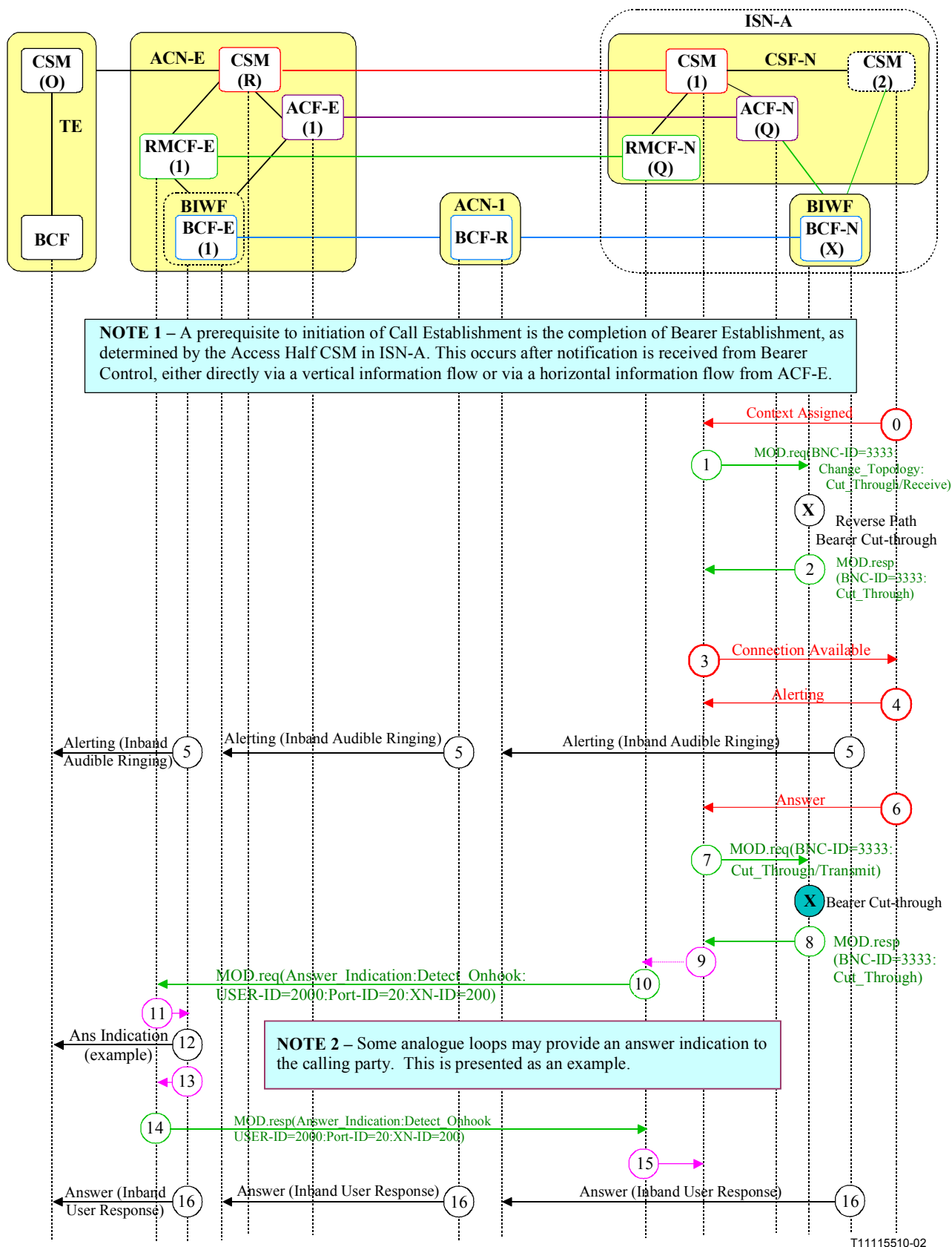
---

|   |  |  |                           |
|---|--|--|---------------------------|
| 4 | ACI (BNC_Cutthrough)                                       |  | ACF-T to ACF-N            |
|   | <u>Address Information</u>                                 | <u>Control information</u>                                   | <u>Bearer information</u> |
|   | ACF Address = ISN1,<br>User-ID = 2000,<br>ACN Address = T1 | ACA-ID = 88,<br>Primitive = Cutthrough Forward/Backward/Both | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow it may inform CSM(1) that the action is complete.

## 15.5 Call establishment



T11115510-02

Figure 24 – Call establishment – Terminal originated – Stimulus-based

### 15.5.1 Call establishment – Terminal originated – Stimulus-based

The information flows and functional entity actions illustrated in Figure 24 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. Analogue loops vary in the types and sequences of signals used for call admission and call establishment. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |   |
|---|----------------------------|---|
| 0 | Context Assigned           | CSM(2) to CSM(1)  |
|   | <u>Address Information</u> | <u>Control information</u><br><u>Bearer information</u> |

---

**Initiation of information flow:** CSM(2) obtains a contextID and a terminationID for the new call.

**Processing upon receipt:** CSM(1) associates the originating and terminating contexts in ISN-A.

---

|   |   |  |
|---|---|--|
| 1 | MODIFY.req (Change_Topology)(Cut_Through/Receive) | CSM(1) to BIWFX  |
|   | <u>Address Information</u>                        | <u>Control information</u><br>Port-ID = 20,<br>ContextID = new<br>Primitive = Change_Topology<br>Primitive = Cut_Through/Receive |
|   |   | <u>Bearer information</u><br>BNC-ID = 3333   |

---

**Initiation of information flow:** Processing of information flow 0.

NOTE – Bearer cut-through in the reverse direction (receive for the originating caller) may be required before ALERTING is received to convey audible ringing from the destination terminal to the originating terminal. Bearer cut-through in the forward direction may be withheld until receipt of an ANSWER message.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the receive direction and joins the terminations in ISN-A associated with both CSM(1) and CSM(2). It responds to CSM(1) that cut-through is complete.

---

|   |                            |   |
|---|----------------------------|---|
| 2 | MODIFY.resp                | BIWFX to CSM(1)   |
|   | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>ContextID = new<br>Primitive = Change_Topology,<br>Primitive = Cut_Through/Receive |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333  |

---

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(1) receives this information flow it responds to CSM(2) that the connection is available.

---

|   |                            |   |
|---|----------------------------|---|
| 3 | Connection Available       | CSM(1) to CSM(2)  |
|   | <u>Address Information</u> | <u>Control information</u><br><u>Bearer information</u> |

---

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** CSM(2) can associate the originating and terminating call contexts in ISN-A.

|   |                            |   |  |
|---|----------------------------|---|--|
| 4 | Alerting                   | CSM(2) to CSM(1)                                    |  |
|   | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Alerting signal is received from the network.

**Processing upon receipt:** CSM(1) allows this alerting to be passed through the bearer path. It waits for further instructions from CSM(2), CSM(R), or ACF-N.

|   |                            |   |  |
|---|----------------------------|---|--|
| 5 | Alerting                   | terminating network to TE                           |  |
|   | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Alerting signal is passed from the called destination or terminating network.

**Processing upon receipt:** Calling party awaits answer.

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 6 | Answer                     | CSM(2) to CSM(1)                                    |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) | <u>Bearer information</u> |

**Initiation of information flow:** The network forwards an answer indication.

**Processing upon receipt:** CSM(1) requests cut-through of the transmit path and allows in-band information to be passed through the bearer path. It waits for further instructions from CSM(2), CSM(R), or ACF-N.

|   |                                   |  |  |
|---|-----------------------------------|--|--|
| 7 | MODIFY.req (Cut_Through/Transmit) | CSM(1) to BIWFX  |  |
|   | <u>Address Information</u>        | <u>Control information</u><br>Port-ID = 20,<br>ContextID = new<br>Primitive = Cut_Through/Transmit | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 6.

NOTE – Bearer cut-through in the reverse direction (receive for the originating caller) may be required before ALERTING is received to convey audible ringing from the destination terminal to the originating terminal. Bearer cut-through in the forward direction may be withheld until receipt of an ANSWER message.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the transmit direction and joins the terminations in ISN-A associated with both CSM(1) and CSM(2). It responds to CSM(1) that cut-through is complete.

|   |                                    |  |  |
|---|------------------------------------|--|--|
| 8 | MODIFY.resp (Cut_Through/Transmit) | BIWFX to CSM(1)  |  |
|   | <u>Address Information</u>         | <u>Control information</u><br>Port-ID = 20,<br>ContextID = new<br>Primitive = Cut_Through/Transmit | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** When CSM(1) receives this information flow it completes the connection of the call across the access network, if required. It instructs ACN-E to monitor for call release (on-hook).

---

|    |   |   |   |
|----|---|---|---|
| 10 | <b>MODIFY.req (Insert_Answer Indication)(Detect_Onhook)</b> |   | <b>ACF-N to ACF-E</b>                             |
|    | <b><u>Address Information</u></b>                           | <b><u>Control information</u></b><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Answer Indication),<br>Primitive = Detect_Onhook | <b><u>Bearer information</u></b><br>BNC-ID = 3333 |

---

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** ACN-E may send an answer indication to the terminal equipment or may apply the indication within the port serving the terminal. It monitors for on-hook from the terminal and sends a response to ACF-N.

---

|    |                                   |   |                                  |
|----|-----------------------------------|---|----------------------------------|
| 12 | <b>Answer Indication</b>          |   | <b>CSM(R) to TE</b>              |
|    | <b><u>Address Information</u></b> | <b><u>Control information</u></b><br>Off-hook | <b><u>Bearer information</u></b> |

---

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** The terminal equipment may provide an answer indication to the calling party.

---

|    |                                   |   |   |
|----|-----------------------------------|---|---|
| 14 | <b>MODIFY.resp</b>                |   | <b>ACF-E to ACF-N</b>                             |
|    | <b><u>Address Information</u></b> | <b><u>Control information</u></b><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Answer Indication,<br>Primitive = Detect_On-hook | <b><u>Bearer information</u></b><br>BNC-ID = 3333 |

---

**Initiation of information flow:** Processing of information flow 12.

**Processing upon receipt:** ISN-A awaits call release indications from the TE or the network.

---

|    |                                   |  |                                  |
|----|-----------------------------------|--|----------------------------------|
| 16 | <b>Answer</b>                     |  | <b>Called Party to TE</b>        |
|    | <b><u>Address Information</u></b> | <b><u>Control information</u></b><br>Off-hook (If In-band) | <b><u>Bearer information</u></b> |

---

**Initiation of information flow:** The user at the destination responds to alerting signal.

**Processing upon receipt:** CSM(R) allows in-band information to be passed through the bearer path in both directions. It waits for further instructions from CSM(1), TE, or ACF-E.

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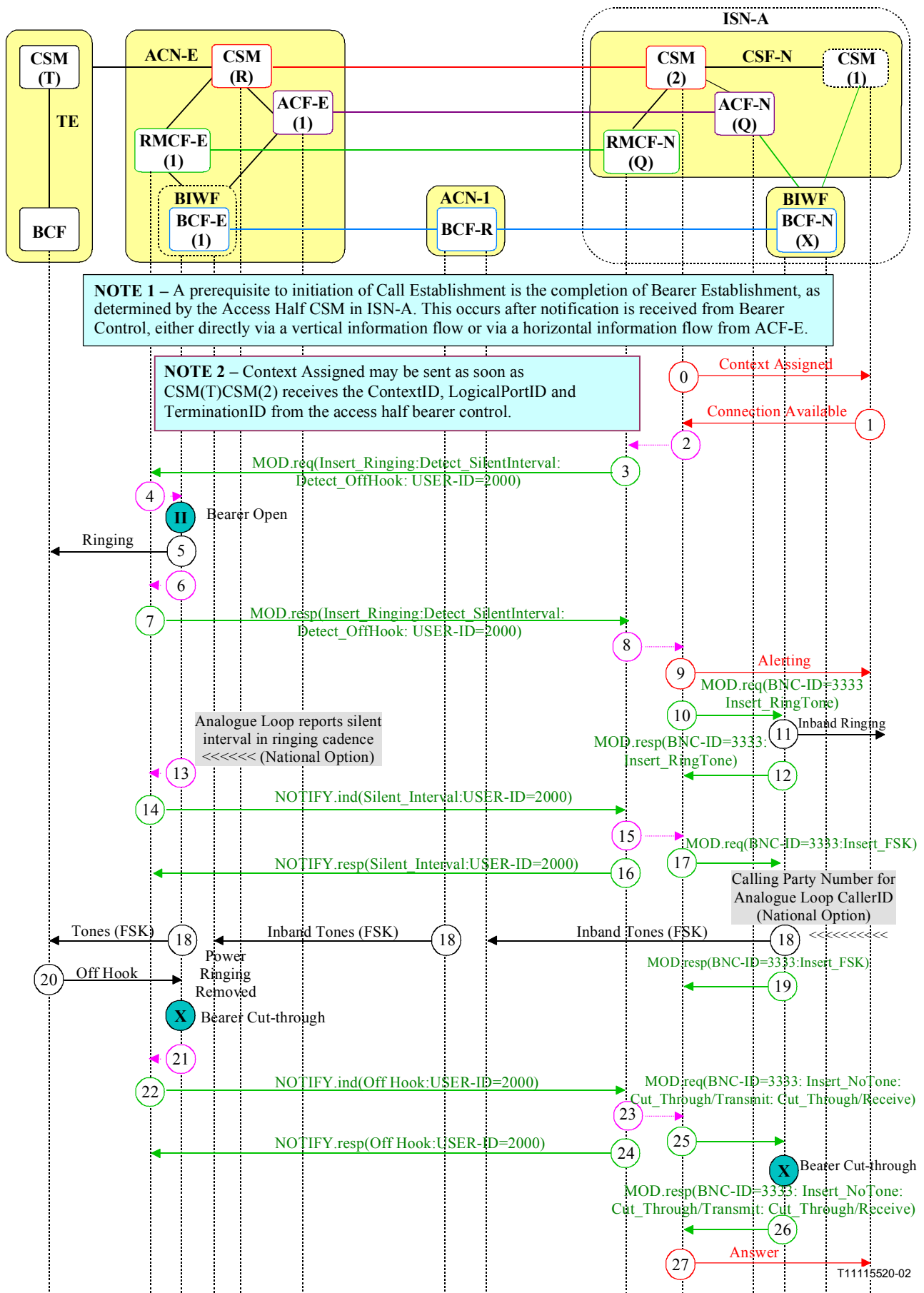


Figure 25 – Call establishment – Network originated – Stimulus-based

### 15.5.2 Call establishment – Network originated – Stimulus-based

The information flows and functional entity actions illustrated in Figure 25 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. Analogue loops vary in the types and sequences of signals used for call admission and call establishment. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

|   |                            |  |
|---|----------------------------|--|
| 0 | Context Assigned           | CSM(2) to CSM(1)                                     |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** A notification is received from BIWFx that the ContextID = 555 and the TerminationID is associated with the new call within the terminating half of ISN-A.

**Processing upon receipt:** CSM(1) prepares to associate the originating and terminating call contexts in ISN-A.

|   |                            |  |
|---|----------------------------|--|
| 1 | Connection Available       | CSM(1) to CSM(2)                                     |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** Receipt of information that the network connection is established.

**Processing upon receipt:** CSM(2) can associate the originating and terminating call contexts in ISN-A. It initiates flow 4 forwarding loop signals to ACN-E. It awaits further instructions from the CSM(R), CSM(1), or ACF-N.

|   |  |  |                           |
|---|--|--|---------------------------|
| 3 | MOD.req (Insert_Ringing) (Detect_Interval)(Detect_Offhook) |  | RMCF-N to RMCF-E          |
|   | <u>Address Information</u><br>(ACN Address) = E1,          | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Ringing,<br>Primitive = Detect_Interval,<br>Primitive = Detect_OffHook | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** ACN-E's RMCF passes instructions to the BIWF to insert ringing cadence on the analogue loop termination. It waits off-hook or answer. As a national option, it may detect the interval in the ringing cadence.

NOTE – When ringing is applied to an analogue loop, the terminal interface and the ringing source must be disconnected from the associated bearer termination until Ring Trip is received. Cut-through of the access bearer path to the terminal interface in both the forward and reverse directions is accomplished at the terminating ACN-E on receipt of Ring Trip from the called destination.

|   |                            |  |
|---|----------------------------|--|
| 5 | Ringling                   | ACN-E to TE  |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |
|   |                            | Dial Tone  |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** ACN-E sends a response to ISN-A.



|    |  |  |                           |
|----|--|--|---------------------------|
| 14 | NOTIFY.ind (Silent_Interval)                     | RMCF-E to RMCF-N   |                           |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Silent Interval | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 13. Receipt of notification of silent interval in ringing cadence.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(2) indicating the state change of ACN-E. CSM(2) sends Calling Party information to BIWFX for insertion to the bearer path.

|    |  |  |                           |
|----|--|--|---------------------------|
| 16 | NOTIFY.resp (Silent_Interval)                    | RMCF-N to RMCF-E   |                           |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Silent_Interval | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|    |                            |   |
|----|----------------------------|---|
| 17 | MOD.req (Insert_FSK)       | CSM(2) to BIWFx   |
|    | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Insert FSK |
|    |                            | <u>Bearer information</u><br>BNC-ID = 3333                            |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** When BIWFX receives this information flow, it connects a tone generator to the bearer path and responds to CSM(2).

|    |                            |   |  |
|----|----------------------------|---|--|
| 18 | In-band FSK                | ISN-A to TE   |  |
|    | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) | <u>Bearer information</u><br>In-band Tones |

**Initiation of information flow:** Processing of information flow 17.

**Processing upon receipt:** In-band tones are processed at the called destination.

|    |                            |   |
|----|----------------------------|---|
| 19 | MOD.resp (Insert_FSK)      | BIWFx to CSM(2)   |
|    | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Insert FSK |
|    |                            | <u>Bearer information</u><br>BNC-ID = 3333                            |

**Initiation of information flow:** Processing of information flow 18.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications.

|    |                                   |                                   |                                  |
|----|-----------------------------------|-----------------------------------|----------------------------------|
| 20 | <b>Off Hook</b>                   | <b>TE to ACN-E</b>                |                                  |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u> | <u><b>Bearer information</b></u> |
|    |                                   | Off-Hook                          |                                  |

**Initiation of information flow:** The called party answers the phone.

**Processing:** ACN-E immediately removes power ringing if it is applied to the loop. RMCF-E generates a notification message to RMCF-N indicating that user has answered.

|    |                                   |   |                                  |
|----|-----------------------------------|---|----------------------------------|
| 22 | <b>NOTIFY.ind (Off_Hook)</b>      | <b>RMCF-E to RMCF-N</b>   |                                  |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u>   | <u><b>Bearer information</b></u> |
|    | (ACN Address) = E1                | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Off_Hook |                                  |

**Initiation of information flow:** Processing of information flow 20.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(2) indicating the state change of ACN-E. CSM(2) sends information to BIWFX to remove audible ringing from the reverse path. It also instructs BIWFX to cut through the bearer path in both directions, transmit and receive.

|    |                                   |   |                                  |
|----|-----------------------------------|---|----------------------------------|
| 24 | <b>NOTIFY.resp (Off_Hook)</b>     | <b>RMCF-N to RMCF-E</b>                 |                                  |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u>       | <u><b>Bearer information</b></u> |
|    | (ACN Address) = E1                | USER-ID = 2000,<br>Primitive = Off_Hook |                                  |

**Initiation of information flow:** Processing of information flow 22.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|    |   |  |                                  |
|----|---|--|----------------------------------|
| 25 | <b>MOD.req (Insert_NoTone)(Cut_Through)</b> | <b>CSM(2) to BIWFX</b>   |                                  |
|    | <u><b>Address Information</b></u>           | <u><b>Control information</b></u>  | <u><b>Bearer information</b></u> |
|    |   | Port-ID = 20,<br>Primitive = Insert No Tone<br>Primitive = Cut_Through/Transmit<br>Primitive = Cut_Through/Receive | BNC-ID = 3333                    |

**Initiation of information flow:** Processing of information flow 22.

**Processing upon receipt:** BIWFX removes audible ringing from the bearer path, cuts through the bearer in both directions and responds to CSM(2).

|    |  |  |                                  |
|----|--|--|----------------------------------|
| 26 | <b>MOD.resp (Insert_NoTone)(Cut_Through)</b> | <b>BIWFX to CSM(2)</b>   |                                  |
|    | <u><b>Address Information</b></u>            | <u><b>Control information</b></u>  | <u><b>Bearer information</b></u> |
|    |  | Port-ID = 20,<br>Primitive = Insert No Tone<br>Primitive = Cut_Through/Transmit<br>Primitive = Cut_Through/Receive | BNC-ID = 3333                    |

**Initiation of information flow:** Processing of information flow 25.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications. It sends an answer indication in flow 27 to CSM(1).

|    |                                   |                                   |                                  |
|----|-----------------------------------|-----------------------------------|----------------------------------|
| 27 | <b>Answer</b>                     | <b>CSM(2) to CSM(1)</b>           |                                  |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u> | <u><b>Bearer information</b></u> |
|    |                                   |                                   |                                  |

**Initiation of information flow:** Processing of information flow 26.

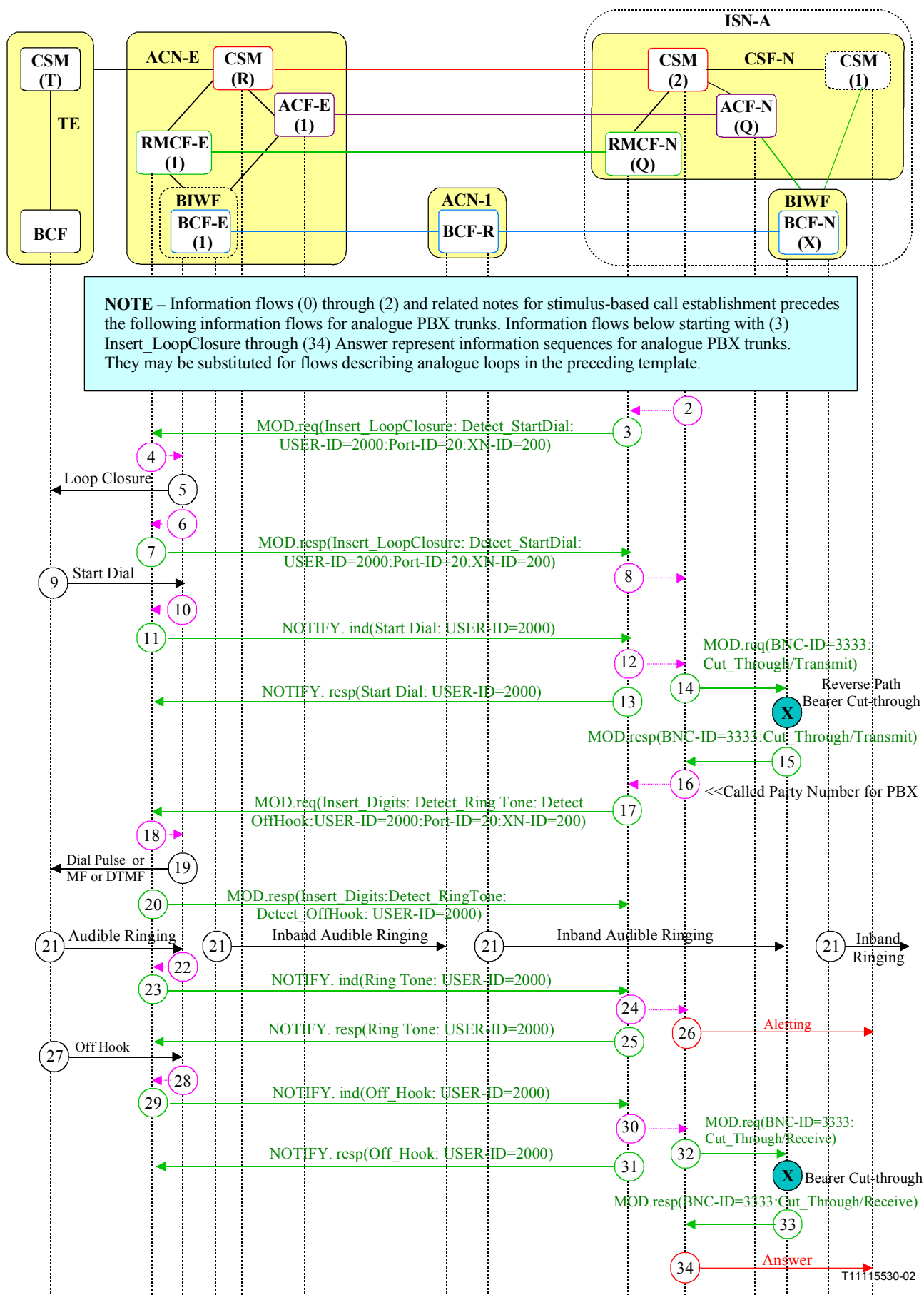


Figure 26 – Call establishment – Network originated – Stimulus-based PABX trunk

### 15.5.3 Call establishment – Network originated – Stimulus-based PABX trunk

The information flows and functional entity actions illustrated in Figure 26 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. The flows for PABX analogue trunks are alternative flows to those for analogue lines, starting with information flow (2). The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

|   |   |  |                           |
|---|---|--|---------------------------|
| 3 | MOD.req (Insert_LoopClosure) (Detect_StartDial)   | RMCF-N to RMCF-E   |                           |
|   | <u>Address Information</u><br>(ACN Address) = E1, | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_LoopClosure,<br>Primitive = Detect_StartDial | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** ACN-E's RMCF passes instructions to the BIWF to apply loop closure and to detect start dial indication on the analogue trunk termination. It awaits start dial.

|   |                            |  |                           |
|---|----------------------------|--|---------------------------|
| 5 | Loop Closure               | ACN-E to TE                                |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>Loop Closure | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** ACN-E sends a response to ISN-A.

|   |   |  |                           |
|---|---|--|---------------------------|
| 7 | MOD.resp (Insert_LoopClosure) (Detect_StartDial)  | RMCF-E to RMCF-N   |                           |
|   | <u>Address Information</u><br>(ACN Address) = E1, | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_LoopClosure,<br>Primitive = Detect_StartDial | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** ISN-A's RMCF awaits further instructions. CSM(2) sends an alerting indicator to CSM(1) and initiates in-band audible ringing to the reverse bearer path.

|   |                            |  |                           |
|---|----------------------------|--|---------------------------|
| 9 | Start Dial                 | TE to ACN-E  |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>Wink or comparable signal from TE. | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 5.

**Processing:** ACN-E generates a notification message to CSM(2) indicating that the TE is ready to receive address information. ACN-E waits for the address, which it may forward to the TE as MF tones, DTMF tones or dial pulses.

|    |  |   |                           |
|----|--|---|---------------------------|
| 11 | NOTIFY.ind (Start_Dial)                          | RMCF-E to RMCF-N  |                           |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Start_Dial | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(2) indicating the state change of ACN-E. CSM(2) sends information to BIWFX to cut through the reverse path, or transmit path from the PABX.

|    |  |   |
|----|--|---|
| 13 | NOTIFY.resp (Start_Dial)                         | RMCF-N to RMCF-E  |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Start_Dial |
|    |  | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|    |                                |   |
|----|--------------------------------|---|
| 14 | MOD.req (Cut_Through/Transmit) | CSM(2) to BIWfx                                   |
|    | <u>Address Information</u>     | <u>Control information</u>                        |
|    |                                | Port-ID = 20,<br>Primitive = Cut Through/Transmit |
|    |                                | <u>Bearer information</u>                         |
|    |                                | BNC-ID = 3333                                     |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** BIWFX cuts through the bearer in the reverse direction (PABX transmit direction) and responds to CSM(2).

|    |                                 |   |
|----|---------------------------------|---|
| 15 | MOD.resp (Cut_Through/Transmit) | BIWfx to CSM(2)                                   |
|    | <u>Address Information</u>      | <u>Control information</u>                        |
|    |                                 | Port-ID = 20,<br>Primitive = Cut Through/Transmit |
|    |                                 | <u>Bearer information</u>                         |
|    |                                 | BNC-ID = 3333                                     |

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications. It sends the called party number to ACN-E.

|    |  |   |                           |
|----|--|---|---------------------------|
| 17 | MOD.req (Insert_Digits)(Detect_RingTone)(Detect_Offhook) |   | RMCF-N to RMCF-E          |
|    | <u>Address Information</u>                               | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Digits,<br>Primitive = Detect_RingTone,<br>Primitive = Detect_Offhook | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** The ACN-E sends the list of digits in the bearer path and responds to CSF-N. It awaits audible ringing and an off-hook indication from the TE.

|    |   |  |
|----|---|--|
| 19 | Outpulsing  | ACN-E to TE  |
|    | <u>Address Information</u><br>Called Party Number | <u>Control information</u><br>On-Hook Indication from TE       |
|    |   | <u>Bearer information</u><br>Digits List = Called Party Number |

**Initiation of information flow:** Processing of information flow 17.

**Processing upon receipt:** The terminal equipment receives dialled digits and routes the call internally. It provides audible ringing in the reverse bearer path when the user is being alerted.

|    |   |  |
|----|---|--|
| 20 | MOD.resp (Insert_Digits)(Detect_RingTone)(Detect_Offhook) | RMCF-N to RMCF-E   |
|    | <u>Address Information</u>                                | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Digits<br>Primitive = Detect_RingTone,<br>Primitive = Detect_Offhook |
|    |   | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 19.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications.

|    |                            |  |
|----|----------------------------|--|
| 21 | Inband Ringing             | TE to calling party                                  |
|    | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band)  |
|    |                            | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Alerting signal is passed from the called destination or terminating network.

**Processing upon receipt:** Calling party awaits answer.

|    |  |  |
|----|--|--|
| 23 | NOTIFY.ind (Ring_Tone)                           | RMCF-E to RMCF-N   |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Ring_Tone |
|    |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 22. Detection of audible ringing tone in the bearer path.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(2) indicating the state change of ACN-E. CSM(2) sends an alerting indication to CSM(1).

|    |  |  |
|----|--|--|
| 25 | NOTIFY.resp (Ring_Tone)                          | RMCF-N to RMCF-E   |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Ring_tone |
|    |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 23.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|    |                            |                            |  |
|----|----------------------------|----------------------------|--|
| 26 | Alerting                   | CSM(2) to CSM(1)           |  |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Processing of information flow 23.

**Processing upon receipt:** CSM(1) forwards alerting indication to the network. It waits for further instructions from CSM(2).

|    |                            |  |                           |
|----|----------------------------|--|---------------------------|
| 27 | Off Hook                   | TE to ACN-E                            |                           |
|    | <u>Address Information</u> | <u>Control information</u><br>Off-hook | <u>Bearer information</u> |

**Initiation of information flow:** The TE answers.

**Processing:** ACN-E generates a notification message to CSM(2) indicating that the user has answered. For analogue PABX trunks, audible ringing is removed by the TE.

|    |  |   |                           |
|----|--|---|---------------------------|
| 29 | NOTIFY.ind(Off_Hook)                             | RMCF-E to RMCF-N  |                           |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Off_Hook | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 27.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(2) indicating the state change of ACN-E. CSM(2) sends instructions to BIWFX to cut through the bearer path in the receive direction.

|    |  |   |                           |
|----|--|---|---------------------------|
| 31 | NOTIFY.resp(Off_Hook)                            | RMCF-N to RMCF-E  |                           |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Off_Hook | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 30.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|    |                               |  |  |
|----|-------------------------------|--|--|
| 32 | MOD.req (Cut_Through/Receive) | CSM(2) to BIWFX  |  |
|    | <u>Address Information</u>    | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_Through/Receive | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 29.

**Processing upon receipt:** BIWFX cuts through the bearer in the receive direction and responds to CSM(2).

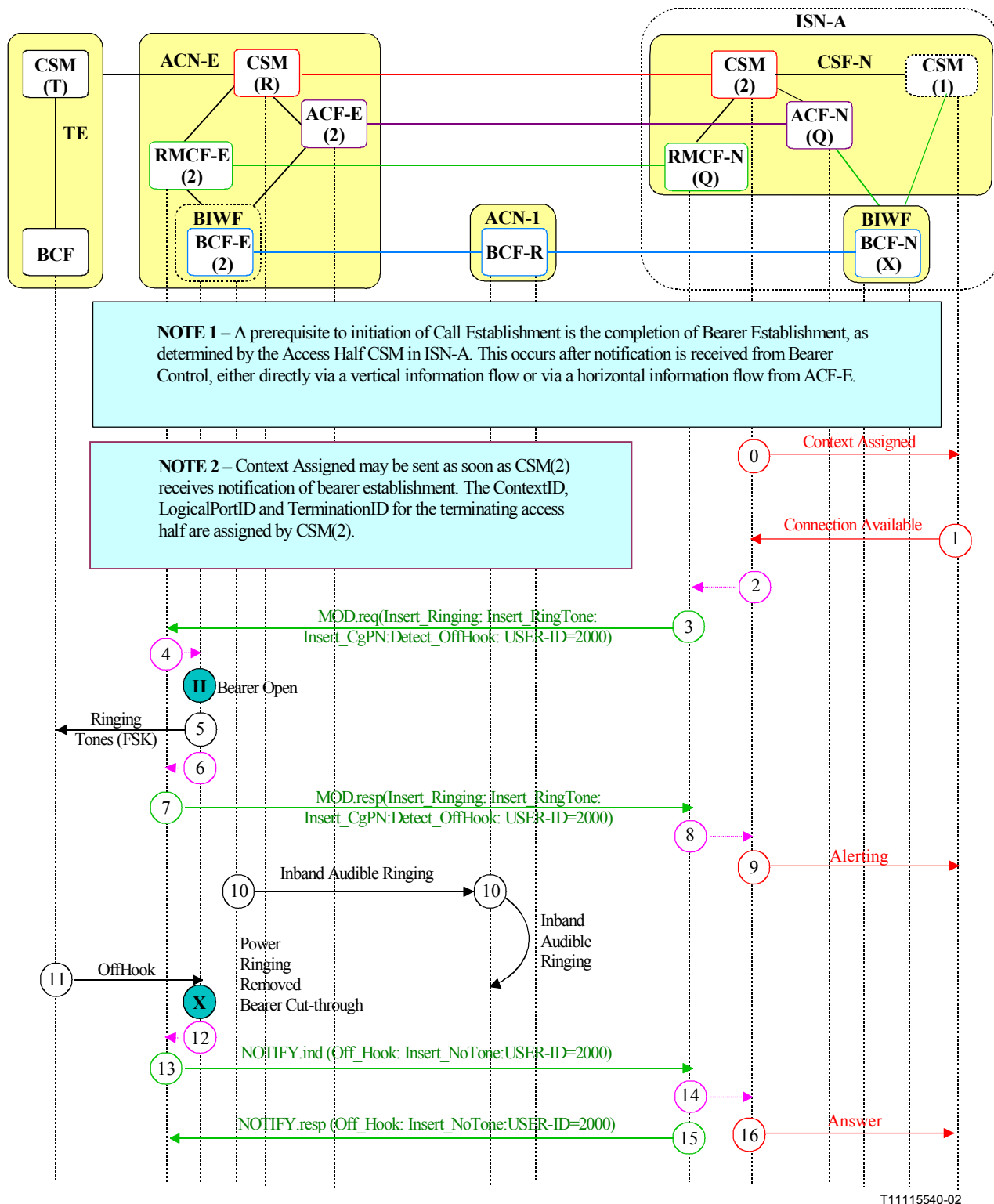
|    |                                |  |  |
|----|--------------------------------|--|--|
| 33 | MOD.resp (Cut_Through/Receive) | BIWFX to CSM(2)  |  |
|    | <u>Address Information</u>     | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_Through/Receive | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 32.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications. It sends an answer indication in flow 34 to CSM(1).

Address InformationControl informationBearer information

**Initiation of information flow:** Processing of information flow 33.



**Figure 27 – Intra-ISN call establishment – Terminating ACN-E – Stimulus-based**

### 15.5.4 Intra-ISN call establishment – Terminating ACN-E – Stimulus-based

The information flows and functional entity actions illustrated in Figure 27 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. Analogue loops vary in the types and sequences of signals used for call admission and call establishment. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 0 | Context Assigned           | CSM(2) to CSM(1)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** A notification is received from BIWfx that the ContextID = 555 and the TerminationID is associated with the new call within the terminating half of ISN-A.

**Processing upon receipt:** CSM(1) prepares to associate the originating and terminating call contexts in ISN-A.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 1 | Connection Available       | CSM(1) to CSM(2)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Receipt of information that the network connection is established.

**Processing upon receipt:** CSM(2) can associate the originating and terminating call contexts in ISN-A. It initiates flow 4 forwarding loop signals to ACN-E. It awaits further instructions from the CSM(R), CSM(1), or ACF-N.

|   |  |  |                           |
|---|--|--|---------------------------|
| 3 | MOD.req (Insert_Ringing) (Insert_CgPN)(Detect_OffHook) | RMCF-N to RMCF-E   |                           |
|   | <u>Address Information</u><br>(ACN Address) = E1,      | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Ringing,<br>Primitive = Insert_RingTone,<br>Primitive = Insert_CgPN,<br>Primitive = Detect_OffHook | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** ACN-E's RMCF passes instructions to the BIWF to insert ringing cadence on the analogue loop termination and audible ringing to the access network bearer termination in the reverse path. It awaits off-hook or answer. As a national option, it may insert calling party number data using FSK during the silent interval in the ringing cadence.

NOTE – When ringing is applied to an analogue loop, the terminal interface and the ringing source must be disconnected from the associated bearer termination until Ring Trip is received. Cut-through of the access bearer path to the terminal interface in both the forward and reverse directions is accomplished at the terminating ACN-E on receipt of Ring Trip from the called destination.

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 5 | Ringing                    | ACN-E to TE                             |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>Dial Tone | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** ACN-E sends a response to ISN-A.

|   |   |  |                           |
|---|---|--|---------------------------|
| 7 | MOD.resp (Insert_Ringing) (Insert_CgPN)(Detect_OffHook) |  | RMCF-E to RMCF-N          |
|   | <u>Address Information</u>                              | <u>Control information</u>   | <u>Bearer information</u> |
|   |   | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Ringing,<br>Primitive = Insert_RingTone,<br>Primitive = Detect_CgPN,<br>Primitive = Detect_OffHook |                           |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** ISN-A's RMCF awaits further instructions. CSM(2) sends an alerting indicator to CSM(1).

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 9 | Alerting                   | CSM(2) to CSM(1)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|   |                            |                            | In-band Audible Ringing   |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** CSM(1) forwards alerting indication to the network. It waits for further instructions from CSM(2).

|    |                            |                            |                           |
|----|----------------------------|----------------------------|---------------------------|
| 10 | In-band Ringing            | ACN-E(2) to ACN-E(1)       |                           |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|    |                            | Off-hook (If In-band)      | In-band Audible Ringing   |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** Calling party awaits answer.

|    |                            |                            |                           |
|----|----------------------------|----------------------------|---------------------------|
| 11 | Off Hook                   | TE to ACN-E                |                           |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|    |                            | Off-hook                   |                           |

**Initiation of information flow:** The called party answers the phone.

**Processing:** ACN-E immediately removes power ringing if it is applied to the loop and removes audible ringing if it is applied to the reverse bearer path. RMCF-E generates a notification message to RMCF-N indicating that user has answered, and that the audible ringing tone is removed from the reverse bearer path.

|    |   |   |                           |
|----|---|---|---------------------------|
| 13 | NOTIFY.ind (Off_Hook)(Ring_Trip)(No_Tone) |   | RMCF-E to RMCF-N          |
|    | <u>Address Information</u>                | <u>Control information</u>  | <u>Bearer information</u> |
|    | (ACN Address) = E2                        | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Off_Hook,<br>Primitive = No_Tone |                           |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(2) indicating the state change of ACN-E. It sends a NOTIFY.resp to RMCF-E. CSM(2) sends an answer indication to CSM(1).

---

|           |   |  |
|-----------|---|--|
| <b>15</b> | <b>NOTIFY.resp (Off_Hook)</b>                           | <b>RMCF-N to RMCF-E</b>  |
|           | <u><b>Address Information</b></u><br>(ACN Address) = E1 | <u><b>Control information</b></u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Off_Hook,<br>Primitive = No_Tone |
|           |   | <u><b>Bearer information</b></u>   |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

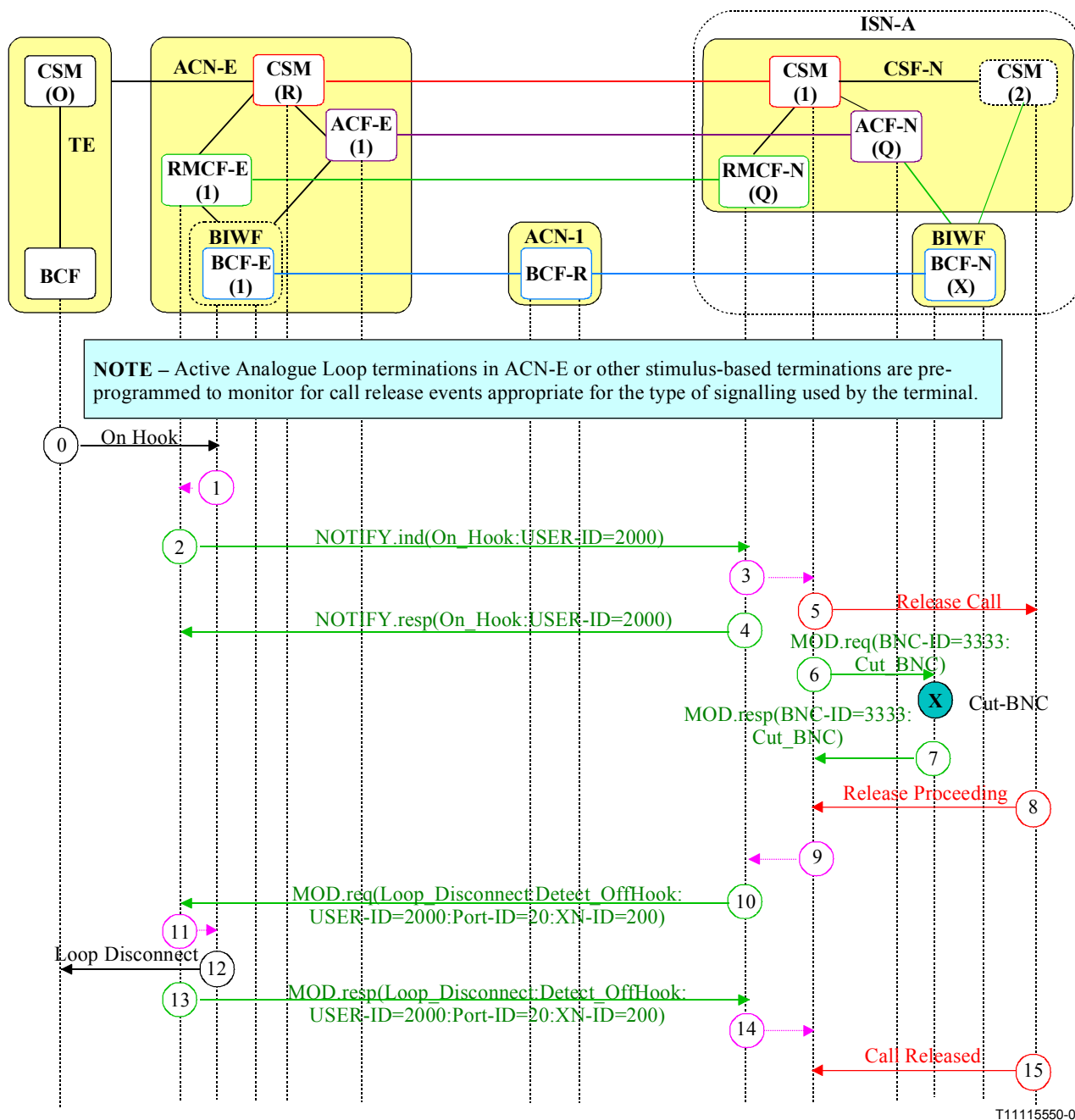
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|           |                                   |                                   |
|-----------|-----------------------------------|-----------------------------------|
| <b>16</b> | <b>Answer</b>                     | <b>CSM(2) to CSM(1)</b>           |
|           | <u><b>Address Information</b></u> | <u><b>Control information</b></u> |
|           |                                   | <u><b>Bearer information</b></u>  |

**Initiation of information flow:** Processing of information flow 13.

---

## 15.6 Call release



**Figure 28 – Call release – Terminal released – Stimulus-based**

### 15.6.1 Call release – Terminal released – Stimulus-based

The information flows and functional entity actions illustrated in Figure 28 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Additional messages between ISN-A and ACN-E, as well as between ACN-E and TE may be present in the loop protocols. They are dependent on the type of terminal equipment. These messages must be conveyed across the access network before the USER-ID is released. They are neither described nor numbered. The timing and procedures for loop protocol apply independently of the access network signalling procedures.

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

|   |                            |                                       |
|---|----------------------------|---------------------------------------|
| 0 | On Hook                    | TE to ACN-E                           |
|   | <u>Address Information</u> | <u>Control information</u><br>On-hook |
|   |                            | <u>Bearer information</u>             |

**Initiation of information flow:** A user associated with the TE requests disconnect for an analogue line.

**Processing upon receipt:** When ACN-E receives this information flow, it sends a notification to ISN-A.

|   |  |  |
|---|--|--|
| 2 | NOTIFY.ind (On_Hook)                             | RMCF-E to RMCF-N   |
|   | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = On_Hook |
|   |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(1) indicating the state change of ACN-E. CSM(1) sends instructions to BIWFX to sever the access bearer path from the network termination, after it determines that the call and bearer are to be released. It also sends a release call indication in flow 5 to CSM(2).

|   |  |  |
|---|--|--|
| 4 | NOTIFY.resp (On_Hook)                            | RMCF-N to RMCF-E   |
|   | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = On_Hook |
|   |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|   |                            |                            |
|---|----------------------------|----------------------------|
| 5 | Release Call               | CSM(1) to CSM(2)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** When CSM(2) receives this information flow it forwards the release to the network. It then responds with a Release Proceeding.

|   |                            |  |
|---|----------------------------|--|
| 6 | MOD.req (Cut_BNC)          | CSM(1) to BIWFX  |
|   | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_BNC |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333                         |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** BIWFX severs the bearer path and responds to CSM(1).

|   |                            |  |
|---|----------------------------|--|
| 7 | MOD.resp (Cut_BNC)         | BIWFX to CSM(1)  |
|   | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_BNC |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333                         |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** When CSM(1) receives this information flow it updates the call state and waits for further notifications.

|   |                            |                            |
|---|----------------------------|----------------------------|
| 8 | Release Proceeding         | CSM(2) to CSM(1)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 5 by CSM(2).

**Processing upon receipt:** When CSM(1) receives this information flow it proceeds to release the call in the access network.

|    |   |   |
|----|---|---|
| 10 | MOD.req (Loop_Disconnect)(Detect_Offhook) | RMCF-N to RMCF-E  |
|    | <u>Address Information</u>                | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Offhook |
|    |   | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The ACN-E sends loop disconnect to the TE if this message is required by the analogue loop protocol that is in use. It awaits an off-hook indication for a new call admission from the TE.

|    |                            |   |
|----|----------------------------|---|
| 12 | Loop Disconnect            | ACN-E to TE                                   |
|    | <u>Address Information</u> | <u>Control information</u><br>Loop Disconnect |
|    |                            | <u>Bearer information</u>                     |

**Initiation of information flow:** Processing of information flow 18.

**Processing upon receipt:** The terminal port in ACN-E notes the change in loop state and forwards an indication to the TE if required.

|    |  |   |
|----|--|---|
| 13 | MOD.resp (Loop_Disconnect)(Detect_Offhook) | RMCF-E to RMCF-N  |
|    | <u>Address Information</u>                 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Offhook |
|    |  | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** When CSM(1) receives this information flow it updates the call state and waits for further notifications.

Address InformationControl informationBearer information

**Initiation of information flow:** CSM(2) has received confirmation from the network that the call is released.

**Processing upon receipt:** When CSM(1) receives this information flow it proceeds to release the bearer associated with the call in the access network.

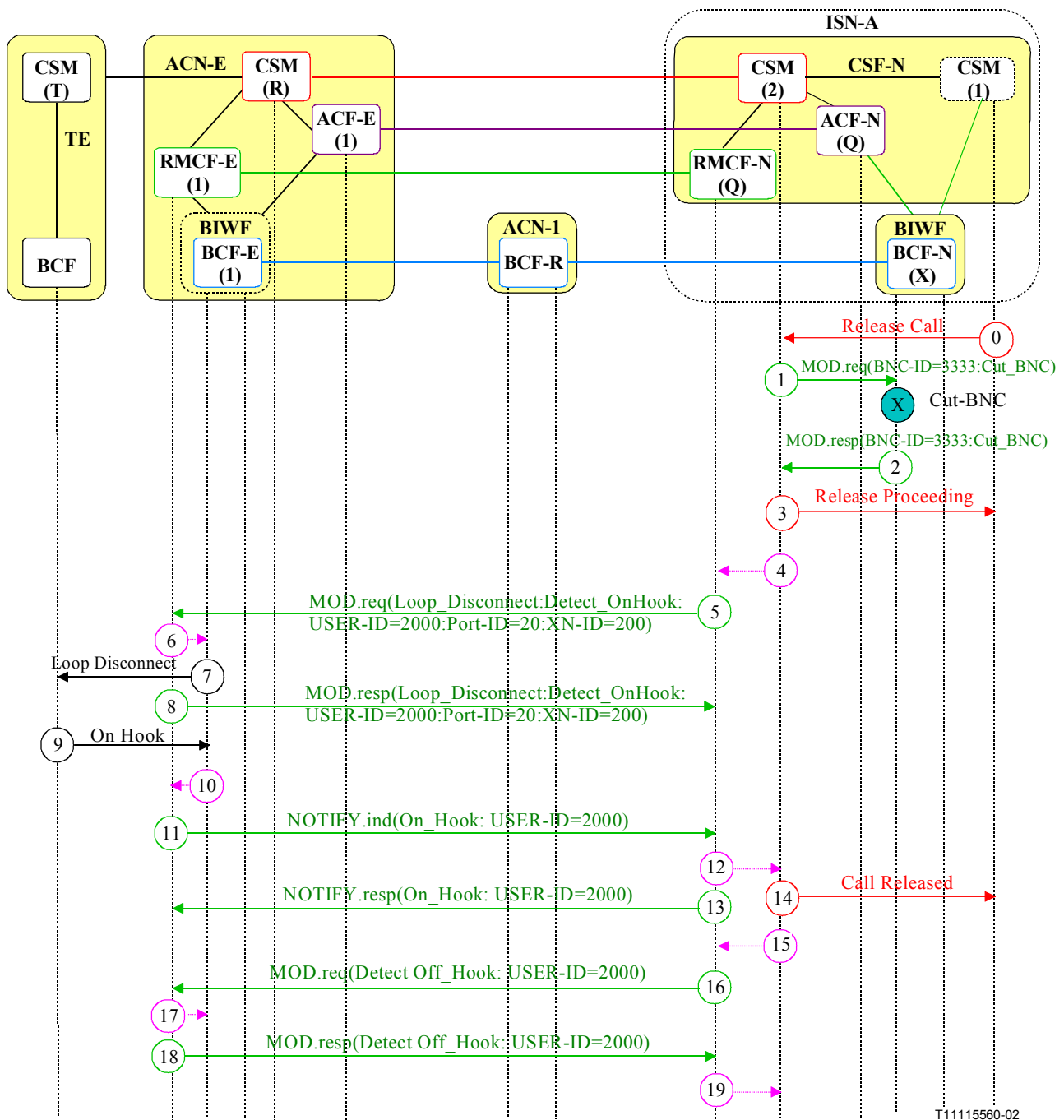


Figure 29 – Call release – Network released – Stimulus-based

### 15.6.2 Call release – Network released – Stimulus-based

The information flows and functional entity actions illustrated in Figure 29 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Additional messages between ISN-A and ACN-E, as well as between ACN-E and TE may be present in the loop protocols. They are dependent on the type of terminal equipment. These messages must be conveyed across the access network before the USER-ID is released. They are neither described nor numbered. The timing and procedures for loop protocol apply independently of the access network signalling procedures.

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

---

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 0 | Release Call               | CSM(1) to CSM(2)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

---

**Initiation of information flow:** The network requests disconnect for an analogue line.

**Processing upon receipt:** The CSM(2) determines that the call is to be disconnected. It requests ACN-E to disconnect the analogue loop and responds to CSM(1) that the release is proceeding.

---

|   |                            |  |  |
|---|----------------------------|--|--|
| 1 | MOD.req (Cut_BNC)          | CSM(2) to BIWFX  |  |
|   | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_BNC | <u>Bearer information</u><br>BNC-ID = 3333 |

---

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** BIWFX severs the bearer path and responds to CSM(1).

---

|   |                            |  |  |
|---|----------------------------|--|--|
| 2 | MOD.resp (Cut_BNC)         | BIWFX to CSM(2)  |  |
|   | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_BNC | <u>Bearer information</u><br>BNC-ID = 3333 |

---

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state.

---

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 3 | Release Proceeding         | CSM(2) to CSM(1)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

---

**Initiation of information flow:** Processing of information flow 2 by CSM(2).

**Processing upon receipt:** When CSM(1) receives this information flow it proceeds to confirm the release the call across the network.

|   |  |  |                           |
|---|--|--|---------------------------|
| 5 | MOD.req (Loop_Disconnect)(Detect_Onhook) |  | RMCF-N to RMCF-E          |
|   | <u>Address Information</u>               | <u>Control information</u>   | <u>Bearer information</u> |
|   |  | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Onhook |                           |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The ACN-E sends loop disconnect to the TE if this message is required by the analogue loop protocol that is in use. It awaits an on-hook indication from the TE.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 7 | Loop Disconnect            |                            | ACN-E to TE               |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|   |                            | Loop Disconnect            |                           |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The terminal port in ACN-E notes the change in loop state and forwards an indication to the TE if required.

|   |   |  |                           |
|---|---|--|---------------------------|
| 8 | MOD.resp (Loop_Disconnect)(Detect_Onhook) |  | RMCF-E to RMCF-N          |
|   | <u>Address Information</u>                | <u>Control information</u>   | <u>Bearer information</u> |
|   |   | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Onhook |                           |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 9 | On Hook                    |                            | TE to ACN-E               |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|   |                            | On-hook                    |                           |

**Initiation of information flow:** The user associated with the TE disconnects an analogue line.

**Processing upon receipt:** When ACN-E receives this information flow, it sends a notification to ISN-A.

|    |                            |  |                           |
|----|----------------------------|--|---------------------------|
| 11 | NOTIFY.ind (On_Hook)       |  | RMCF-E to RMCF-N          |
|    | <u>Address Information</u> | <u>Control information</u>   | <u>Bearer information</u> |
|    | (ACN Address) = E1         | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = On_Hook |                           |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** When the ISN's RMCF-N receives this information flow, it sends primitives to CSM(2) indicating the state change of ACN-E. CSM(2) sends a call released indication in flow 14 to CSM(1). It may send a request to ACN-E to detect off-hook indication for a new call admission from the TE.

|    |  |  |                           |
|----|--|--|---------------------------|
| 13 | NOTIFY.resp (On_Hook)                            | RMCF-N to RMCF-E   |                           |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = On_Hook | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

|    |                            |                            |                           |
|----|----------------------------|----------------------------|---------------------------|
| 14 | Call Released              | CSM(2) to CSM(1)           |                           |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** When CSM(1) receives this information flow it notes the change in state.

|    |                            |   |
|----|----------------------------|---|
| 16 | MOD.req (Detect_Offhook)   | RMCF-N to RMCF-E  |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Detect Offhook |
|    |                            | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** The ACN-E awaits an off-hook indication for a new call admission from the TE.

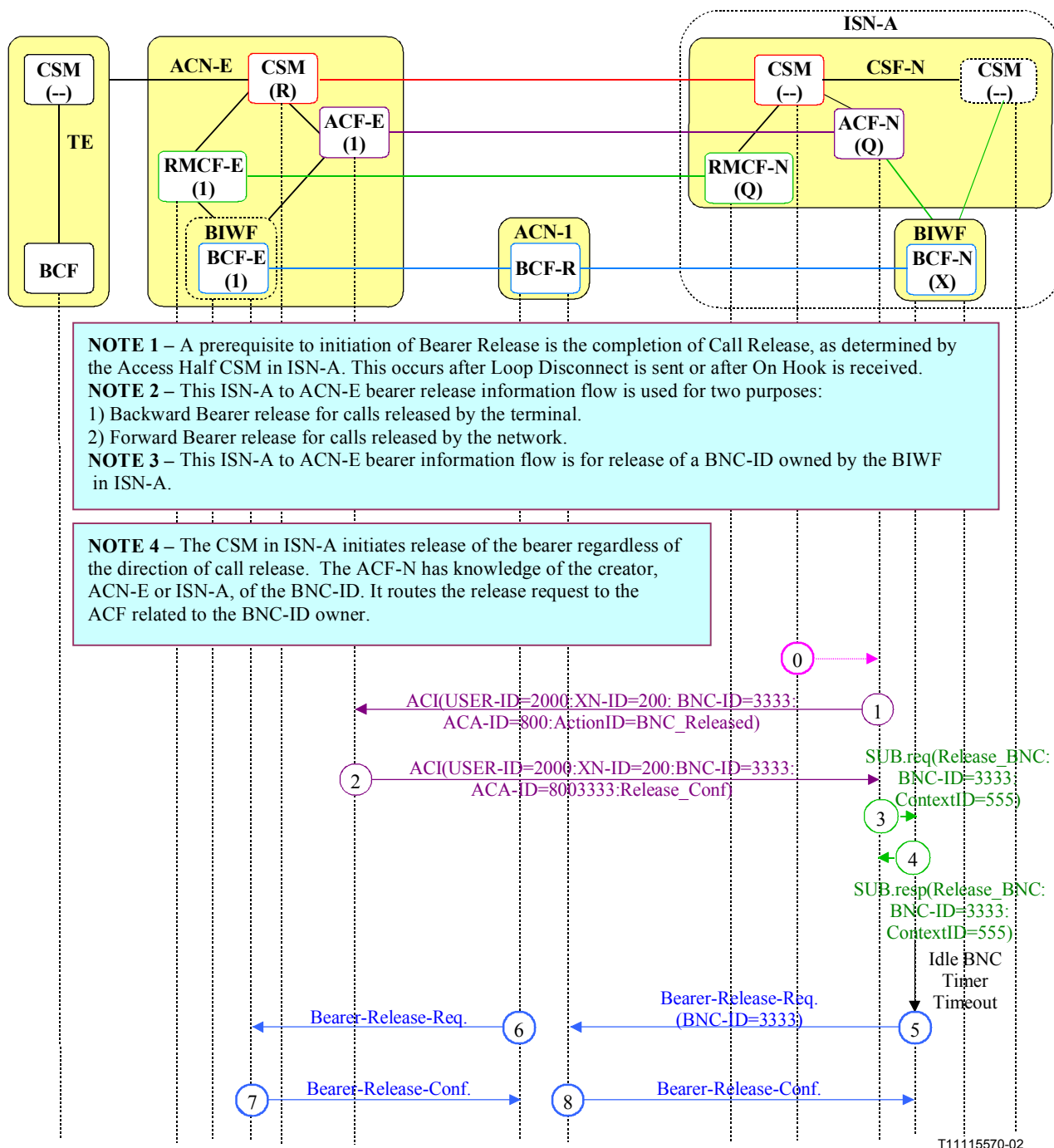
|    |                            |   |                           |
|----|----------------------------|---|---------------------------|
| 18 | MOD.resp (Detect_Offhook)  |   | RMCF-E to RMCF-N          |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Detect_Offhook | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 17.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications.

---

## 15.7 Bearer release



**Figure 30 – Bearer release – ISN-A to ACN-E – Terminal independent**

### 15.7.1 Bearer release – ISN-A to ACN-E – Terminal independent

The information flows and functional entity actions illustrated in Figure 30 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

A prerequisite to initiation of Bearer Release is the completion of Call Release, as determined by the Access Half CSM in ISN-A. This occurs after Loop Disconnect is sent or after On Hook is received. This ISN-A to ACN-E bearer information flow is for release of a BNC-ID owned by the BIWF in ISN-A.

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

| 0                          |  |                           | CSM(-- ) to ACF-N |
|----------------------------|--|---------------------------|-------------------|
| <u>Address Information</u> | <u>Control information</u>   | <u>Bearer information</u> |                   |
| BIWF Addr = x,             | USER-ID: = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = 555<br>Primitive = Release_BNC | BNC-ID: = 3333            |                   |

**Initiation of information flow:** CSM in ISN-A receives an on-hook from an analogue line, a DISCONNECT or a RELEASE message from an ISDN line, or a RELEASE or RELEASE COMPLETE message from a B-ISDN.

**Processing upon receipt:** When ACF-N receives this information flow it notes that ISN-A has requested release of the bearer. It determines that BIWFX is the creator and owner of the BNC-ID related to the call, and sends a release request for the BNC to BIWFX. It also sends a subtract request for the terminations in the context in ISN-A and notifies ACF-E of the release of the BNC and the USER-ID.

| 1                          |   |                           | ACF-N to ACF-E |
|----------------------------|---|---------------------------|----------------|
| <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |                |
|                            | ACA-ID = 800,<br>USER-ID: = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = BNC_Released | BNC-ID = 3333             |                |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-E receives this information flow it notes that ISN-A has acknowledged call release and BNC release. It initiates information flow to ACF-N confirming the call release. ACN-E may release resources associated with the call and with the bearer from the port termination of the terminal equipment. The USER-ID can be marked as available by ACN-E, if ACN-E is the assigning entity for the call reference.

| 2                          |   |                           | ACF-E to ACF-N |
|----------------------------|---|---------------------------|----------------|
| <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |                |
|                            | ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Release_Confirm | BNC-ID = 3333             |                |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow it notes the response from ACN-E. The USER-ID can be marked as available by CSF-N, if CSF-N is the assigning entity for the call reference.

| 3                          |   |                           | ACF-N to BIWFX |
|----------------------------|---|---------------------------|----------------|
| <u>Address Information</u> | <u>Control information</u>                                  | <u>Bearer information</u> |                |
|                            | Port-ID = 20,<br>ContextID = 555<br>Primitive = Release_BNC | BNC-ID: = 3333,           |                |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The BIWF's BCF-N notes that the USER-ID is released and dissociates it from the BNC-ID = 3333. It determines that the Access connection will not be retained as idle and initiates bearer release. It removes the termination from the context. It notifies ACF-N that the release request is processed.

---

|                                   |   |                                  |
|-----------------------------------|---|----------------------------------|
| 4                                 | <b>SUB.resp (Release_BNC)</b>                                       | <b>BIWFX to ACF-N</b>            |
| <u><b>Address Information</b></u> | <u><b>Control information</b></u>                                   | <u><b>Bearer information</b></u> |
|                                   | Port-ID = 20,<br>Primitive = Cut_BNC<br>Primitive = ContextID = 555 | BNC-ID = 3333                    |

---

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When ACF-N receives this information flow it notes release of the bearer.

---

|                                      |                                   |                                    |
|--------------------------------------|-----------------------------------|------------------------------------|
| 5                                    | <b>Bearer-Release.Req</b>         | <b>BIWF(x) to ACN(1)</b>           |
| <u><b>Address Information</b></u>    | <u><b>Control information</b></u> | <u><b>Bearer information</b></u>   |
| (ACN Address) = E1,<br>BIWF Addr = x | BCS-ID = "15",                    | BNC-ID: = 3333,<br>BNCL-ID = 1004, |

---

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The selected access node validates the request and releases the connection to the adjacent node.

---

|                                      |                                   |                                    |
|--------------------------------------|-----------------------------------|------------------------------------|
| 6                                    | <b>Bearer-Release.Req</b>         | <b>ACN(1) to BCF-E</b>             |
| <u><b>Address Information</b></u>    | <u><b>Control information</b></u> | <u><b>Bearer information</b></u>   |
| (ACN Address) = E1,<br>BIWF Addr = x | BCS-ID = "27"                     | BNC-ID: = 3333,<br>BNCL-ID = 1003, |

---

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The selected Bearer Control Function validates the request and may notify its associated Access Control function that a bearer has been released between ISN-A and ACN-E with BNC-ID = 3333. BCF-E issues information flow 7 toward Access Node 1 to confirm the bearer release.

---

|                                   |                                   |                                  |
|-----------------------------------|-----------------------------------|----------------------------------|
| 7                                 | <b>Bearer-Release.Confirm</b>     | <b>BCF-E to ACN(1)</b>           |
| <u><b>Address Information</b></u> | <u><b>Control information</b></u> | <u><b>Bearer information</b></u> |
|                                   | BCS-ID = "27"                     | BNCL-ID = 1003,                  |

---

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The access node notes the confirmation of the release and issues information flow 8 toward BIWFX.

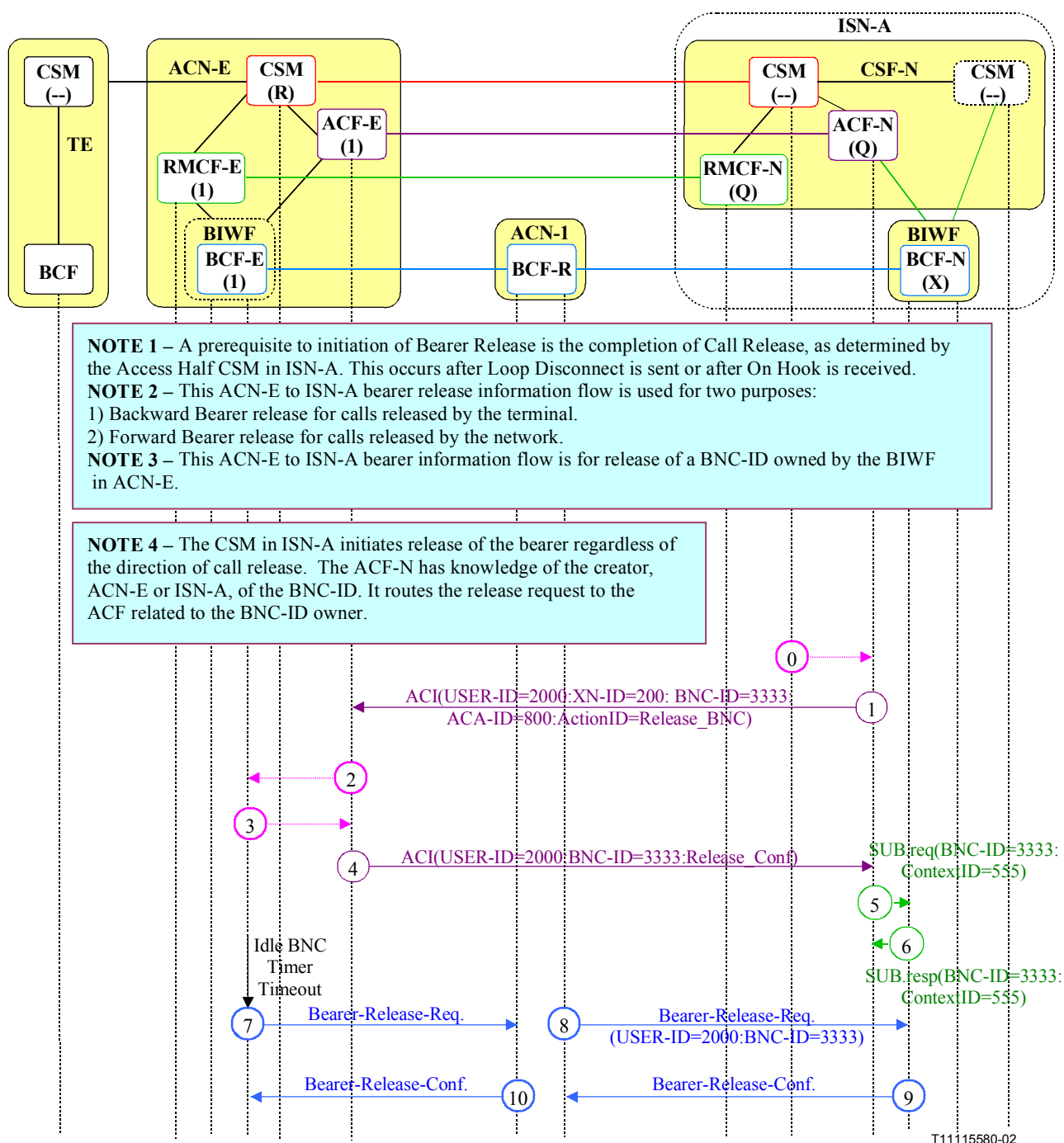
---

|                                   |                                   |                                  |
|-----------------------------------|-----------------------------------|----------------------------------|
| 8                                 | <b>Bearer-Release.Confirm</b>     | <b>ACN(1) to BIWFX</b>           |
| <u><b>Address Information</b></u> | <u><b>Control information</b></u> | <u><b>Bearer information</b></u> |
|                                   | BCS-ID = "15"                     | BNCL-ID = 1004,                  |

---

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The Bearer Interworking Function records the release of the Access connection.



**Figure 31 – Bearer release – ACN-E to ISN-A – Terminal independent**

### 15.7.2 Bearer release – ACN-E to ISN-A – Terminal independent

The information flows and functional entity actions illustrated in Figure 31 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

A prerequisite to initiation of Bearer Release is the completion of Call Release, as determined by the Access Half CSM in ISN-A. This occurs after Loop Disconnect is sent or after On Hook is received. This ACN-E to ISN-A bearer information flow is for release of a BNC-ID owned by the BIWF in ACN-E.

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

0

CSM(--) to ACF-N

**Address Information**

BIWF Addr = x,

**Control information**

USER-ID: = 2000,  
 Port-ID = 20,  
 Connection ID = 200  
 ContextID = 555  
 Primitive = Release\_BNC

**Bearer information**

BNC-ID: = 3333

**Initiation of information flow:** CSM in ISN-A receives an On Hook from an analogue line, a DISCONNECT or a RELEASE message from an ISDN line, or a RELEASE or RELEASE COMPLETE message from a B-ISDN.

**Processing upon receipt:** When ACF-N receives this information flow it notes that ISN-A has requested release of the bearer. It determines that ACN-E is the creator and owner of the BNC-ID related to the call, and sends a release request for the BNC to ACN-E. It also sends a subtract request for the terminations in the context in ISN-A. It notifies ACN-E that the USER-ID is released.

1

ACI (Release\_BNC)

ACF-N to ACF-E

**Address Information****Control information**

ACA-ID = 800,  
 USER-ID: = 2000,  
 Port-ID = 20,  
 Connection ID = 200  
 Primitive = Release\_BNC

**Bearer information**

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-E receives this information flow it notes that ISN-A has acknowledged call release processing. It initiates release of the bearer when it determines that the bearer will not be retained as idle. It initiates information flow to ACF-N confirming the call and bearer release. ACN-E may release resources associated with the call and with the bearer from the port termination of the terminal equipment. ACN-E notes that the USER-ID is released and dissociates it from the BNC-ID = 3333. The USER-ID can be marked as available by ACN-E, if ACN-E is the assigning entity for the call reference.

4

ACI (Release\_Confirm)

ACF-E to ACF-N

**Address Information****Control information**

ACA-ID = 800,  
 USER-ID = 2000,  
 Port-ID = 20,  
 Connection ID = 200  
 Primitive = Release\_Confirm

**Bearer information**

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow it notes the response from ACN-E. The USER-ID can be marked as available by CSF-N, if CSF-N is the assigning entity for the call reference.

5

SUB.req

ACF-N to BIWFX

**Address Information****Control information**

Port-ID = 20,  
 ContextID = 555

**Bearer information**

BNC-ID: = 3333,

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The BIWF's BCF-N removes the termination from the context and dissociates the BNC-ID from the BNC. It notifies ACF-N that the request is processed.

---

|   |                                   |                                   |
|---|-----------------------------------|-----------------------------------|
| 6 | <b>SUB.resp</b>                   | <b>BIWFX to ACF-N</b>             |
|   | <u><b>Address Information</b></u> | <u><b>Control information</b></u> |
|   |                                   | Port-ID = 20,<br>ContextID = 555  |
|   |                                   | <u><b>Bearer information</b></u>  |
|   |                                   | BNC-ID = 3333                     |

---

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** When ACF-N receives this information flow it notes the response.

---

|   |                                      |                                    |
|---|--------------------------------------|------------------------------------|
| 7 | <b>Bearer-Release.Req</b>            | <b>BCF-E to ACN(1)</b>             |
|   | <u><b>Address Information</b></u>    | <u><b>Control information</b></u>  |
|   | (ACN Address) = E1,<br>BIWF Addr = x | BCS-ID = "15",                     |
|   |                                      | <u><b>Bearer information</b></u>   |
|   |                                      | BNC-ID: = 3333,<br>BNCL-ID = 1004, |

---

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** The selected access node validates the request and releases the connection to the adjacent node.

---

|   |                                      |                                    |
|---|--------------------------------------|------------------------------------|
| 8 | <b>Bearer-Release.Req</b>            | <b>ACN(1) to BIWF(x)</b>           |
|   | <u><b>Address Information</b></u>    | <u><b>Control information</b></u>  |
|   | (ACN Address) = E1,<br>BIWF Addr = x | BCS-ID = "27"                      |
|   |                                      | <u><b>Bearer information</b></u>   |
|   |                                      | BNC-ID: = 3333,<br>BNCL-ID = 1003, |

---

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The selected Bearer Control Function validates the request. BIWFX issues information flow 9 toward Access Node 1 to confirm the bearer release.

---

|   |                                   |                                   |
|---|-----------------------------------|-----------------------------------|
| 9 | <b>Bearer-Release.Confirm</b>     | <b>BIWFX to ACN(1)</b>            |
|   | <u><b>Address Information</b></u> | <u><b>Control information</b></u> |
|   |                                   | BCS-ID = "27"                     |
|   |                                   | <u><b>Bearer information</b></u>  |
|   |                                   | BNCL-ID = 1003,                   |

---

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** The access node notes the confirmation of the release and issues information flow 10 toward BCF-E.

---

|    |                                   |                                   |
|----|-----------------------------------|-----------------------------------|
| 10 | <b>Bearer-Release.Confirm</b>     | <b>ACN(1) to BCF-E</b>            |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u> |
|    |                                   | BCS-ID = "15"                     |
|    |                                   | <u><b>Bearer information</b></u>  |
|    |                                   | BNCL-ID = 1004,                   |

---

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** ACN-E records the release of the Access connection.

---

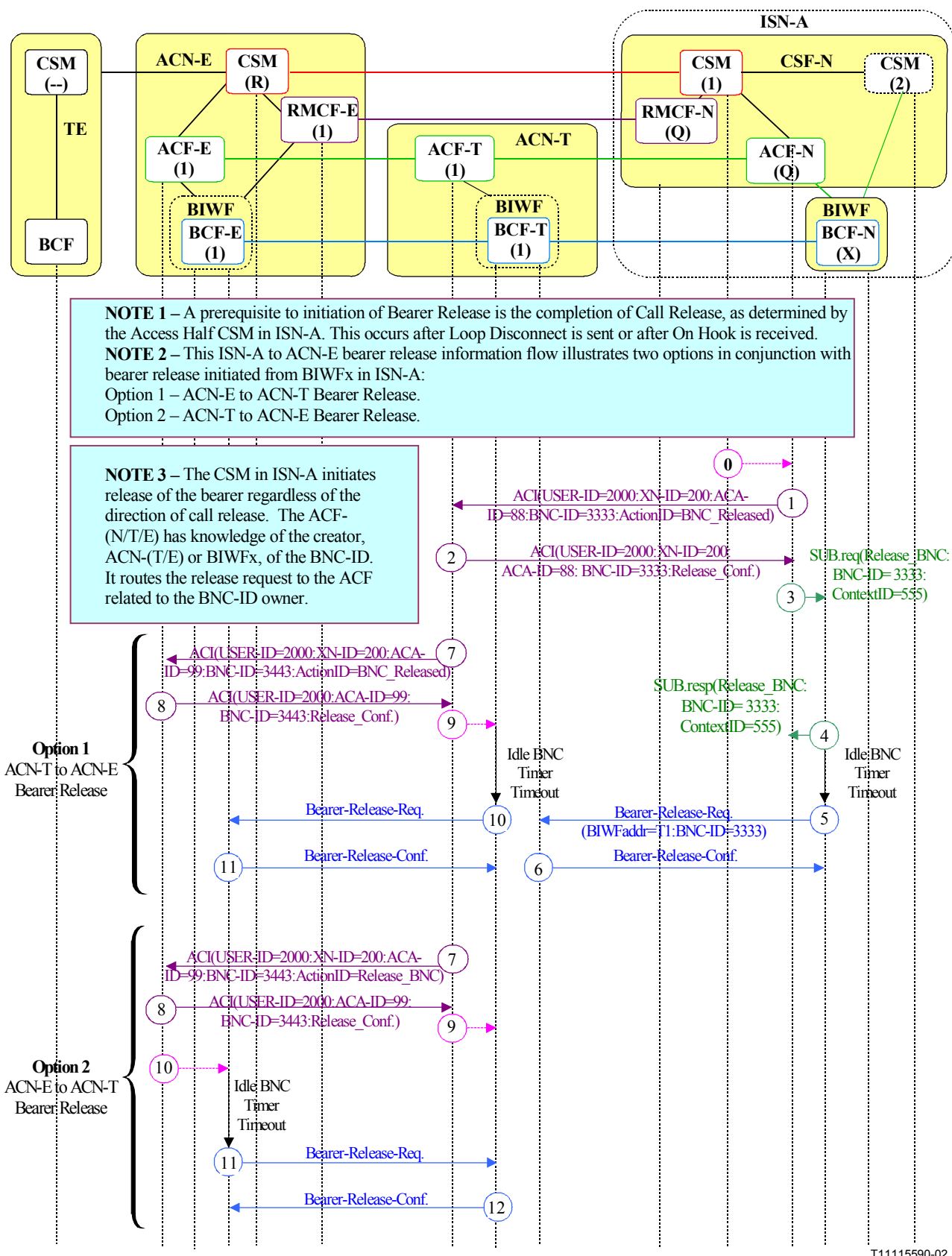


Figure 32 – Bearer release through ACN-T – ISN-A to ACN-E – Terminal independent

### 15.7.3 Bearer release through ACN-T – ISN-A to ACN-E – Terminal independent

The information flows and functional entity actions illustrated in Figure 32 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

A prerequisite to initiation of Bearer Release is the completion of Call Release, as determined by the Access Half CSM in ISN-A. This occurs after Loop Disconnect is sent or after On Hook is received. The information flow between ACF-N and ACF-T is for release of a BNC-ID owned by the BCF-N in ISN-A. The BNC-ID between ACN-T and ACN-E is owned by either BCF-T (Option 1) or BCF-E (Option 2).

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

---

#### 0 CSM(--) to ACF-N

##### Address Information

Logical Port-ID = TE1,  
Connection ID = 200,  
BIWF Addr = x

##### Control information

User-ID: = 2000,  
ContextID = 555  
Primitive = Release\_BNC

##### Bearer information

BNC-ID: = 3333

**Initiation of information flow:** CSM in ISN-A receives an on-hook from an analogue line, a DISCONNECT or a RELEASE message from an ISDN line, or a RELEASE or RELEASE COMPLETE message from a B-ISDN.

**Processing upon receipt:** When ACF-N receives this information flow it notes that ISN-A has requested release of the bearer. It determines that BCF-N is the creator and owner of the BNC-ID related to the call. It sends a subtract request for the terminations in the context in ISN-A. It also notifies ACF-T of the release of the BNC = 3333, the User-ID = 2000, Logical Port = TE1, and Connection-ID = 200.

---

#### 1 ACI (BNC\_Released) ACF-N to ACF-T

##### Address Information

ACN Address = E1,  
User-ID: = 2000,  
Logical Port-ID = TE1,  
Connection ID = 200

##### Control information

ACA-ID = 88,  
Primitive = BNC\_Released

##### Bearer information

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-T receives this information flow it notes that ISN-A has acknowledged call release and BNC release. It initiates information flow to ACF-N confirming the call release. ACN-T may release resources associated with the bearer.

ACF-T also will notify the next ACF, in this case ACF-E, that the call and BNC are to be released. In option 2, it will request bearer release in the next ACF.

#### Option 1:

If ACF-T determines that BCF-T is the creator and owner of the BNC-ID related to the call, it sends a request to BCF-T to release the bearer for BNC-ID = 3443. It also notifies ACF-E of the release of the BNC = 3443, the User-ID = 2000, Logical Port = TE1, and Connection-ID = 200.

#### Option 2:

If ACF-T determines that BCF-E is the creator and owner of the BNC-ID related to the call, it sends a request to ACF-E to release the bearer for BNC-ID = 3443. It also notifies ACF-E of the release of the User-ID = 2000, Logical Port = TE1, and Connection-ID = 200.

---

|   |                       |                |
|---|-----------------------|----------------|
| 2 | ACI (Release_Confirm) | ACF-T to ACF-N |
|---|-----------------------|----------------|

|                            |                            |                           |
|----------------------------|----------------------------|---------------------------|
| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|----------------------------|----------------------------|---------------------------|

|                                      |   |               |
|--------------------------------------|---|---------------|
| ACN Address = T1,<br>User-ID: = 2000 | ACA-ID = 88,<br>Primitive = Release_Confirm | BNC-ID = 3333 |
|--------------------------------------|---|---------------|

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow it notes the response from ACN-T. The User-ID can be marked as available by CSF-N, if CSF-N is the assigning entity for the User-ID.

---

|   |                       |                |
|---|-----------------------|----------------|
| 3 | SUB.req (Release_BNC) | ACF-N to BCF-N |
|---|-----------------------|----------------|

|                            |                            |                           |
|----------------------------|----------------------------|---------------------------|
| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|----------------------------|----------------------------|---------------------------|

|                   |  |                 |
|-------------------|--|-----------------|
| BIWF Address = N1 | ContextID = 555<br>Primitive = Release_BNC | BNC-ID: = 3333, |
|-------------------|--|-----------------|

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The BIWF's BCF-N determines that the Access connection with BNC-ID = 3333 will not be retained as idle and initiates bearer release. It removes the termination from the context. It notifies ACF-N that the release request is processed.

---

|   |                        |                |
|---|------------------------|----------------|
| 4 | SUB.resp (Release_BNC) | BCF-N to ACF-N |
|---|------------------------|----------------|

|                            |                            |                           |
|----------------------------|----------------------------|---------------------------|
| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|----------------------------|----------------------------|---------------------------|

|                    |  |               |
|--------------------|--|---------------|
| ACF Address = ISN1 | ContextID = 555<br>Primitive = Release_BNC | BNC-ID = 3333 |
|--------------------|--|---------------|

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When ACF-N receives this information flow it notes release of the bearer.

---

|   |                    |                |
|---|--------------------|----------------|
| 5 | Bearer-Release.Reg | BCF-N to BCF-T |
|---|--------------------|----------------|

|                            |                            |                           |
|----------------------------|----------------------------|---------------------------|
| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|----------------------------|----------------------------|---------------------------|

|                |                |                                    |
|----------------|----------------|------------------------------------|
| BIWF Addr = T1 | BCS-ID = "15", | BNC-ID: = 3333,<br>BNCL-ID = 1004, |
|----------------|----------------|------------------------------------|

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The selected Bearer Control Function validates the request and may notify its associated Access Control function that a bearer with BNC-ID = 3333 has been released between ISN-A and ACN-T. BCF-T issues information flow 6 toward BCF-N to confirm the bearer release.

---

|   |                        |                |
|---|------------------------|----------------|
| 6 | Bearer-Release.Confirm | BCF-T to BCF-N |
|---|------------------------|----------------|

|                            |                            |                           |
|----------------------------|----------------------------|---------------------------|
| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|----------------------------|----------------------------|---------------------------|

|              |               |                 |
|--------------|---------------|-----------------|
| BIWFaddr = x | BCS-ID = "15" | BNCL-ID = 1004, |
|--------------|---------------|-----------------|

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The BCF-N records the release of the Access connection.

|      |  |  |
|------|--|--|
| 7(1) | ACI (BNC_Released)   | ACF-T to ACF-E   |
|      | <u>Address Information</u><br>ACN Address = E1,<br>User-ID: = 2000,<br>Logical Port-ID = TE1,<br>Connection ID = 200 | <u>Control information</u><br>ACA-ID = 99,<br>Primitive = BNC_Released |
|      |  | <u>Bearer information</u><br>BNC-ID = 3443                             |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When the ACF-E receives this information flow it notes that ISN-A has acknowledged call release and BNC release. It initiates information flow to ACF-T confirming the call release.

ACN-E may release resources associated with the call and with the bearer from the port termination of the terminal equipment. These actions, however, are stimulated by information exchange in the call control association or the remote media control association. The User-ID can be marked as available by ACN-E as determined by the call control information exchange, if ACN-E is the assigning entity for the call reference.

|      |  |   |
|------|--|---|
| 8(1) | ACI (Release_Confirm)  | ACF-E to ACF-T  |
|      | <u>Address Information</u><br>ACN Address = T1,<br>User-ID: = 2000 | <u>Control information</u><br>ACA-ID = 99,<br>Primitive = Release_Confirm |
|      |  | <u>Bearer information</u><br>BNC-ID = 3443                                |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** When the ACN-T's ACF-T receives this information flow it notes the response from ACN-E. It also requests that BCF-T release BNC-ID = 3443.

BCF-T determines that the Access connection with BNC-ID = 3443 will not be retained as idle and initiates bearer release. It may notify ACF-T that the release request is processed.

|       |  |   |
|-------|--|---|
| 10(1) | Bearer-Release.Reg                           | BCF-T to BCF-E  |
|       | <u>Address Information</u><br>BIWF Addr = E1 | <u>Control information</u><br>BCS-ID = "27"                     |
|       |  | <u>Bearer information</u><br>BNC-ID: = 3333,<br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** The selected Bearer Control Function validates the request and may notify its associated Access Control function that a bearer with BNC-ID = 3443 has been released between ACN-T and ACN-E. BCF-T issues information flow 11 toward BCF-N to confirm the bearer release.

|       |  |  |
|-------|--|--|
| 11(1) | Bearer-Release.Confirm                       | BCF-E to BCF-T                               |
|       | <u>Address Information</u><br>BIWF Addr = T1 | <u>Control information</u><br>BCS-ID = "27"  |
|       |  | <u>Bearer information</u><br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** The BCF-N records the release of the Access connection.

---

|      |  |   |
|------|--|---|
| 8(2) | ACI (Release_BNC)  | ACF-T to ACF-E  |
|      | <u>Address Information</u><br>ACN Address = E1,<br>User-ID: = 2000,<br>Logical Port-ID = TE1,<br>Connection ID = 200 | <u>Control information</u><br>ACA-ID = 99,<br>Primitive = Release_BNC |
|      |  | <u>Bearer information</u><br>BNC-ID = 3443                            |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When the ACF-E receives this information flow it notes that ISN-A has acknowledged call release processing. It initiates release of the bearer in BCF-E. It sends information to ACF-T confirming the call and bearer release.

ACN-E may release resources associated with the call and with the bearer from the port termination of the terminal equipment. These actions, however, are stimulated by information exchange in the call control association or the remote media control association. The User-ID can be marked as available by ACN-E as determined by the call control information exchange, if ACN-E is the assigning entity for the call reference.

---

|      |  |   |
|------|--|---|
| 9(2) | ACI (Release_Confirm)  | ACF-E to ACF-T  |
|      | <u>Address Information</u><br>ACN Address = T1,<br>User-ID = 2000, | <u>Control information</u><br>ACA-ID = 99,<br>Primitive = Release_Confirm |
|      |  | <u>Bearer information</u><br>BNC-ID = 3443                                |

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** When the ACN-T's ACF-T receives this information flow it notes the response from ACN-E.

---

|       |  |   |
|-------|--|---|
| 11(2) | Bearer-Release.Reg                           | BCF-E to BCF-T  |
|       | <u>Address Information</u><br>BIWF Addr = T1 | <u>Control information</u><br>BCS-ID = "27",                    |
|       |  | <u>Bearer information</u><br>BNC-ID: = 3443,<br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** The selected Bearer Control Function validates the request and may notify its associated Access Control function that a bearer with BNC-ID = 3443 has been released between ACN-E and ACN-T. BCF-T issues information flow 12 toward BCF-E to confirm the bearer release.

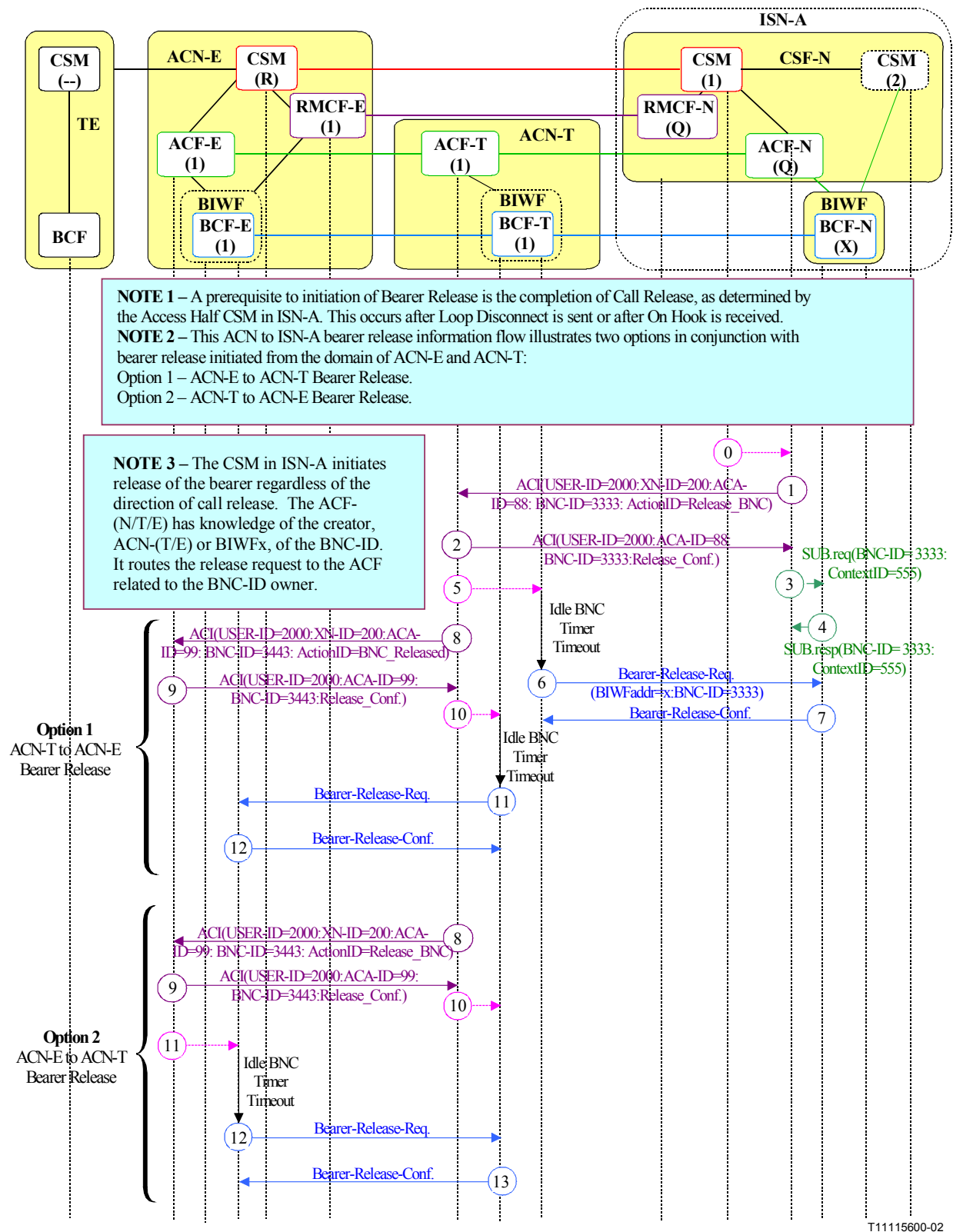
---

|       |  |  |
|-------|--|--|
| 12(2) | Bearer-Release.Confirm                       | BCF-T to BCF-E                               |
|       | <u>Address Information</u><br>BIWF Addr = E1 | <u>Control information</u><br>BCS-ID = "27"  |
|       |  | <u>Bearer information</u><br>BNCL-ID = 1003, |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** The BCF-E records the release of the Access connection.

---



**Figure 33 – Bearer release through ACN-T – ACN-E to ISN-A – Terminal independent**

#### 15.7.4 Bearer release through ACN-T – ACN-E to ISN-A – Terminal independent

The information flows and functional entity actions illustrated in Figure 33 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

A prerequisite to initiation of Bearer Release is the completion of Call Release, as determined by the Access Half CSM in ISN-A. This occurs after Loop Disconnect is sent or after On Hook is received. The information flow between ACF-N and ACF-T is for release of a BNC-ID owned by the BCF-T in ACN-T. The BNC-ID between ACN-T and ACN-E is owned by either BCF-T (Option 1) or BCF-E (Option 2).

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

---

0 CSM(--) to ACF-N

**Address Information**

Logical Port-ID = TE1,  
Connection ID = 200,  
BIWF Addr = x

**Control information**

User-ID: = 2000,  
ContextID = 555  
Primitive = Release\_BNC

**Bearer information**

BNC-ID: = 3333

**Initiation of information flow:** CSM in ISN-A receives an on-hook from an analogue line, a DISCONNECT or a RELEASE message from an ISDN line, or a RELEASE or RELEASE COMPLETE message from a B-ISDN.

**Processing upon receipt:** When ACF-N receives this information flow it notes that ISN-A has requested release of the bearer. It determines that ACN-T is the creator and owner of the BNC-ID related to the call and sends a release request for the BNC-ID = 3333 to ACN-T. It also sends a subtract request for the terminations in the context in ISN-A. It also notifies ACF-T of the release of the User-ID = 2000, Logical Port = TE1, and Connection-ID = 200.

---

1 ACI (Release\_BNC) ACF-N to ACF-T

**Address Information**

User-ID: = 2000,  
Logical Port-ID = TE1,  
Connection ID = 200

**Control information**

ACA-ID = 88,  
Primitive = Release\_BNC

**Bearer information**

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-T receives this information flow it notes that ISN-A has acknowledged call release processing. ACF-T initiates release of the bearer in BCF-T. It initiates information flow to ACF-N confirming the call and bearer release.

ACN-T may release resources associated with the bearer. ACN-T notes that the User-ID is released and dissociates it from the BNC-ID = 3333.

#### Option 1 and Option 2:

ACF-T also will notify the next ACF, in this case ACF-E, that the call association and BNC are to be released.

---

|   |                            |   |
|---|----------------------------|---|
| 2 | ACI(Release_Confirm)       | ACF-T to ACF-N  |
|   | <u>Address Information</u> | <u>Control information</u><br>ACA-ID = 88,<br>Primitive = Release_Confirm |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333                                |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When the ISN's ACF-N receives this information flow it notes the response from ACN-T. The User-ID can be marked as available by CSF-N, if CSF-N is the assigning entity for the call reference.

---

|   |                            |  |
|---|----------------------------|--|
| 3 | SUB.req (Release_BNC)      | ACF-N to BCF-N   |
|   | <u>Address Information</u> | <u>Control information</u><br>ContextID = 555<br>Primitive = Release_BNC |
|   |                            | <u>Bearer information</u><br>BNC-ID: = 3333,                             |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The BIWF's BCF-N removes the termination from the context and dissociates the BNC-ID from the termination. It notifies ACF-N that the request is processed.

---

|   |                            |  |
|---|----------------------------|--|
| 4 | SUB.resp (BNC_Released)    | BCF-N to ACF-N   |
|   | <u>Address Information</u> | <u>Control information</u><br>ContextID = 555<br>Primitive = Release_BNC |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333                               |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When ACF-N receives this information flow it notes the response.

---

|   |   |   |
|---|---|---|
| 6 | Bearer-Release.Reg                          | BCF-T to BCF-N  |
|   | <u>Address Information</u><br>BIWF Addr = x | <u>Control information</u><br>BCS-ID = "15",                    |
|   |   | <u>Bearer information</u><br>BNC-ID: = 3333,<br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The selected Bearer Control Function validates the request and may notify its associated Access Control function that a bearer with BNC-ID = 3333 has been released between ISN-A and ACN-T. BCF-N issues information flow 7 toward BCF-T to confirm the bearer release.

---

|   |  |  |
|---|--|--|
| 7 | Bearer-Release.Confirm                       | BCF-N to BCF-T                               |
|   | <u>Address Information</u><br>BIWF Addr = T1 | <u>Control information</u><br>BCS-ID = "15"  |
|   |  | <u>Bearer information</u><br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The BCF-T records the release of the Access connection.

---

## 8-13      Option 1 and Option 2 Information Flows      between ACN-T and ACN-E

The information flows between ACN-T and ACN-E for both option 1 and option 2 are equivalent to those previously described.

## **15.8 Access network information flows for functional terminals on the ISN**

The information flows for functional terminals apply to ISDN and 64 kbit/s ISDN circuit mode services in B-ISDN. The flows also may apply to V5.2 access networks where the analogue loop protocol from the terminal equipment is converted to V5 PSTN protocol in the Access Concentration Edge node (ACN-E) and conveyed to the Call Service Function (CSF) in the Interface Serving Node (ISN). The analogue loop signals for the V5 case are not illustrated in the information flows for the functional terminals, however, after conversion to the V5 PSTN format they are conveyed across the access network, as are the signals for other functional terminals.

### **15.8.1 Terminal originated – Forward bearer setup**

The information flows for functional terminal origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Terminal originated – Function-based in Figure 34.
- 2-a) Bearer establishment – ISN-A to ACN-E in Figure 18, or
- 2-b) Bearer establishment – Through ACN-T – ISN-A to ACN-E in Figure 21 (ActionID = Forward Setup).
- 3) Call establishment – Terminal originated – Function-based in Figure 36.

### **15.8.2 Terminal originated – Backward bearer setup**

The information flows for functional terminal origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Terminal originated – Function-based in Figure 34.
- 2-a) Bearer establishment – ACN-E to ISN-A in Figure 19, or
- 2-b) Bearer establishment – Through ACN-T – ACN-E to ISN-A in Figure 22 (ActionID = Backward Setup).
- 3) Call establishment – Terminal originated – Function-based in Figure 36.

### **15.8.3 Network originated – Backward bearer setup**

The information flows for network origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Network originated – Function-based in Figure 35.
- 2-a) Bearer establishment – ACN-E to ISN-A in Figure 19, or
- 2-b) Bearer establishment – Through ACN-T – ACN-E to ISN-A in Figure 22 (ActionID = Backward Setup).
- 3) Call establishment – Network originated – Function-based in Figure 37.

### **15.8.4 Network originated – Forward bearer setup**

The information flows for network origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Network originated – Functional-based in Figure 35.
- 2-a) Bearer establishment – ISN-A to ACN-E in Figure 18, or
- 2-b) Bearer establishment – Through ACN-T – ISN-A to ACN-E in Figure 21 (ActionID = Forward Setup).
- 3) Call establishment – Network originated – Functional-based in Figure 37.

### **15.8.5 Terminal originated – Intra-ISN Call – Function-based**

The information flows for functional terminal origination and Intra-ISN connection with both backward and forward bearer setup are described by the sequential application of five flows:

- 1) Call admission – Terminal originated – Function-based in Figure 34.
- 2) Call admission – Network originated – Function-based in Figure 35.
- 3) Bearer establishment – ACN-E to ACN-E in Figure 20. (ActionID = Backward Setup or Forward Setup).
- 4) Call establishment – Network originated – Function-based in Figure 37. (See Note 1.)
- 5) Call establishment – Terminal originated – Function-based in Figure 36.

NOTE 1 – Omit cut-through information flows.

NOTE 2 – Certain functionality such as audible ringing, busy tone, and congestion tone must be supported in the ACN-E if the intra-ISN proposal is to be supported by the network. Otherwise, the network will support intra-ISN calls using the same information flows and functional capabilities that are used for inter-ISN calls.

### **15.8.6 Terminal released – ISN-A owned BNC**

The information flows for terminal release and BNC ownership by ISN-A are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 38.
- 2-a) Bearer release – ISN-A owned in Figure 30, or
- 2-b) Bearer release through ACN-T – ISN-A to ACN-E in Figure 32.

### **15.8.7 Terminal released – ACN-E owned BNC**

The information flows for terminal release and BNC ownership by ACN-E are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 28.
- 2-a) Bearer release – ACN-E owned in Figure 31, or
- 2-b) Bearer release through ACN-T – ACN-E to ISN-A in Figure 33.

### **15.8.8 Network released – ISN-A owned BNC**

The information flows for network release and BNC ownership by ISN-A are described by the sequential application of two flows:

- 1) Call release – Network released in Figure 39.
- 2-a) Bearer release – ISN-A owned in Figure 30, or
- 2-b) Bearer release through ACN-T – ISN-A to ACN-E in Figure 32.

### **15.8.9 Network released – ACN-E owned BNC**

The information flows for network release and BNC ownership by ACN-E are described by the sequential application of two flows:

- 1) Call release – Network released in Figure 39.
- 2-a) Bearer release – ACN-E owned in Figure 31, or
- 2-b) Bearer release through ACN-T – ACN-E to ISN-A in Figure 33.

## 15.9 Call admission

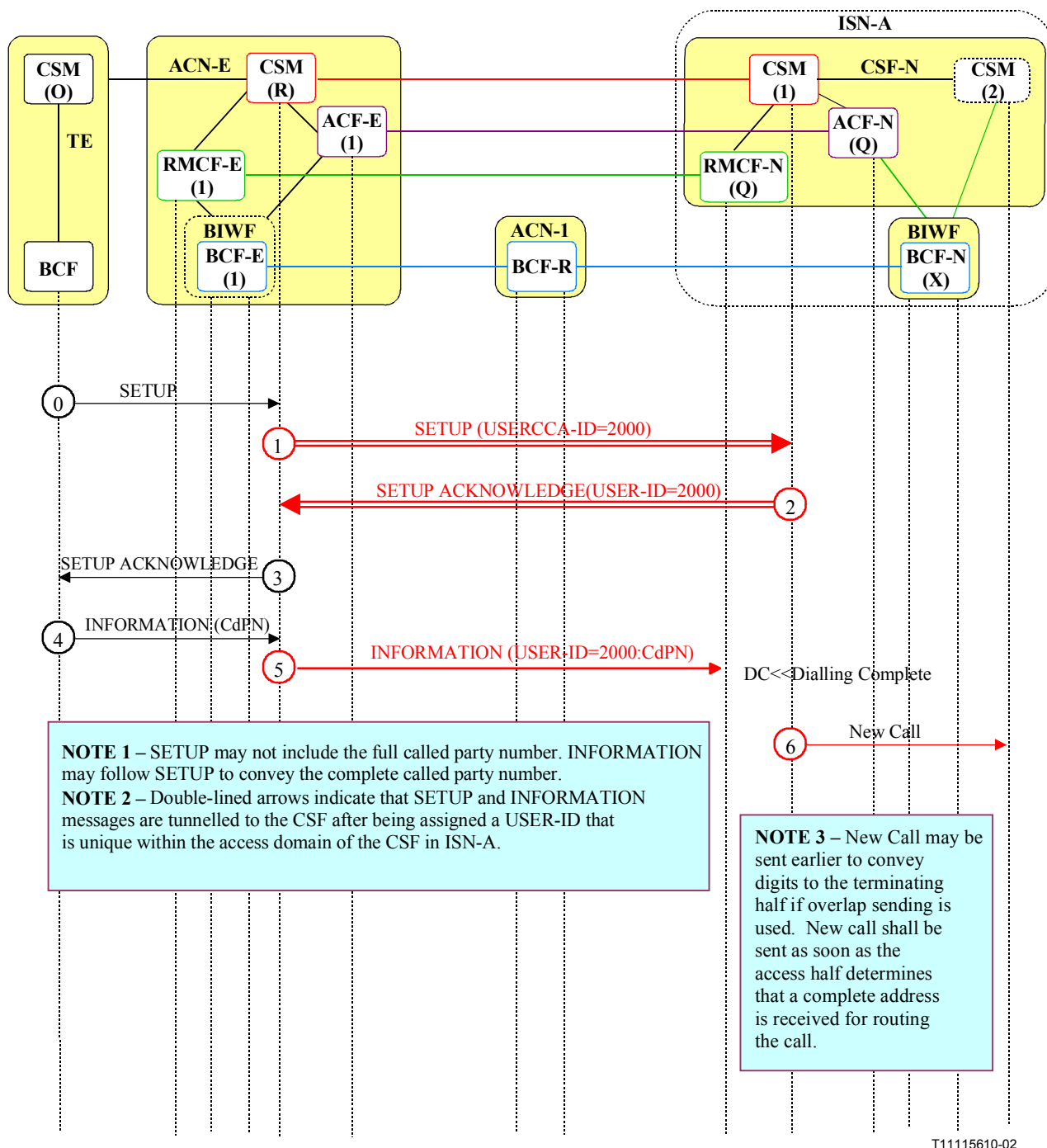


Figure 34 – Call admission – Terminal originated – Function-based

### 15.9.1 Call admission – Terminal originated – Function-based

The information flows and functional entity actions illustrated in Figure 34 are described in the following numbered paragraphs. The call admission stage describes all information flows starting with receipt of a request for a new call through and including the point when complete number or address information is received by CSM(1). It precedes the bearer establishment stage. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

|   |                            |  |
|---|----------------------------|--|
| 0 | SETUP                      | TE to ACN-E  |
|   | <u>Address Information</u> | <u>Control information</u><br>Local call reference |
|   |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** A user associated with the TE requests a connection with an ISDN or B-ISDN interface.

**Processing upon receipt:** When the ACN's CSM receives this information flow, it assigns a USER-ID that is unique within the access domain of the CSF in ISN-A. It then tunnels the SETUP and subsequent INFORMATION messages to the CSF. It may also send primitives containing descriptors for ISDN or B-ISDN, terminal address including port and channel. The descriptors are provisioned attributes of the port that is dedicated to the terminal equipment within the ACN-E.

|   |                            |   |
|---|----------------------------|---|
| 1 | SETUP                      | CSM(R) to CSM(1)  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                     |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** CSM(1) prepares to establish the context and terminations for the terminating half of ISN-A. It knows the status of the ISDN line and other attributes of the requested connection, such as serving ACN Address, preferred connection group, type of ISDN line, and service options. It determines the bearer interworking function (BIWF = x) to be used to carry the new Access connection between ACN-E and ISN(A). It issues information flows toward the access control function (ACF-N) in order to determine if a pre-established idle Access network connection exists between it and ACN-E. It indicates the preferred setup option, either Forward or Backward Bearer Connection and requests a BNC-ID for the bearer. CSM(1) may respond to CSM(R) with a SETUP ACKNOWLEDGE message.

|   |                            |   |
|---|----------------------------|---|
| 2 | SETUP ACKNOWLEDGE          | CSM(1) to CSM(R)  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                     |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** CSM(R) relays the ISDN SETUP ACKNOWLEDGE to the TE, indicating that call processing has received the SETUP request, and that destination address may be forwarded by CSM(R), if not already included in the SETUP message. It awaits further instructions from the CSM(1), ACF-E, or TE.

|   |                            |  |
|---|----------------------------|--|
| 3 | SETUP ACKNOWLEDGE          | CSM(R) to TE                                       |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|   |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flows 2.

**Processing upon receipt:** The terminal equipment may respond appropriately, including the sending of destination address and other information.

|   |  |                            |
|---|--|----------------------------|
| 4 | INFORMATION                                | TE to CSM(R)               |
|   | <u>Address Information</u>                 | <u>Control information</u> |
|   | Called Party Address<br>Feature Activators | Local Call Reference       |
|   |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The CSM(R) inserts or attaches USER-ID = 2000 and relays this INFORMATION message to CSM(1).

|   |  |                                 |
|---|--|---------------------------------|
| 5 | INFORMATION                                | CSM(R) to CSM(1)                |
|   | <u>Address Information</u>                 | <u>Control information</u>      |
|   | Called Party Address<br>Feature Activators | USER-ID = 2000,<br>Port-ID = 20 |
|   |  | <u>Bearer information</u>       |

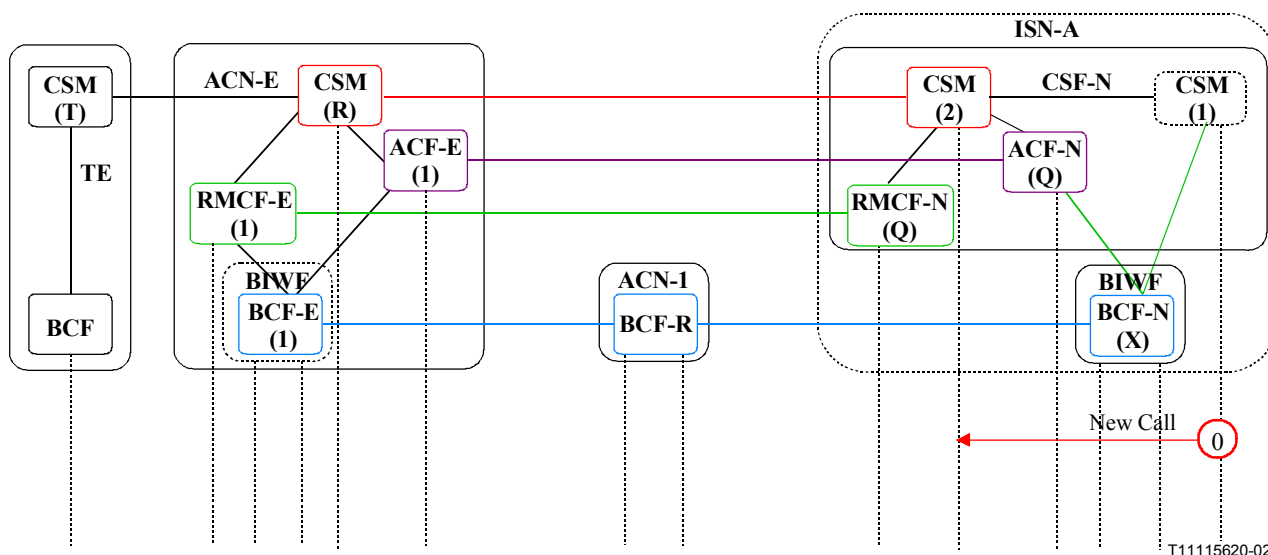
**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The CSM(1) responds with a CALL PROCEEDING message when the received destination address information is complete. It then routes the call to the destination.

|   |                            |                            |
|---|----------------------------|----------------------------|
| 6 | New Call                   | CSM(1) to CSM(2)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 5 and receipt of complete destination address information. For overlap sending, earlier messages may have been sent to CSM(2) to convey dialed digits for route analysis.

**Processing upon receipt:** CSM(2) prepares to establish the context and terminations in the terminating half of ISN-A.



**Figure 35 – Call admission – Network originated – Function-based**

### 15.9.2 Call admission – Network originated – Function-based

The information flows and functional entity actions illustrated in Figure 35 are described in the following numbered paragraphs. The call admission stage describes all information flows starting with receipt of a request for a new call through and including the point when complete number or address information is received by CSM(2). It precedes the bearer establishment stage. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |  |
|---|----------------------------|--|
| 0 | New Call                   | CSM(1) to CSM(2)                                     |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

---

**Initiation of information flow:** A connection to an ISDN line is requested by the network.

**Processing upon receipt:** CSM(2) prepares to establish the context and terminations for the terminating half of ISN-A.

It knows the status of the ISDN line and other attributes of the requested connection, such as serving ACN Address, preferred connection group, type of ISDN line, and service options. The selected ISN(A)'s CSF-N assigns a unique USER-ID of 2000. It determines the bearer interworking function (BIWF = x) to be used to carry the new Access connection between ACN-E and ISN(A). It issues information flows toward the access control function (ACF-N) in order to determine if a pre-established idle Access network connection exists between it and ACN-E. It indicates the preferred setup option, either Forward or Backward Bearer Connection.

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## 15.10 Call establishment

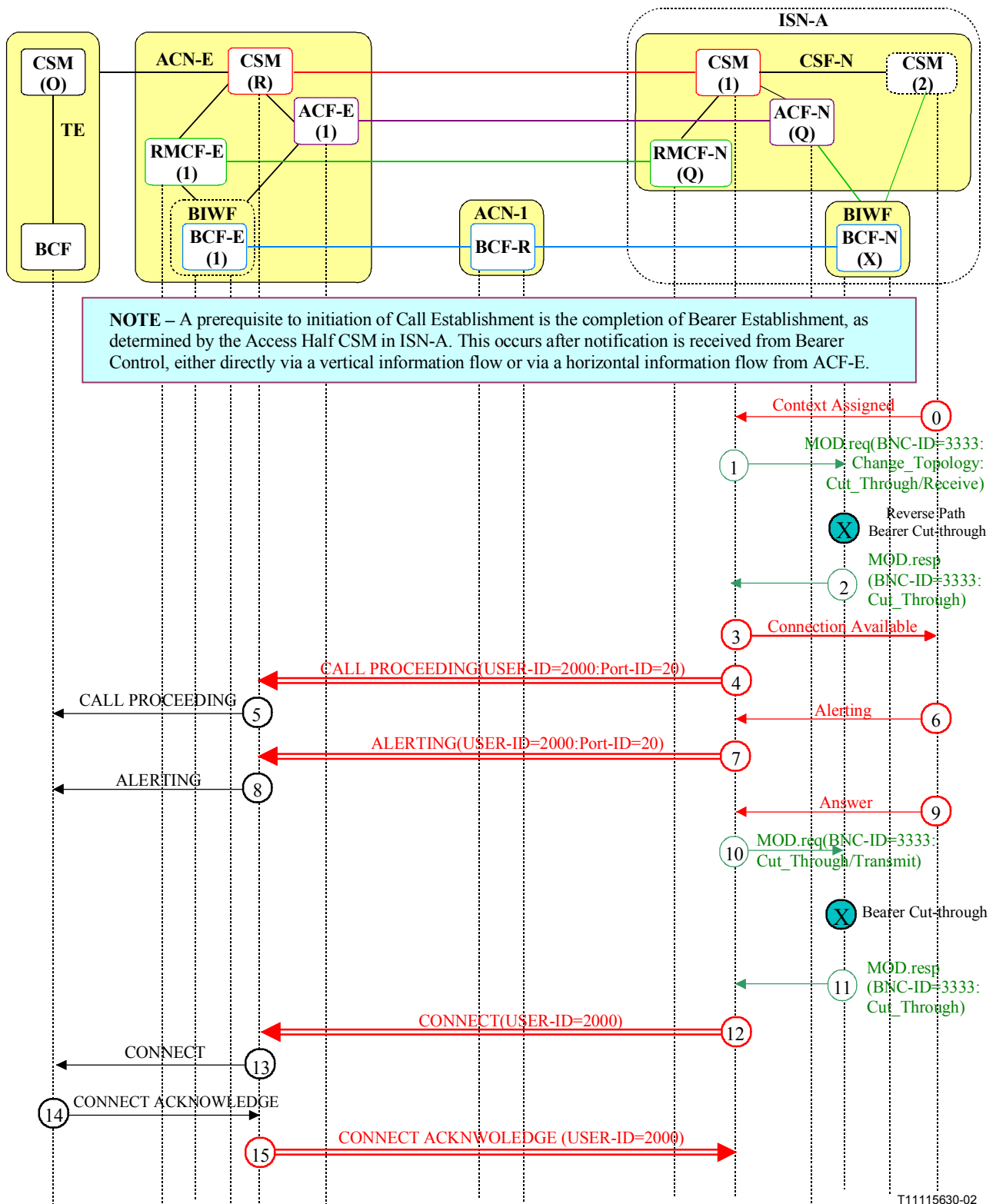


Figure 36 – Call establishment – Terminal originated – Function-based

### 15.10.1 Call establishment – Terminal originated – Function-based

The information flows and functional entity actions illustrated in Figure 36 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 0 | Context Assigned           |                            | CSM(2) to CSM(1)          |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** CSM(2) obtains a contextID and a terminationID for the new call.

**Processing upon receipt:** CSM(1) associates the originating and terminating contexts in ISN-A.

|   |   |  |                           |
|---|---|--|---------------------------|
| 1 | MODIFY.req (Change_Topology)(Cut_Through/Receive) |  | CSM(1) to BIWFX           |
|   | <u>Address Information</u>                        | <u>Control information</u>   | <u>Bearer information</u> |
|   |   | Port-ID = 20,<br>ContextID = new<br>Primitive = Change_Topology<br>Primitive = Cut_Through/Receive | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 0.

NOTE – Bearer cut-through in the reverse direction (receive for the originating caller) may be required before ALERTING is received to convey audible ringing from the destination terminal to the originating terminal. Bearer cut-through in the forward direction may be withheld until receipt of an ANSWER message.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the receive direction and joins the terminations in ISN-A associated with both CSM(1) and CSM(2). It responds to CSM(1) that cut-through is complete.

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 2 | MODIFY.resp                |   | BIWFX to CSM(1)           |
|   | <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |
|   |                            | Port-ID = 20,<br>ContextID = new<br>Primitive = Change_Topology,<br>Primitive = Cut_Through/Receive | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(1) receives this information flow it responds to CSM(2) that the connection is available.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 3 | Connection Available       |                            | CSM(1) to CSM(2)          |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** CSM(2) can associate the originating and terminating call contexts in ISN-A.

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 4 | CALL PROCEEDING            | CSM(1) to CSM(R)  |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** CSM(R) relays the CALL PROCEEDING message to the terminal equipment. This indicates that call processing has received complete address information and will accept no more.

|   |                            |  |                           |
|---|----------------------------|--|---------------------------|
| 5 | CALL PROCEEDING            | CSM(R) to TE                                       |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The terminal equipment should end addressing information. It waits for alerting indication from the destination address.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 6 | Alerting                   | CSM(2) to CSM(1)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Alerting signal is received from the network.

**Processing upon receipt:** CSM(1) sends alerting to CSM(R). It waits for further instructions from CSM(2), CSM(R), or ACF-N.

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 7 | ALERTING                   | CSM(1) to CSM(R)  |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** CSM(R) relays the message to the TE. It waits for further instructions from CSM(1), TE, or ACF-E.

|   |                            |  |                           |
|---|----------------------------|--|---------------------------|
| 8 | ALERTING                   | CSM(R) to TE                                       |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** TE awaits a CONNECT message.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 9 | Answer                     | CSM(2) to CSM(1)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** The network forwards an answer indication.

**Processing upon receipt:** CSM(1) requests cut-through of the transmit path and sends ANSWER to CSM(R). It waits for further instructions from CSM(2), CSM(R), or ACF-N.

|    |                                   |  |
|----|-----------------------------------|--|
| 10 | MODIFY.req (Cut_Through/Transmit) | CSM(1) to BIWFX  |
|    | <u>Address Information</u>        | <u>Control information</u><br>Port-ID = 20,<br>ContextID = new<br>Primitive = Cut_Through/Transmit |
|    |                                   | <u>Bearer information</u><br>BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 9.

**NOTE** – Bearer cut-through in the reverse direction (receive for the originating caller) may be required before ALERTING is received to convey audible ringing from the destination terminal to the originating terminal. Bearer cut-through in the forward direction may be withheld until receipt of an ANSWER message.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the transmit direction and joins the terminations in ISN-A associated with both CSM(1) and CSM(2). It responds to CSM(1) that cut-through is complete.

|    |                                    |  |
|----|------------------------------------|--|
| 11 | MODIFY.resp (Cut_Through/Transmit) | BIWFX to CSM(1)  |
|    | <u>Address Information</u>         | <u>Control information</u><br>Port-ID = 20,<br>ContextID = new<br>Primitive = Cut_Through/Transmit |
|    |                                    | <u>Bearer information</u><br>BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** When CSM(1) receives this information flow it completes the connection of the call across the access network, if required.

|    |                            |   |
|----|----------------------------|---|
| 12 | CONNECT                    | CSM(1) to CSM(R)  |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|    |                            | <u>Bearer information</u>                                     |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** CSM(R) relays the message to the TE. It waits for further instructions from CSM(1), TE, or ACF-E.

|    |                            |  |
|----|----------------------------|--|
| 13 | CONNECT                    | CSM(R) to TE                                       |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|    |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 12.

**Processing upon receipt:** The TE serving an ISDN or B-ISDN interface may respond with CONNECT ACKNOWLEDGE to confirm the connection.

|    |                            |  |
|----|----------------------------|--|
| 14 | CONNECT ACKNOWLEDGE        | TE to CSM(R)                                       |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|    |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** The CSM(R) inserts or appends USER-ID = 2000 and relays this message to the CSM(1).

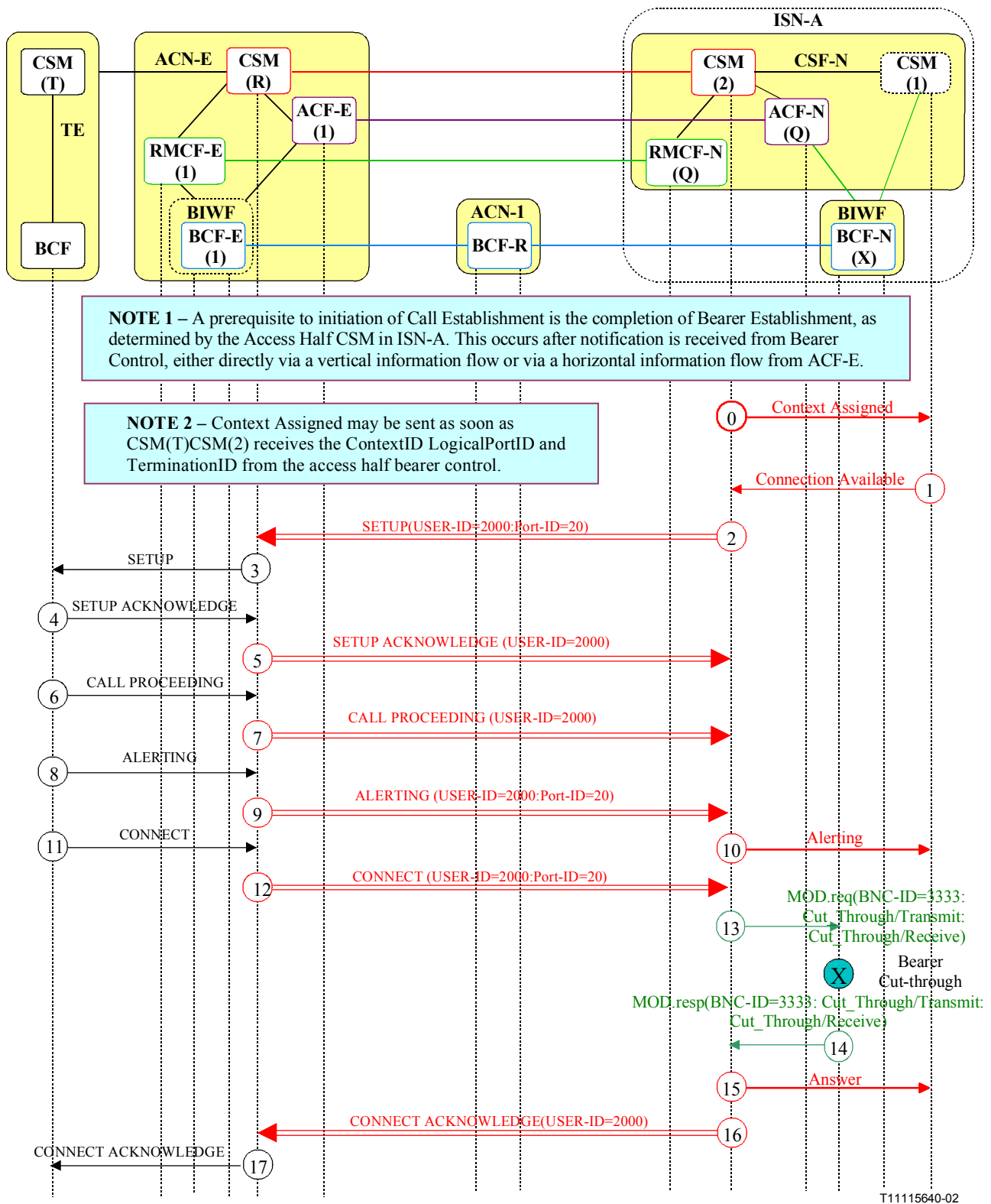
---

|           |                                   |                                   |
|-----------|-----------------------------------|-----------------------------------|
| <b>15</b> | <b>CONNECT ACKNOWLEDGE</b>        | <b>CSM(R) to CSM(1)</b>           |
|           | <b><u>Address Information</u></b> | <b><u>Control information</u></b> |
|           |                                   | USER-ID = 2000,<br>Port-ID = 20   |
|           |                                   | <b><u>Bearer information</u></b>  |

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** The CSM(1) records the response.

---



**Figure 37 – Call establishment – Network originated – Function-based**

### 15.10.2 Call establishment – Network originated – Function-based

The information flows and functional entity actions illustrated in Figure 37 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 0 | Context Assigned           | CSM(2) to CSM(1)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** A notification is received from BIWFX that the ContextID = 555 and the TerminationID are associated with the new call within the terminating half of ISN-A.

**Processing upon receipt:** CSM(1) prepares to associate the originating and terminating call contexts in ISN-A.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 1 | Connection Available       | CSM(1) to CSM(2)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Receipt of information that the network connection is established.

**Processing upon receipt:** CSM(2) can associate the originating and terminating call contexts in ISN-A. It initiates flow 2 forwarding loop signals to ACN-E. It awaits further instructions from the CSM(R), CSM(1), or ACF-N.

---

|   |                            |                                  |
|---|----------------------------|----------------------------------|
| 2 | SETUP                      | CSM(2) to CSM(R)                 |
|   | <u>Address Information</u> | <u>Control information</u>       |
|   |                            | <u>Bearer information</u>        |
|   |                            | USER-ID: = 2000,<br>Port-ID = 20 |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** CSM(R) will relay the ISDN or B-ISDN SETUP message to the TE. The CSM(R) awaits further instruction from the terminal equipment. This can be Call Proceeding, Progress, Alerting, or Connect messages.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 3 | SETUP                      | CSM(R) to TE               |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |
|   |                            | Local Call reference       |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** The TE awaits further instructions from the CSM(R) or from the user of the terminal equipment. The TE may notify the network that call information is received and is being processed.

---

|   |                            |  |
|---|----------------------------|--|
| 4 | SETUP ACKNOWLEDGE          | TE to CSM(R)                                       |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call reference |
|   |                            | <u>Bearer information</u>                          |

---

**Initiation of information flow:** Processing of information flow 3.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the SETUP ACKNOWLEDGE message to CSM(2).

---

|   |                            |   |
|---|----------------------------|---|
| 5 | SETUP ACKNOWLEDGE          | CSM(R) to CSM(2)  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                     |

---

**Initiation of information flow:** Processing of information flow 4.

**Processing:** CSM(2) waits for further instructions from CSM(R).

---

|   |                            |  |
|---|----------------------------|--|
| 6 | CALL PROCEEDING            | TE to CSM(R)                                       |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call reference |
|   |                            | <u>Bearer information</u>                          |

---

**Initiation of information flow:** Processing of information flow 3.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the CALL PROCEEDING message to CSM(2).

---

|   |                            |   |
|---|----------------------------|---|
| 7 | CALL PROCEEDING            | CSM(R) to CSM(2)  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                     |

---

**Initiation of information flow:** Processing of information flow 6.

**Processing:** CSM(2) waits for further instructions from CSM(R).

---

|   |                            |  |
|---|----------------------------|--|
| 8 | ALERTING                   | TE to CSM(R)                                       |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|   |                            | <u>Bearer information</u>                          |

---

**Initiation of information flow:** Processing of information flow 3.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the ALERTING message to CSM(2).

---

|   |                            |   |
|---|----------------------------|---|
| 9 | ALERTING                   | CSM(R) to CSM(2)  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                     |

---

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** CSM(2) sends an alerting signal toward CSM(1).

|    |                            |                            |                           |
|----|----------------------------|----------------------------|---------------------------|
| 10 | Alerting                   | CSM(2) to CSM(1)           |                           |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** CSM(1) sends an alerting signal toward the calling ISDN. It waits for further instructions from CSM(2).

|    |                            |  |                           |
|----|----------------------------|--|---------------------------|
| 11 | CONNECT                    | TE to CSM(R)                                       |                           |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference | <u>Bearer information</u> |

**Initiation of information flow:** The called ISDN answers.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the CONNECT message to CSM(2).

|    |                            |   |                           |
|----|----------------------------|---|---------------------------|
| 12 | CONNECT                    | CSM(R) to CSM(2)  |                           |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** CSM(2) instructs the BIWFX to cut through the bearer in both directions. It may issue a CONNECT ACKNOWLEDGE message toward CSM(R). It waits for further instructions from CSM(1), or CSM(R).

|    |                            |  |  |
|----|----------------------------|--|--|
| 13 | MOD.req (Cut_Through)      | CSM(2) to BIWFX  |  |
|    | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_Through/Transmit<br>Primitive = Cut_Through/Receive | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 12.

**Processing upon receipt:** BIWFX cuts through the bearer in both directions and responds to CSM(2).

|    |                            |  |  |
|----|----------------------------|--|--|
| 14 | MOD.resp (Cut_Through)     | BIWFX to CSM(2)  |  |
|    | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_Through/Transmit<br>Primitive = Cut_Through/Receive | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** When CSM(2) receives this information flow it updates the call state and waits for further notifications. It sends an answer indication in flow 16 to CSM(1).

---

|    |                            |  |
|----|----------------------------|--|
| 15 | Answer                     | CSM(2) to CSM(1)                                     |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** The CSM(1) forwards an ANSWER message to the network.

---

|    |                            |  |
|----|----------------------------|--|
| 16 | CONNECT ACKNOWLEDGE        | CSM(2) to CSM(R)                                     |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |
|    |                            | USER-ID = 2000,<br>Port-ID = 20                      |

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** The CSM(R) relays this message to the TE.

---

|    |                            |  |
|----|----------------------------|--|
| 17 | CONNECT ACKNOWLEDGE        | CSM(R) to TE   |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |
|    |                            | Local Call Reference                                 |

**Initiation of information flow:** Processing of information flow 16.

**Processing upon receipt:** The TE records the response.

---

## 15.11 Call release

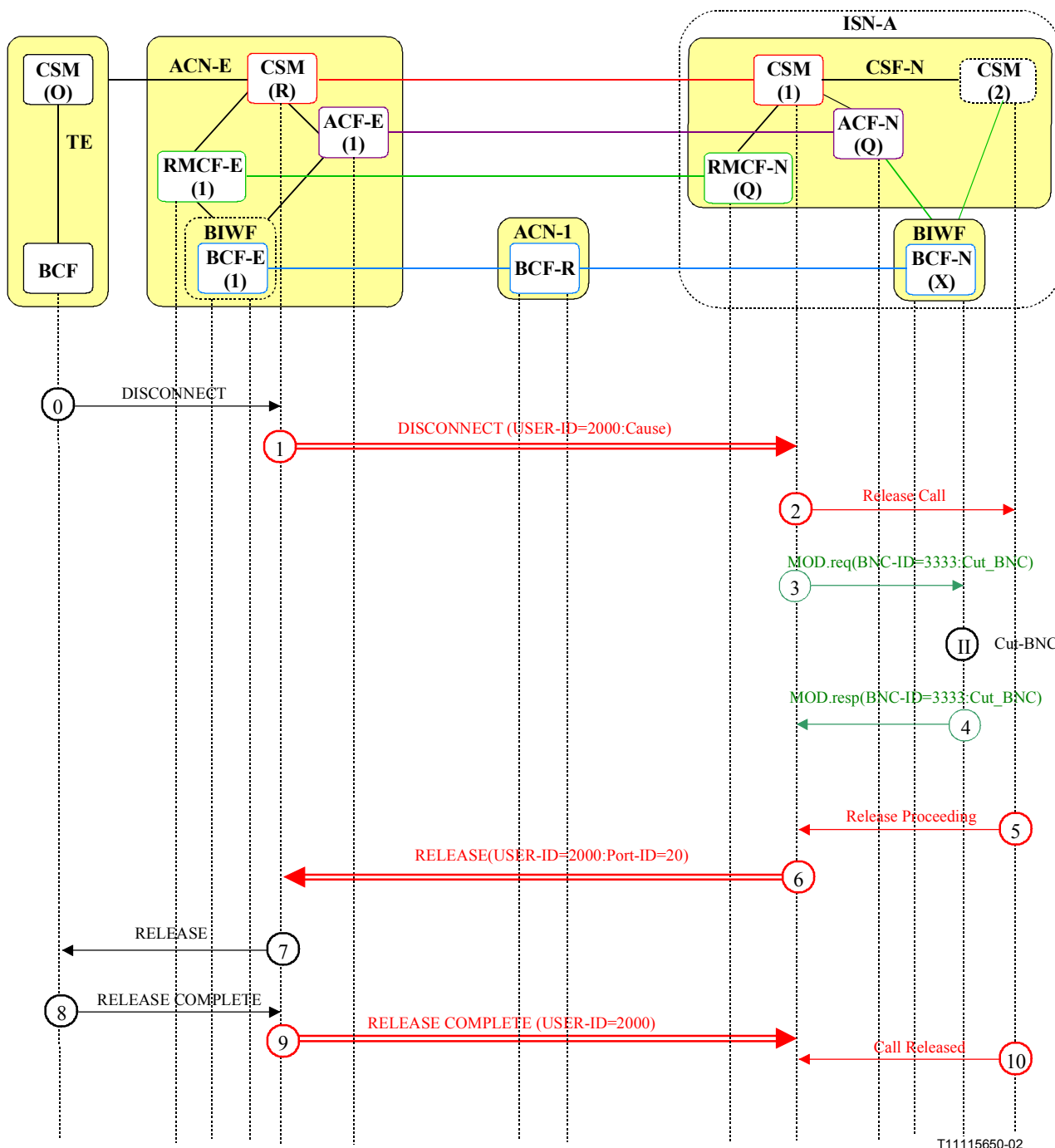


Figure 38 – Call release – Terminal released – Function-based

### 15.11.1 Call release – Terminal released – Function-based

The information flows and functional entity actions illustrated in Figure 38 are described in the following numbered paragraphs. The call release information flows precede the bearer release information flows. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Three stage release procedures are illustrated in the following information flows. They include exchange of three messages between ISN-A and ACN-E: DISCONNECT, RELEASE, and RELEASE COMPLETE. They represent the release procedures for DSS1. The timing and

procedures for DSS1 apply independently of the access network signalling procedures. Two stage release procedures for DSS2 are noted in the information flow text. The DSS2 release procedure includes RELEASE and RELEASE COMPLETE messages, rather than the DISCONNECT and RELEASE used in DSS1.

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

|   |                             |  |
|---|-----------------------------|--|
| 0 | DISCONNECT (DSS2 – RELEASE) | TE to ACN-E  |
|   | <u>Address Information</u>  | <u>Control information</u><br>Local Call Reference |
|   |                             | <u>Bearer information</u>                          |

**Initiation of information flow:** A user associated with the TE requests disconnect for an ISDN interface.

**Processing upon receipt:** When the ACN's CSM(R) receives this information flow, it inserts or appends USER-ID = 2000 and relays the message to CSM(1).

|   |                             |   |
|---|-----------------------------|---|
| 1 | DISCONNECT (DSS2 – RELEASE) | CSM(R) to CSM(1)  |
|   | <u>Address Information</u>  | <u>Control information</u><br>USER-ID: = 2000<br>Port-ID = 20 |
|   |                             | <u>Bearer information</u>                                     |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** The CSM(1) sends a release call indication to CSM(2). It requests BIWFX to sever the connection between the ISDN bearer on the access side and the network. It sends a message in response to CSM(R).

|   |                            |                            |
|---|----------------------------|----------------------------|
| 2 | Release Call               | CSM(1) to CSM(2)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** CSM(2) can request that the terminating call context in ISN-A be removed.

|   |                            |   |
|---|----------------------------|---|
| 3 | MOD.req (Cut_BNC)          | CSM(1) to BIWFX   |
|   | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>ContextID = 555<br>Primitive = Cut_BNC |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When BIWFX receives this information flow it severs the connection between the access and the network. BIWFX also initiates flow 4 confirming that BIWFX severed the connection.

|   |                            |  |
|---|----------------------------|--|
| 4 | MOD.resp                   | BIWFX to CSM(1)  |
|   | <u>Address Information</u> | <u>Control information</u><br>Port-ID = 20,<br>Primitive = Cut_BNC |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333                         |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When CSM(1) receives this information flow it notes the change in state.

|   |                            |  |
|---|----------------------------|--|
| 5 | Release Proceeding         | CSM(2) to CSM(1)                                     |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 2 by CSM(2).

**Processing upon receipt:** When CSM(1) receives this information flow it proceeds to release the call and bearer in the access network, if it has not already done so.

|   |                                   |  |
|---|-----------------------------------|--|
| 6 | RELEASE (DSS2 – RELEASE COMPLETE) | CSM(1) to CSM(R)                                     |
|   | <u>Address Information</u>        | <u>Control information</u> <u>Bearer information</u> |
|   |                                   | USER-ID = 2000,<br>Port-ID = 20                      |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The CSM(R) relays this message to the TE.

|   |                                   |  |
|---|-----------------------------------|--|
| 7 | RELEASE (DSS2 – RELEASE COMPLETE) | CSM(R) to TE   |
|   | <u>Address Information</u>        | <u>Control information</u> <u>Bearer information</u> |
|   |                                   | Local Call Reference                                 |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The TE records the response.

|   |                            |  |
|---|----------------------------|--|
| 8 | RELEASE COMPLETE           | TE to ACN-E  |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |
|   |                            | Local Call Reference                                 |

**Initiation of information flow:** A user associated with the TE receives a RELEASE for an ISDN interface.

**Processing upon receipt:** When the ACN's CSM(R) receives this information flow, it inserts or appends USER-ID = 2000 and relays the message to CSM(1).

|   |                            |  |
|---|----------------------------|--|
| 9 | RELEASE COMPLETE           | CSM(R) to CSM(1)                                     |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |
|   |                            | USER-ID: = 2000,<br>Port-ID = 20                     |

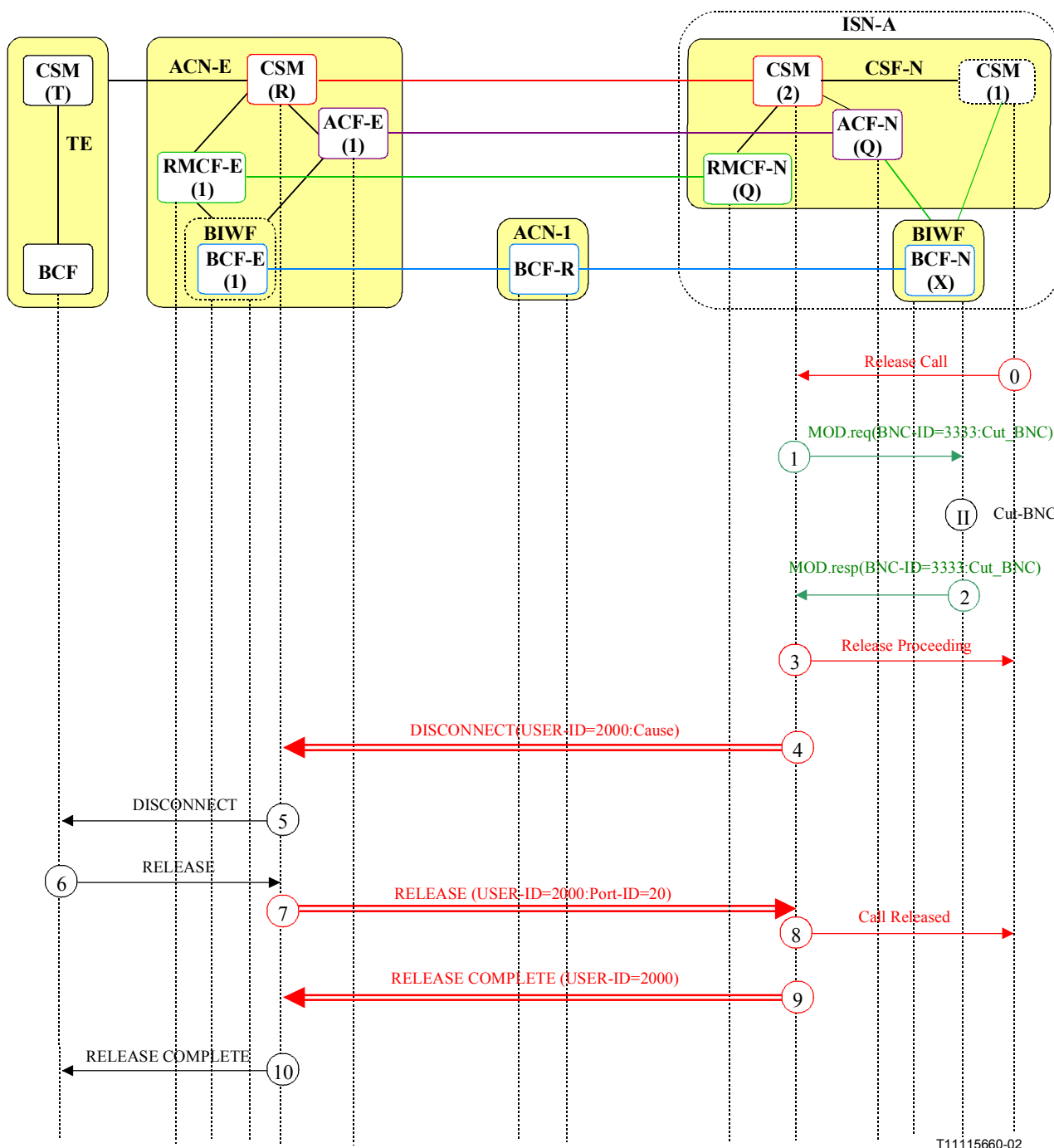
**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** CSM(1) notes the call release.

|    |                            |  |
|----|----------------------------|--|
| 10 | Call Released              | CSM(2) to CSM(1)                                     |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** CSM(2) has received confirmation from the network that the call is released.

**Processing upon receipt:** When CSM(1) receives this information flow it proceeds to release the bearer associated with the call in the access network, if it has not already done so.



**Figure 39 – Call release – Network released – Function-based**

### 15.11.2 Call release – Network released – Function-based

The information flows and functional entity actions illustrated in Figure 39 are described in the following numbered paragraphs. The call release information flows precede the bearer release information flows. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Three stage release procedures are illustrated in the following information flows. They include exchange of three messages between ISN-A and ACN-E: DISCONNECT, RELEASE, and RELEASE COMPLETE. They represent the release procedures for DSS1. The timing and procedures for DSS1 apply independently of the access network signalling procedures. Two stage release procedures for DSS2 are noted in the information flow text. The DSS2 release procedure

includes RELEASE and RELEASE COMPLETE messages, rather than the DISCONNECT and RELEASE used in DSS1.

NOTE – These release information flows do not vary with respect to the direction in which the call was established. Therefore, it does not matter whether the CSM on the access half is CSM(1) or CSM(2).

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 0 | Release Call               | CSM(1) to CSM(2)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** The network requests disconnect for an ISDN line.

**Processing upon receipt:** The CSM(2) determines that the call is to be disconnected. The CSM(2) requests BIWFx to sever the connection between the ISDN bearer on the access side and the network. It responds to CSM(1) that the release is proceeding and requests ACN-E to disconnect the ISDN line.

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 1 | MOD.req (Cut_BNC)          | CSM(2) to BIWFx   |                           |
|   | <u>Address Information</u> | <u>Control information</u>                              | <u>Bearer information</u> |
|   |                            | Port-ID = 20,<br>ContextID = 555<br>Primitive = Cut_BNC | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When BIWFx receives this information flow it severs the BNC connection between the access and the network. BIWFx also initiates flow 2 confirming that BIWFx severed the BNC connection.

|   |                            |                                      |                           |
|---|----------------------------|--------------------------------------|---------------------------|
| 2 | MOD.resp                   | BIWFx to CSM(2)                      |                           |
|   | <u>Address Information</u> | <u>Control information</u>           | <u>Bearer information</u> |
|   |                            | Port-ID = 20,<br>Primitive = Cut_BNC | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(1) receives this information flow it notes the change in state and indicates to CSM(1) that the call release is proceeding.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 3 | Release Proceeding         | CSM(2) to CSM(1)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 1 by CSM(2).

**Processing upon receipt:** When CSM(1) receives this information flow it proceeds to confirm the release the call across the network.

|   |                             |                                  |                           |
|---|-----------------------------|----------------------------------|---------------------------|
| 4 | DISCONNECT (DSS2 – RELEASE) | CSM(2) to CSM(R)                 |                           |
|   | <u>Address Information</u>  | <u>Control information</u>       | <u>Bearer information</u> |
|   |                             | USER-ID: = 2000,<br>Port-ID = 20 |                           |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** CSM(R) relays the message to the TE.

---

|   |                             |  |
|---|-----------------------------|--|
| 5 | DISCONNECT (DSS2 – RELEASE) | CSM(R) to TE                                       |
|   | <u>Address Information</u>  | <u>Control information</u><br>Local Call Reference |
|   |                             | <u>Bearer information</u>                          |

---

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The TE initiates release and sends a response to CSM(2) through CSM(R).

---

|   |                                   |  |
|---|-----------------------------------|--|
| 6 | RELEASE (DSS2 – RELEASE COMPLETE) | TE to CSM(R)                                       |
|   | <u>Address Information</u>        | <u>Control information</u><br>Local Call Reference |
|   |                                   | <u>Bearer information</u>                          |

---

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The CSM(R) relays this message to CSM(2).

---

|   |                                   |   |
|---|-----------------------------------|---|
| 7 | RELEASE (DSS2 – RELEASE COMPLETE) | CSM(R) to CSM(2)  |
|   | <u>Address Information</u>        | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|   |                                   | <u>Bearer information</u>                                     |

---

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** CSM(2) indicates to CSM(1) that the call is released and instructs ACF-N to release the BNC. It may send a RELEASE COMPLETE message in response to CSM(R).

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 8 | Call Released              | CSM(2) to CSM(1)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

---

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** When CSM(1) receives this information flow it notes the change in state.

---

|   |                            |  |
|---|----------------------------|--|
| 9 | RELEASE COMPLETE           | CSM(2) to CSM(R)   |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID: = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                      |

---

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** CSM(R) relays the message to the TE.

---

|    |                            |  |
|----|----------------------------|--|
| 10 | RELEASE COMPLETE           | ACN-E to TE  |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|    |                            | <u>Bearer information</u>                          |

---

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** The TE records the release complete.

---

## 16 Interface Mediation Node (IMN) functional description

The IMN Access Network Functional Architecture diagrams are shown below for an IMN to GSN configuration. An example of an end-to-end configuration could consist of one ACN-E (both originating and terminating "uni"s on same ACN-E), two IMNs and two or more CMNs. The bearer connection takes the shortest path. Other functional configurations are also possible.

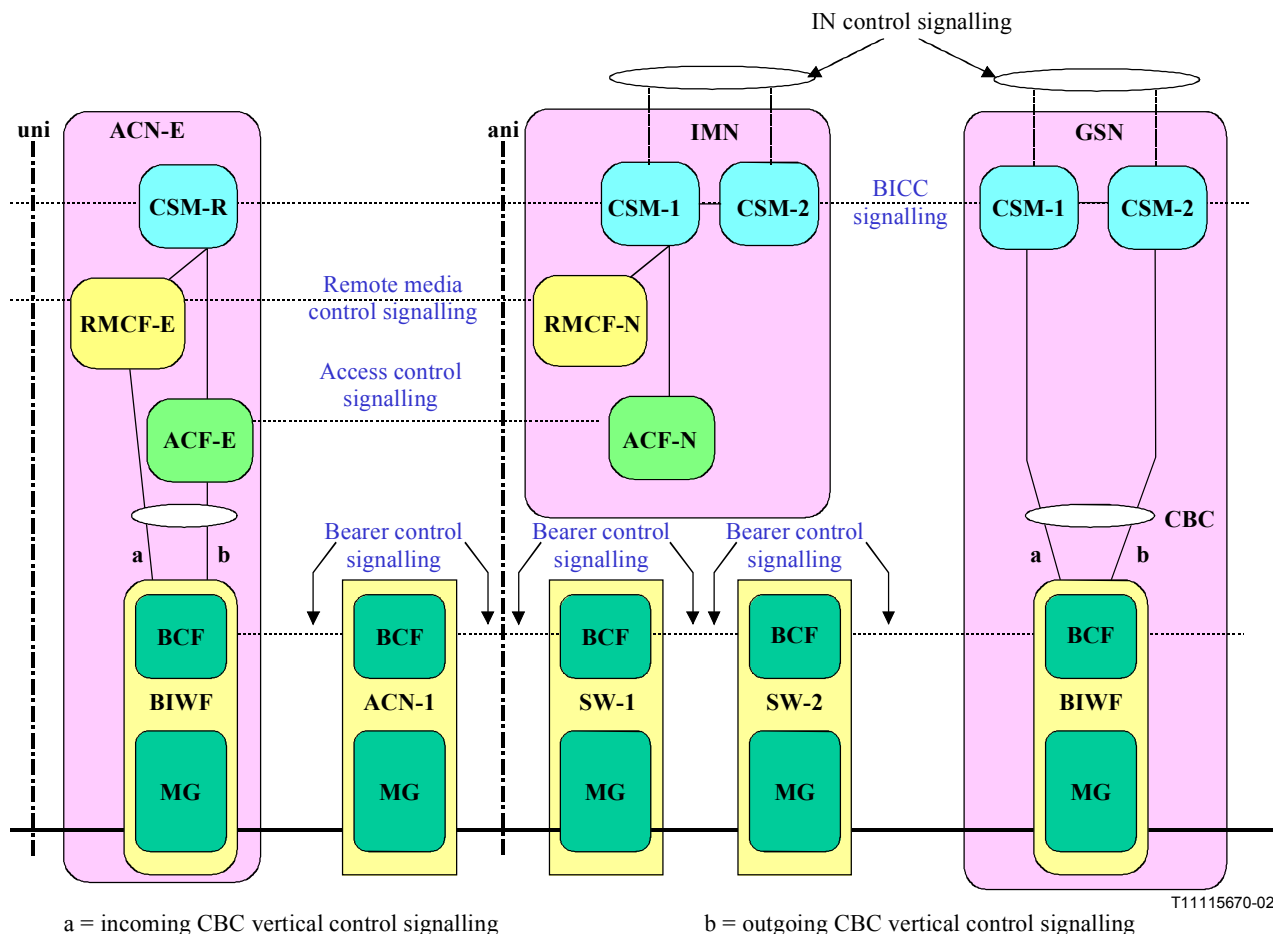
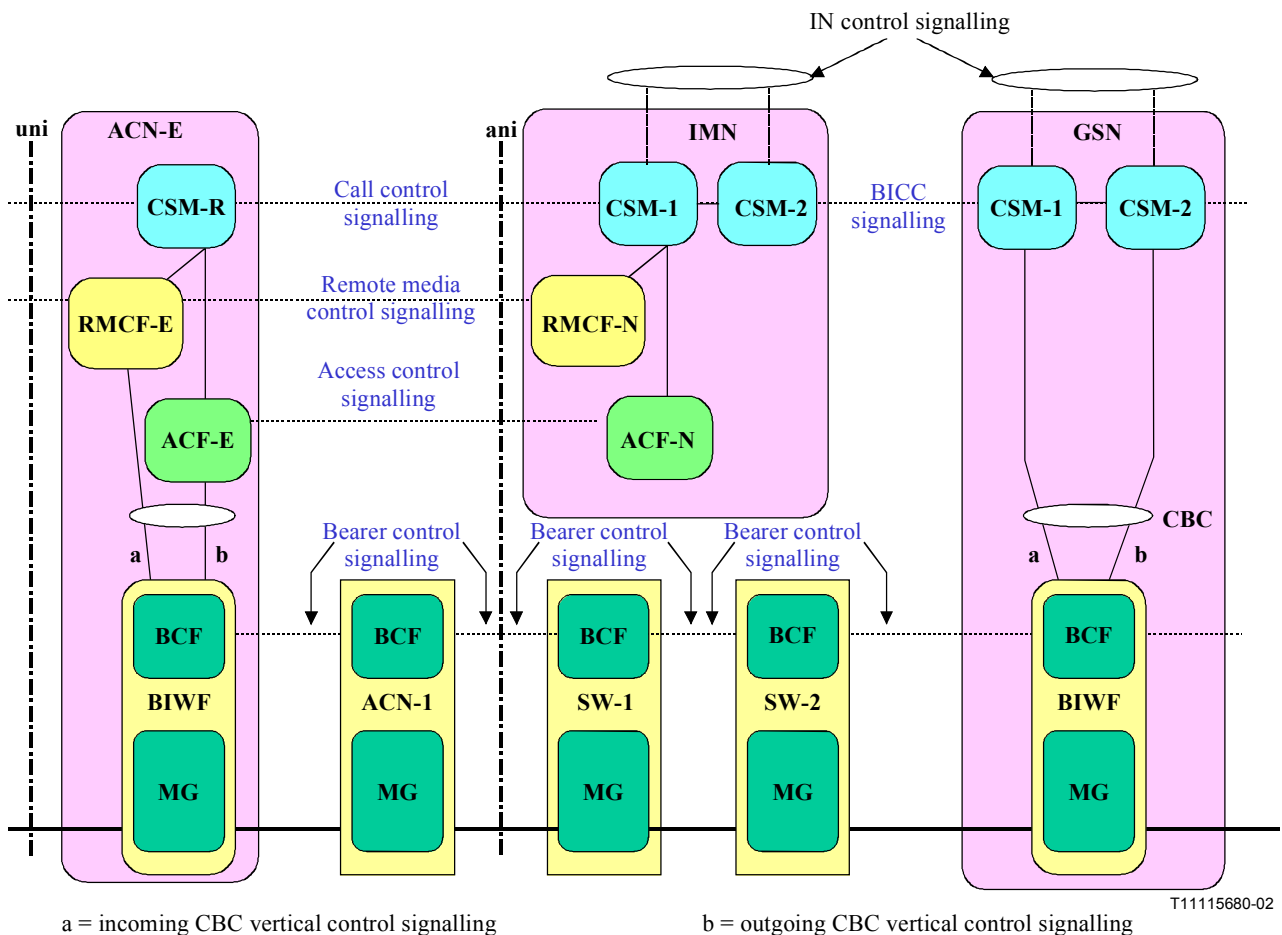


Figure 40 – BICC access network information objects for IMN – In-band user call control



**Figure 41 – BICC access network information objects for IMN – Out-of-band user call control**

The IMN is a serving node that has no direct control of an own BIWF. Therefore, in Figure 40, the BIWF at the ACN-E directly interacts with the BIWF at the GSN. The switching nodes SW have only relay function. In the case of IP bearer they are routers, and the bearer control protocol is tunnelled in BICC call control signalling messages.

The "ani" interface between the ACN-E and the serving node is independent of the type of the serving node (IMN, ISN or GSN).

Additional flows for the IMN configuration are provided. In the "bearer establishment" flows the signalling has to be passed to the remote BIWF via "nni" (BICC call control) instead of addressing a local BIWF. The corresponding BICC information flows are shown in ITU-T Q-Series – Supplement 32.

In addition "call establishment" flows need to be modified according to requirements of the IMN configuration. For example, the control of audible ringing for terminating calls shall occur in the ACN-E (there is no BIWF in the IMN to do this). The same applies to cut through. This has to be done in the ACN-E on control of the IMN, since there is no BIWF at the IMN. Similar requirements are identified for the intra-ISN call.

The information flows for the IMN are structured in "call admission", "bearer establishment", "call establishment", "call release" and "bearer establishment" in order to have a clean functional representation of the information passed between the different functional entities (e.g. RMCf-E – RMCf-N or ACF-E – ACF-N).

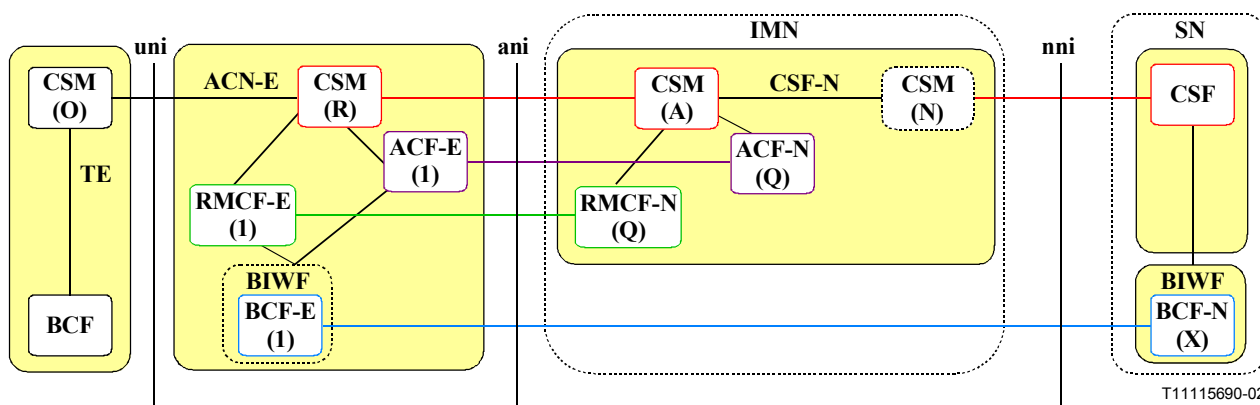
## 16.1 Description of information flows in the IMN configuration

The information flow templates used for the IMN are the same as those used for the ISN in clause 15, however, there are two changes:

- The ISN is replaced with an IMN; and
- The BICC SN is added to illustrate the interaction with the BICC core network.

The following template is an example of the templates used for the IMN information flows.

The same arrangement (TE\_ACN-E\_IMN\_SN) is used for both terminal and network initiated actions (call establishment, bearer establishment, call release and bearer release).



**Figure 42 – Indirect user network direct concentrator interface flow template – Interface mediation node**

CSM(A) is the CSM on the Access Side and CMN(N) is the CSM on the Network Side at the IMN. The Serving Node (SN) on the Network Side can be an ISN, TSN, or GSN. Information Flows at the SN are shown in ITU-T Q-series – Supplement 32.

Other configurations are possible, for example packet-based access (e.g. H.323 or SIP terminal) instead of the BIWF at the SN. The flows at Call Admission for the IMN configuration and for ISN configuration are identical.

## 16.2 Information flows for stimulus terminals

### 16.2.1 Terminal originated – Forward bearer setup

The information flows for stimulus terminal origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Terminal originated – Stimulus-based in Figure 16.
- 2) Bearer establishment – Succeeding SN to ACN-E in Figure 45. (ActionID = Forward Setup).
- 3) Call establishment – Terminal originated – Stimulus-based in Figure 47.

### 16.2.2 Terminal originated – Backward bearer setup

The information flows for stimulus terminal origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Terminal originated – Stimulus-based in Figure 16.
- 2) Bearer establishment – ACN-E to Succeeding SN in Figure 43. (ActionID = Backward Setup).

- 3) Call establishment – Terminal originated – Stimulus-based in Figure 47.

### **16.2.3 Network originated – Backward bearer setup**

The information flows for stimulus Network origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Network originated – Stimulus-based in Figure 17.
- 2) Bearer establishment – ACN-E to Preceding SN in Figure 46. (ActionID = Backward Setup).
- 3) Call establishment – Network originated – Stimulus-based in Figure 49.

### **16.2.4 Network originated – Forward bearer setup**

The information flows for stimulus Network origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Network originated – Stimulus-based in Figure 17.
- 2) Bearer establishment – Preceding SN to ACN-E in Figure 44. (Action = Forward Setup).
- 3) Call establishment – Network originated – Stimulus-Based in Figure 49.

### **16.2.5 Terminal originated – Intra-IMN Call – Stimulus-based**

The information flows for stimulus terminal origination and Intra-IMN connection with both backward and forward bearer setup are described by the sequential application of five flows.

- 1) Call admission – Terminal originated – Stimulus-based in Figure 16.
- 2) Call admission – Network originated – Stimulus-based in Figure 17.
- 3) Bearer establishment – ACN-E to ACN-E in Figure 20. (ActionID = Backward Setup or Forward Setup).
- 4) Intra-IMN call establishment – Terminating ACN-E – Stimulus-based in Figure 27.
- 5) Call establishment – Terminal originated – Stimulus-based in Figure 25.

NOTE 1 – Omit cut-through information flows.

NOTE 2 – Certain functionality such as audible ringing, busy tone, and congestion tone must be supported in the ACN-E if the intra-IMN proposal is to be supported by the network. Otherwise, the network will support intra-IMN calls using the same information flows and functional capabilities that are used for inter-SN calls.

### **16.2.6 Terminal released – SN owned BNC**

The information flows for stimulus terminal release and BNC ownership by SN are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 51.
- 2) Bearer release – ISN-A owned in Figure 56.

### **16.2.7 Terminal released – ACN-E owned BNC**

The information flows for stimulus terminal release and BNC ownership by ACN-E are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 51.
- 2) Bearer release – ACN-E owned in Figure 55.

### **16.2.8 Network released – SN owned BNC**

The information flows for stimulus Network release and BNC ownership by SN are described by the sequential application of two flows:

- 1) Call release – Network released in Figure 53.

- 2) Bearer release – ISN-A owned in Figure 56.

### **16.2.9 Network released – ACN-E owned BNC**

The information flows for stimulus Network release and BNC ownership by ACN-E are described by the sequential application of two flows:

- 1) Call release – Network released in Figure 53.
- 2) Bearer release – ACN-E owned in Figure 55.

## **16.3 Information flows for functional terminals**

### **16.3.1 Terminal originated – Forward bearer setup**

The information flows for functional terminal origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Terminal originated – Function-based in Figure 34.
- 2) Bearer establishment – Succeeding SN to ACN-E in Figure 45.
- 3) Call establishment – Terminal originated – Function-based in Figure 48.

### **16.3.2 Terminal originated – Backward bearer setup**

The information flows for functional terminal origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Terminal originated – Function-based in Figure 34.
- 2) Bearer establishment – ACN-E to succeeding SN in Figure 43.
- 3) Call establishment – Terminal originated – Function-based in Figure 48.

### **16.3.3 Network originated – Backward bearer setup**

The information flows for network origination and backward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Network originated – Function-based in Figure 35.
- 2) Bearer establishment – ACN-E to preceding SN in Figure 46.
- 3) Call establishment – Network originated – Function-based in Figure 50.

### **16.3.4 Network originated – Forward bearer setup**

The information flows for network origination and forward bearer setup are described by the sequential application of three flows:

- 1) Call admission – Network originated – Function-based in Figure 35.
- 2) Bearer establishment – Preceding SN to ACN-E in Figure 44.
- 3) Call establishment – Network originated – Function-based in Figure 50.

### **16.3.5 Terminal originated – Intra-IMN call – Function-based**

The information flows for functional terminal origination and Intra-IMN connection with both backward and forward bearer setup are described by the sequential application of five flows:

- 1) Call admission – Terminal originated – Function-based in Figure 34.
- 2) Call admission – Network originated – Function-based in Figure 35.
- 3) Bearer establishment – ACN-E to ACN-E in Figure 20. (ActionID = Backward Setup or Forward Setup).
- 4) Call establishment – Network originated – Function-based in Figure 37. (See Note 1.)
- 5) Call establishment – Terminal originated – Function-based in Figure 36.

NOTE 1 – Omit cut-through information flows.

NOTE 2 – Certain functionality such as audible ringing, busy tone, and congestion tone must be supported in the ACN-E if the intra-IMN proposal is to be supported by the network. Otherwise, the network will support intra-IMN calls using the same information flows and functional capabilities that are used for inter-SN calls.

#### **16.3.6 Terminal released – SN owned BNC**

The information flows for terminal release and BNC ownership by SN are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 52.
- 2) Bearer release – SN owned in Figure 56.

#### **16.3.7 Terminal released – ACN-E owned BNC**

The information flows for terminal release and BNC ownership by ACN-E are described by the sequential application of two flows:

- 1) Call release – Terminal released in Figure 52.
- 2) Bearer release – ACN-E owned in Figure 55.

#### **16.3.8 Network released – SN owned BNC**

The information flows for network release and BNC ownership by SN are described by the sequential application of two flows:

- 1) Call release – Network released in Figure 54.
- 2) Bearer release – SN owned in Figure 56.

#### **16.3.9 Network released – ACN-E owned BNC**

The information flows for network release and BNC ownership by ACN-E are described by the sequential application of two flows:

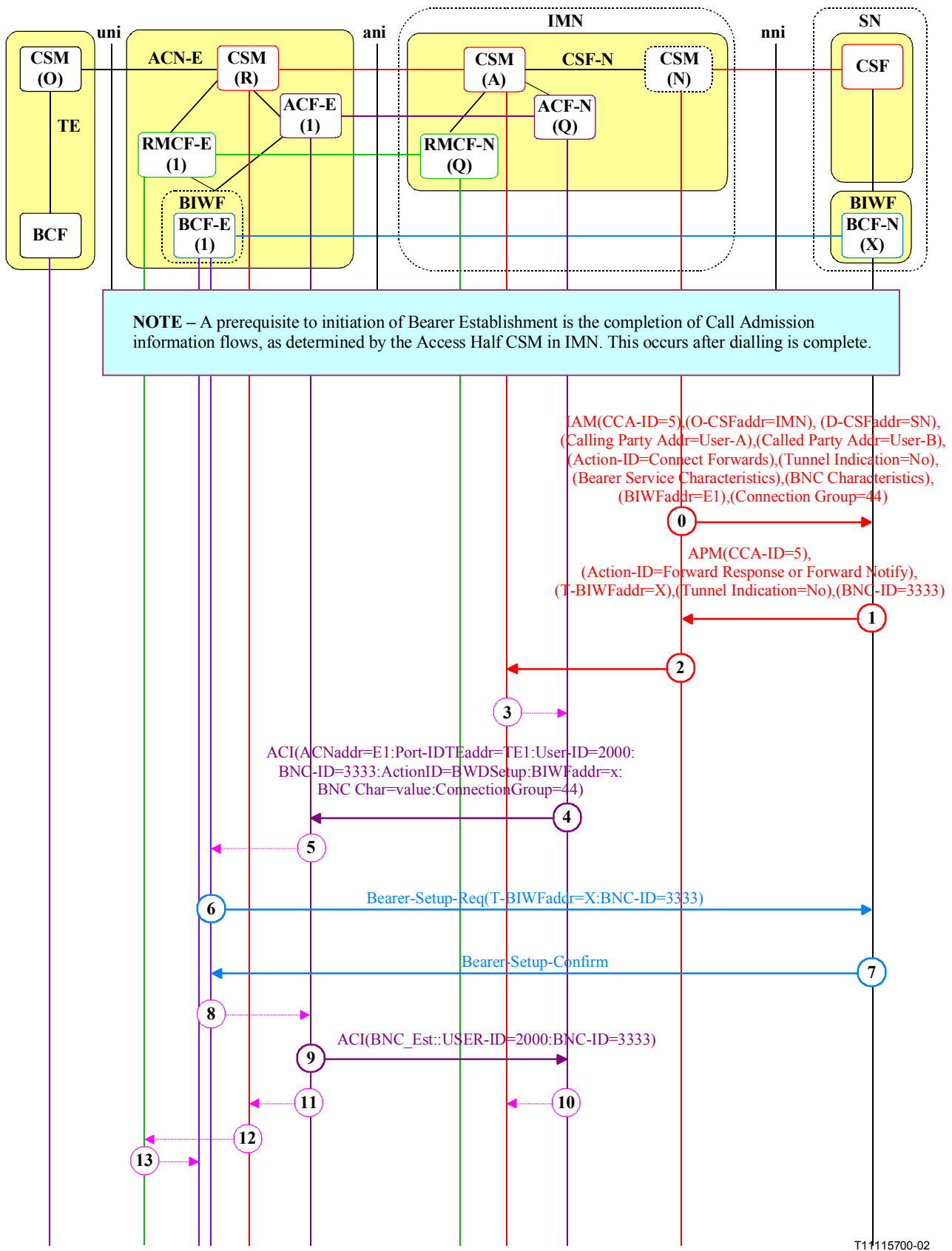
- 1) Call release – Network released in Figure 54.
- 2) Bearer release – ACN-E owned in Figure 55.

### **16.4 Call admission**

The call admission information flows for the IMN configuration are the same as the information flows for the ISN configuration. Following is a list of the subject information flows.

- 1) Call admission – Terminal originated – Stimulus-based: see Figure 16.
- 2) Call admission – Network originated – Stimulus-based: see Figure 17.
- 3) Call admission – Terminal originated – Function-based: see Figure 34.
- 4) Call admission – Network originated – Function-based: see Figure 35.

## 16.5 Bearer establishment



**Figure 43 – IMN backward bearer establishment – Terminal originated – Terminal independent**

### 16.5.1 Backward bearer establishment for terminal originated calls – Terminal independent

The information flows and functional entity actions illustrated in Figure 43 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|          |  |   |
|----------|--|---|
| <b>0</b> | <b>IAM</b>   | <b>CSM(N) to SN:CSF</b>   |
|          | <u><b>Address Information</b></u><br>Calling Party Address = User-A,<br>Called Party Address = User-B,<br>O-CSF Address = IMN,<br>D-CSF Address = SN | <u><b>Control information</b></u><br>CCA-ID = 5,<br>Action-ID = Connect Forwards,<br>Tunnel Indication = No<br>COT on Prev. = 0<br>Connection Group = 44<br>Global Call Ref. = 35 |
|          |  | <u><b>Bearer information</b></u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BIWF Address = E1   |

**Initiation of information flow:** CSM(A) receives a request from a terminal to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** The SN initiates the forward establishment procedure requested by **information flow 0** by selecting a Termination ID, a BNC ID, a BIWF Address which are used in the forward establishment of the BNC. It then sends **information flow 1** to the IMN. **Information flow 1** contains the action ID that the SN has selected (Forward Response or Forward Notify) based on the characteristics of the BIWF (bearer stage by stage cut-through during reception of the bearer setup or during bearer confirmation operation) which have been provisioned for each bearer type within the selected BIWF. In addition, this information flow contains the BNC-ID, BNC Characteristics, BIWF Address (X).

---

|          |                                   |  |
|----------|-----------------------------------|--|
| <b>1</b> | <b>APM</b>                        | <b>SN:CSF to CSM(N)</b>  |
|          | <u><b>Address Information</b></u> | <u><b>Control information</b></u><br>CCA-ID = 5,<br>Action-ID = Forward Response or<br>Forward Notify,<br>Tunnel Indication = No |
|          |                                   | <u><b>Bearer information</b></u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BNC-ID: = 3333,<br>BIWFaddr = X    |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When CSM(N) receives **information flow 1**, it relays the information to CSM(A).

---

|          |                                   |   |
|----------|-----------------------------------|---|
| <b>2</b> |                                   | <b>CSM(N) to CSM(A)</b>   |
|          | <u><b>Address Information</b></u> | <u><b>Control information</b></u>   |
|          |                                   | <u><b>Bearer information</b></u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BNC-ID: = 3333,<br>BIWFaddr = X |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(A) receives **information flow 1**, it relays the information to ACF-N. When ACF-N receives this information flow it issues information flow 4 toward the selected terminating ACN(E1). The USER-ID = 2000 and BNC-ID = 3333, BIWFaddr = X, TEaddr = TE1 including port and channel are inserted in the ACI for association between the call and the bearer in ACN(E1). It awaits confirmation of the bearer access connection from ACN-E.

---

|   |                     |                |
|---|---------------------|----------------|
| 4 | ACI (Establish_BNC) | ACF-N to ACF-E |
|---|---------------------|----------------|

| <u>Address Information</u>  | <u>Control information</u>   | <u>Bearer information</u>  |
|---|--|--|
| (ACN Address) = E1,<br>(Called-Party-Addr) = TE1,<br><br>BIWF Address = x | ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Establish_BNC<br>Primitive = Connect Backwards | BNC-ID = 3333<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristicse |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** When ACF-E receives this information flow, it notes a pending connection for TE1. It requests reservation of the termination to TE1 in ACN-E. It then requests BCF-E to initiate a connection with parameters provided by the remote SN in flow 1.

The access node validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(X) and ACN(E1). BCF-E initiates an access bearer connection with the parameters provided in information flow 3, and selects a bearer based on Connection Group 44. The BNC-ID = 3333 is conveyed across the bearer access connection for association with the call in BIWF(X).

---

|   |                      |                       |
|---|----------------------|-----------------------|
| 6 | Bearer-Setup-Request | ACN(E1) to SN:BIWF(X) |
|---|----------------------|-----------------------|

| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u>                                    |
|----------------------------|----------------------------|--|
| BIWF Addr = x              | BCS-ID = "15",             | BNC-ID = 3333,<br>BNCL-ID = 1004,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Call Service function that a bearer has been established between ACN-E and SN with a BNC-ID = 3333. BIWF(X) initiates flow 7 confirming bearer setup.

---

|   |                      |                       |
|---|----------------------|-----------------------|
| 7 | Bearer-Setup.Confirm | SN:BIWF(X) to ACN(E1) |
|---|----------------------|-----------------------|

| <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|----------------------------|----------------------------|---------------------------|
|                            | BCS-ID = "15"              | BNCL-ID = 1004,           |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The BCF-E records the establishment of the Access connection and notifies its associated access control function that the requested bearer setup is complete and the BNC is established (information flow 8).

ACN-E notifies the ACF-N that the BNC is established in an ACI message (the new Access Network connection to the terminal is not cut-through).

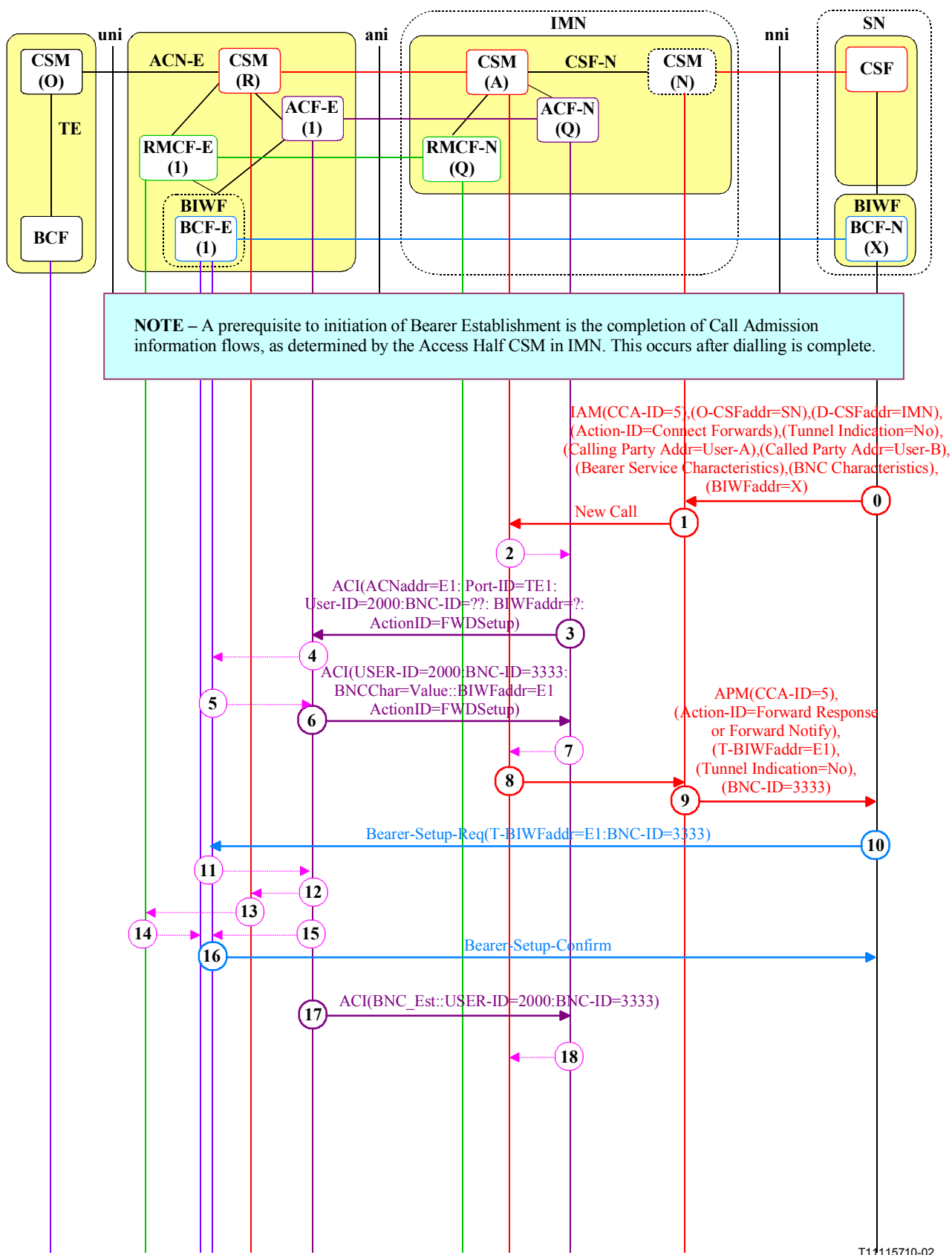
---

|   |                       |                |
|---|-----------------------|----------------|
| 9 | ACI (BNC_Established) | ACF-E to ACF-N |
|---|-----------------------|----------------|

| <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |
|----------------------------|---|---------------------------|
|                            | ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>BNC_Established | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** When the ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It notifies CSM(A) in IMN.



**Figure 44 – IMN forward bearer establishment – Network originated –Terminal independent**

## 16.5.2 Forward bearer establishment for network originated calls – Terminal independent

The information flows and functional entity actions illustrated in Figure 44 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

| 0 | IAM  | SN:CSF to CSM(N)   |
|---|--|--|
|   | <u><b>Address Information</b></u><br>Calling Party Address = User-A,<br>Called Party Address = User-B,<br>O-CSF Address = SN,<br>D-CSF Address = IMN | <u><b>Control information</b></u><br>CCA-ID = 5,<br>Action-ID = Connect Forwards,<br>Tunnel Indication = No<br>COT on Prev. = 1 or 0<br>Connection Group = 44<br>Global Call Ref. = 35 |
|   |  | <u><b>Bearer information</b></u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BIWF Address = X   |

**Initiation of information flow:** CSM(N) receives a request from the network to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** When IMN receives this information flow it creates CSM(N). CSM(N) sends **information flow 1** to CSM(A), including:

- COTind reflecting the status of the incoming link (Circuit not available (COT on Prev.), or Circuit available (No COT));
- Codec List (Optional), sent if received in IAM;
- Incoming BNC Characteristics;
- Incoming Bearer Service Characteristics;
- Incoming Tunnel Indication;
- Calling Party and Called Party Address;
- And the Local Call Instance associating the CSMs to the incoming call request.

---

| 1 | New Call  | CSM(N) to CSM(A)  |
|---|---|---|
|   | <u><b>Address Information</b></u><br>Calling Party Address = User-A,<br>Called Party Address = User-B | <u><b>Control information</b></u><br>Local Call Instance = 250,<br>COTind = COT on Prev. or No COT<br>Incoming Tunnel Indication = No<br>Connection Group = 44<br>Global Call Ref. = 35 |
|   |   | <u><b>Bearer information</b></u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BIWF Address = X  |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When ACF-N receives this information flow, it constructs a request for a BNC-ID and BIWF Address. It sends the request to ACF-E. The request also contains BNC Characteristics, the ACN address, the Connection Group for use by BCF-E to provide bearer setup information.

| 3 | ACI (BNC_Request)  | ACF-N to ACF-E   |  |
|---|--|--|--|
|   | <u><b>Address Information</b></u><br>(ACN Address) = E1,<br>(Called-Party-Addr) = TE1,<br><br>BIWF Address = ? | <u><b>Control information</b></u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200,<br>Primitive = (BNC_Request)<br>Primitive = Connect Forward | <u><b>Bearer information</b></u><br>BNC-ID = ???<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When ACF-E receives this information flow, it requests a BNC-ID from BCF-E and determines a BIWF = E1 to be used for the bearer connection. It may request reservation of the termination to TE1 in ACN-E, as well as any other resources required for the connection in ACN-E.

The BIWF's BCF-E determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3333. It constructs a response to ACF-E with the requested Access network parameters. The bearer BNCL characteristics contained in information flow 4 were determined from the Bearer Service Information contained in information flow 1.

ACF-E sends an ACI to ACF-N containing the BNC-ID = 3333, and BNCL characteristics.

| 6 | ACI (Establish_BNC)                          | ACF-E to ACF-N   |   |
|---|--|--|---|
|   | <u>Address Information</u><br>BIWF Addr = E1 | <u>Control information</u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200,<br>Primitive = Establish_BNC | <u>Bearer information</u><br>BNC Characteristics = value<br>BNC-ID = 3333<br>BCNL Characteristics |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** ACF-N relays the information to CSM(A).

|                            |  |   |
|----------------------------|--|---|
| 8                          | CSM(A) to CSM(N)   |   |
| <u>Address Information</u> | <u>Control information</u><br>Action-ID = Forward Response or<br>Forward Notify,<br>Tunnel Indication = No | <u>Bearer information</u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BNC-ID: = 3333,<br>BIWFAddr = E1 |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The IMN initiates information flow 9 toward its peer CSM in SN and request a bearer connection with the requested characteristics and BNC-ID = 3333, Connection Group = 44 with instructions to establish a BNC. It provides the BNCL Characteristics. The IMN awaits the commitment information flow from the selected bearer interworking function.

|   |                            |   |   |
|---|----------------------------|---|---|
| 9 | APM                        | CSM(N) to SN:CSF  |   |
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5,<br>Action-ID = Forward Response or<br>Forward Notify,<br>Tunnel Indication = No | <u>Bearer information</u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BNC-ID: = 3333,<br>BIWFAddr = E1 |

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** The SN establishes the bearer connection.

---

|    |                                   |                                   |  |
|----|-----------------------------------|-----------------------------------|--|
| 10 | <b>Bearer-Setup.Req</b>           | <b>SN:BIWF(X) to ACN(E1)</b>      |  |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u> | <u><b>Bearer information</b></u>                             |
|    | BIWF Addr = E1,                   | BCS-ID = "15",                    | BNC-ID: = 3333,<br>BNCL-ID = 1004,<br>{BNCL Characteristics} |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Access Control function that a bearer has been established between BIWF(X) and ACN(E1) with BNC-ID = 3333. This is done with information flow 11.

ACF-E correlates the bearer with the terminal information received in information flow 3, ACI. The associated Access Control function correlates the incoming bearer request with the incoming call request using BNC-ID = 3333 and USER-ID = 2000. ACF-E issues a notification response to BCF-E (information flow 15) and notifies the bearer establishment to ACF-N (information flow 17). It awaits further notification of changes to the bearer.

BCF-E issues information flow 16 toward SN:BIWF(X) to confirm the bearer establishment, and to complete establishment of the bearer in the reverse direction.

---

|    |                                   |                                   |                                  |
|----|-----------------------------------|-----------------------------------|----------------------------------|
| 16 | <b>Bearer-Setup.Connect</b>       | <b>BCF-E to SN:BIWF(X)</b>        |                                  |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u> | <u><b>Bearer information</b></u> |
|    |                                   | BCS-ID = "15"                     | BNCL-ID = 1004,                  |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** Call establishment.

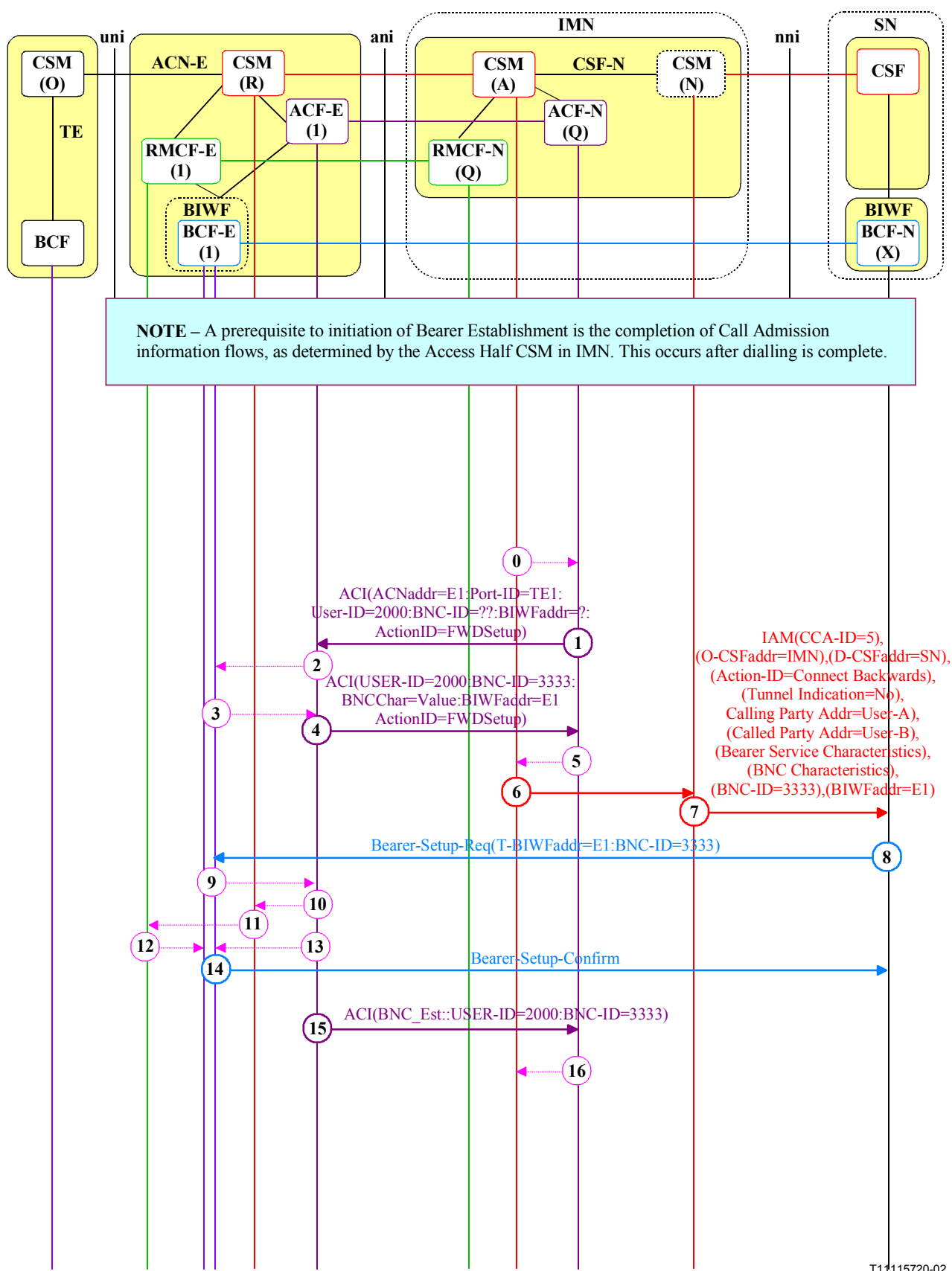
---

|    |                                   |   |                                  |
|----|-----------------------------------|---|----------------------------------|
| 17 | <b>ACI (BNC_Established)</b>      | <b>ACF-E to ACF-N</b>   |                                  |
|    | <u><b>Address Information</b></u> | <u><b>Control information</b></u>   | <u><b>Bearer information</b></u> |
|    |                                   | ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>BNC_Established | BNC-ID = 3333                    |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** When ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It notifies CSM(A) with information flow 18.

CSM(A) in IMN updates the call state. CSM(A) exchanges information with CSM(N) indicating that the connection is available. It begins to send and receive appropriate control signals to/from CSM(R). according to the call control protocol that is in use.



**Figure 45 – IMN forward bearer establishment – Terminal originated – Terminal independent**

### 16.5.3 Forward bearer establishment for terminal originated calls – Terminal independent

The information flows and functional entity actions illustrated in Figure 45 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|          |  |   |   |
|----------|--|---|---|
| <b>0</b> | <b>CSM(A) to ACF-N</b>   |   |   |
|          | <b><u>Address Information</u></b><br>ACN Address = E1,<br>Called-Party-Addr = TE1,<br>BIWF Address = ? | <b><u>Control information</u></b><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200,<br>Primitive = Connect Backward | <b><u>Bearer information</u></b><br>Connection Group = 44<br>Bearer ServiceCharacteristics<br>BNC Characteristics = value |

**Initiation of information flow:** CSM(N) receives a request from the terminal to initiate an access network connection. Completion of the Call Admission information flows.

**Processing upon receipt:** When ACN-N receives this information flow, it constructs a request for a BNC-ID and BIWF Address. It sends the request to ACF-E. The request also contains BNC Characteristics, the ACN Address, the Connection Group for use by the BCF-E to provide the bearer setup information

---

|          |  |  |  |
|----------|--|--|--|
| <b>1</b> | <b>ACI (BNC_Request)</b>   | <b>ACF-N to ACF-E</b>  |  |
|          | <b><u>Address Information</u></b><br>ACN Address = E1,<br>Called-Party-Addr = TE1,<br>BIWF Address = ? | <b><u>Control information</u></b><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200,<br>Primitive = (BNC_Request)<br>Primitive = Connect Forward | <b><u>Bearer information</u></b><br>BNC-ID = ???<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics = value |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When ACF-E receives this information flow, it requests a BNC-ID from BCF-E and determines a BIWF = E1 to be used for the bearer connection. It may request reservation of resources required for the connection in ACN-E.

The BIWF's BCF-E determines that no existing idle Access connection meets the requirements. It assigns a unique BNC-ID of 3333. It constructs a response to ACF-E with the requested Access network parameters. The bearer BNCL characteristics contained in information flow 4 were determined from the Bearer Service Information contained in information flow 1.

ACF-E sends an ACI to ACF-N containing the BNC-ID = 3333, BIWFaddr = E1and BNCL characteristics.

---

|          |   |   |  |
|----------|---|---|--|
| <b>4</b> | <b>ACI (Establish_BNC)</b>                          | <b>ACF-E to ACF-N</b>   |  |
|          | <b><u>Address Information</u></b><br>BIWF Addr = E1 | <b><u>Control information</u></b><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200,<br>Primitive = Establish_BNC | <b><u>Bearer information</u></b><br>BNC Characteristics = value<br>BNC-ID = 3333<br>BCNL Characteristics |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** ACF-N relays the information to CSM(A).

**Address Information****Control information**

Action-ID = Connect Backwards,  
Tunnel Indication = No

**Bearer information**

Bearer Service Characteristics,  
BNC Characteristics  
BNC-ID: = 3333,  
BIWFAddr = E1

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** The IMN initiates information flow 7 toward its peer CSM in SN and requests a bearer connection with the requested characteristics and BNC-ID = 3333, Connection Group = 44 with instructions to establish a BNC. It provides the BNCL Characteristics. The IMN awaits the commitment information flow from the selected bearer interworking function.

**Address Information**

Calling Party Address = User-A,  
Called Party Address = User-B,  
O-CSF Address = IMN,  
D-CSF Address = SN

**Control information**

CCA-ID = 5,  
Action-ID = Connect Backwards,  
Tunnel Indication = No  
COT on Prev. = 1 or 0  
Connection Group = 44  
Global Call Ref. = 35

**Bearer information**

Bearer Service Characteristics,  
BNC Characteristics  
BNC-ID: = 3333,  
BIWF Address = E1

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** The SN establishes the bearer connection.

**Address Information**

ACN Address = E1  
BIWF Addr = E1,

**Control information**

BCS-ID = "15",

**Bearer information**

BNC-ID: = 3333,  
BNCL-ID = 1004,  
{BNCL Characteristics}

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Access Control function that a bearer has been established between BIWF(X) and ACN(E1) with BNC-ID = 3333. This is done with information flow 9.

ACF-E correlates the bearer with the terminal information received in information flow 1, ACI. The associated Access Control function correlates the incoming bearer request with the incoming call request using USER-ID = 2000. ACF-E issues a notification response to BCF-E (information flow 13) and notifies the bearer establishment to the ACF-N (information flow 15). It awaits further notification of changes to the bearer.

BCF-E issues information flow 14 toward SN:BIWF(X) to confirm the bearer establishment, and to complete establishment of the bearer in the reverse direction.

**Address Information****Control information**

BCS-ID = "15"

**Bearer information**

BNCL-ID = 1004,

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** Call establishment.

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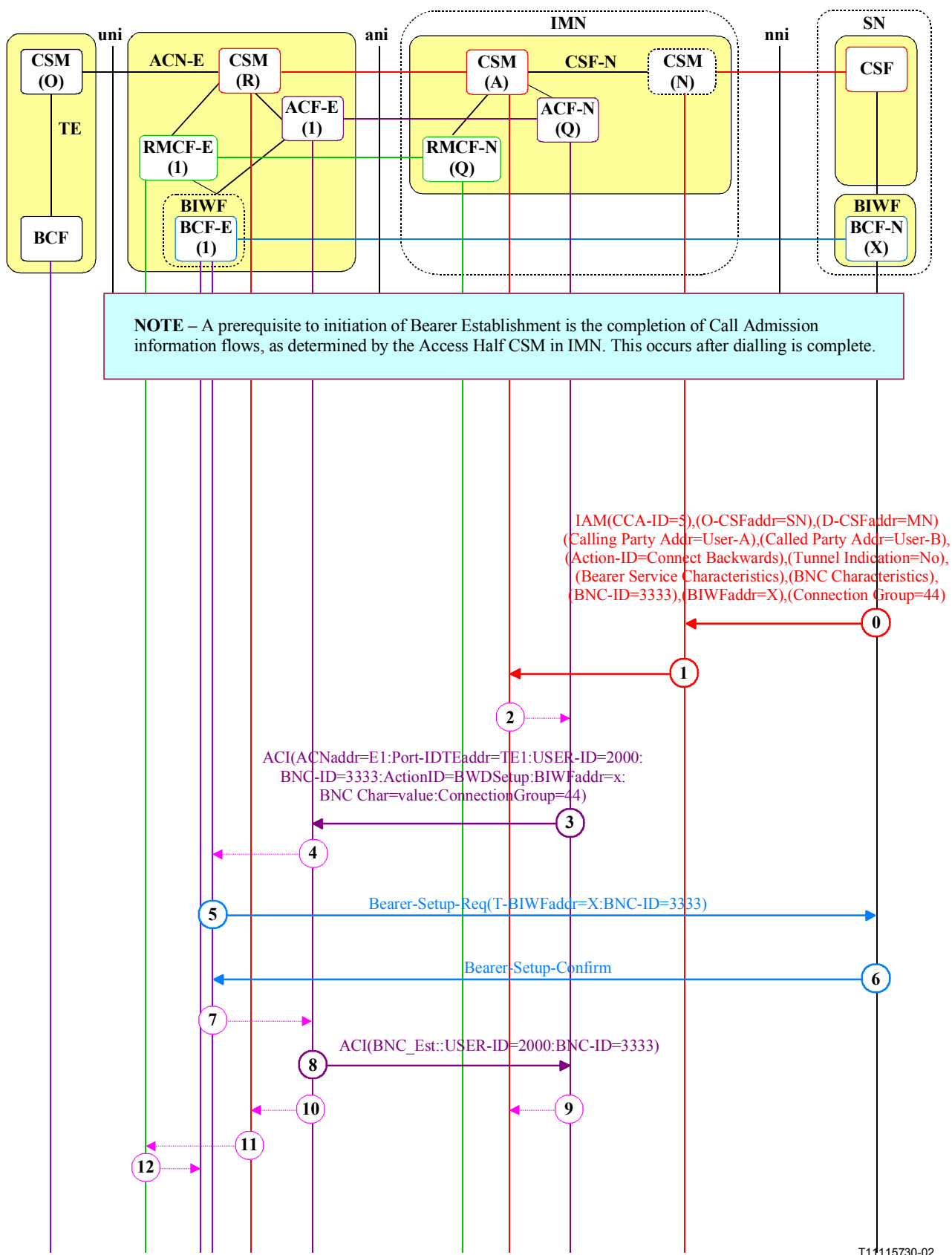
|           |                                   |   |
|-----------|-----------------------------------|---|
| <b>15</b> | <b>ACI (BNC_Established)</b>      | <b>ACF-E to ACF-N</b>   |
|           | <b><u>Address Information</u></b> | <b><u>Control information</u></b>   |
|           |                                   | ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>BNC_Established |
|           |                                   | <b><u>Bearer information</u></b>  |
|           |                                   | BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** When ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It acknowledges the notification to BCF-E and notifies CSM(A) via information flow 16.

CSM(A) in IMN updates the call state. CSM(A) exchanges information with CSM(N) indicating that the connection is available. It begins to send and receive appropriate control signals to/from CSM(R) according to the call control protocol that is in use.

---



**Figure 46 – IMN backward bearer establishment –  
Network originated – Terminal independent**

#### 16.5.4 Backward bearer establishment for network originated calls – Terminal independent

The information flows and functional entity actions illustrated in Figure 46 are described in the following numbered paragraphs. The bearer establishment information flows follow the call admission information flows and precede the call establishment information flows. The ACI and bearer information is closely based on the APM and bearer information of BICC CS-2. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|          |  |  |
|----------|--|--|
| <b>0</b> | <b>IAM</b>   | <b>SN:CSF to CSM(N)</b>  |
|          | <u><b>Address Information</b></u><br>Calling Party Address = User-A,<br>Called Party Address = User-B,<br>O-CSF Address = SN,<br>D-CSF Address = IMN | <u><b>Control information</b></u><br>CCA-ID = 5,<br>Action-ID = Connect Backwards,<br>Tunnel Indication = No<br>COT on Prev. = 0<br>Connection Group = 44<br>Global Call Ref. = 35 |
|          |  | <u><b>Bearer information</b></u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BNC-ID: = 3333,<br>BIWFaddr = X  |

**Initiation of information flow:** CSM(N) receives a request from the network to initiate an access network connection.

**Processing upon receipt:** When CSM(N) receives **information flow 0**, it relays the information to CSM(A).

---

|          |                                   |   |
|----------|-----------------------------------|---|
| <b>1</b> | <b>CSM(N) to CSM(A)</b>           |   |
|          | <u><b>Address Information</b></u> | <u><b>Control information</b></u>   |
|          |                                   | <u><b>Bearer information</b></u><br>Bearer Service Characteristics,<br>BNC Characteristics<br>BNC-ID: = 3333,<br>BIWFaddr = X |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When CSM(A) receives **information flow 1**, it relays the information to ACF-N. When ACF-N receives this information flow it issues information flow 4 toward the selected terminating ACN(E1). The USER-ID = 2000 and BNC-ID = 3333, BIWFaddr = X, TEaddr = TE1 including port and channel are inserted in the ACI for association between the call and the bearer in ACN(E1). It awaits confirmation of the bearer access connection from ACN-E.

---

|          |  |   |
|----------|--|---|
| <b>3</b> | <b>ACI (Establish_BNC)</b>   | <b>ACF-N to ACF-E</b>   |
|          | <u><b>Address Information</b></u><br>(ACN Address) = E1,<br>(Called-Party-Addr) = TE1,<br>BIWF Address = x | <u><b>Control information</b></u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Establish_BNC<br>Primitive = Connect Backwards |
|          |  | <u><b>Bearer information</b></u><br>BNC-ID = 3333<br>Connection Group = 44<br>Bearer Service Characteristics<br>BNC Characteristics   |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When ACF-E receives this information flow, it notes a pending connection for TE1. It requests reservation of the termination to TE1 in ACN-E. It then requests BCF-E to initiate a connection with parameters provided by the remote SN in flow 0.

The access node validates the request and determines the route and Access transport facility used to carry the new Access connection between BIWF(X) and ACN(E1). BCF-E initiates an access bearer connection with the parameters provided in information flow 3, and selects a bearer based on Connection Group 44. The BNC-ID = 3333 is conveyed across the bearer access connection for association with the call in BIWF(X).

---

|   |                            |   |
|---|----------------------------|---|
| 5 | Bearer-Setup-Request       | ACN(E1) to SN:BIWF(X)   |
|   | <u>Address Information</u> | <u>Control information</u>                                    |
|   | BIWF Addr = x              | BCS-ID = "15",  |
|   |                            | <u>Bearer information</u>                                     |
|   |                            | BNC-ID: = 3333,<br>BNCL-ID = 1004,<br>{BNCL characteristics}, |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The selected Bearer Control Function validates the request and notifies its associated Call Service function that a bearer has been established between ACN-E and SN with a BNC-ID = 3333. BIWF(X) initiates flow 6 confirming bearer setup.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 6 | Bearer-Setup.Confirm       | SN:BIWF(X) to ACN(E1)      |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | BCS-ID = "15"              |
|   |                            | <u>Bearer information</u>  |
|   |                            | BNCL-ID = 1004,            |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** The BCF-E records the establishment of the Access connection and notifies its associated access control function that the requested bearer setup is complete and the BNC is established.

ACN-E notifies the ACF-N that the BNC is established in an ACI message (the new Access Network connection to the terminal is not cut through).

---

|   |                            |   |
|---|----------------------------|---|
| 8 | ACI (BNC_Established)      | ACF-E to ACF-N  |
|   | <u>Address Information</u> | <u>Control information</u>  |
|   |                            | ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>BNC_Established |
|   |                            | <u>Bearer information</u>   |
|   |                            | BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** When the ACF-N receives this information flow it notes that ACN-E has confirmed BNC establishment. It notifies CSM(A) in IMN.

## 16.6 Call establishment

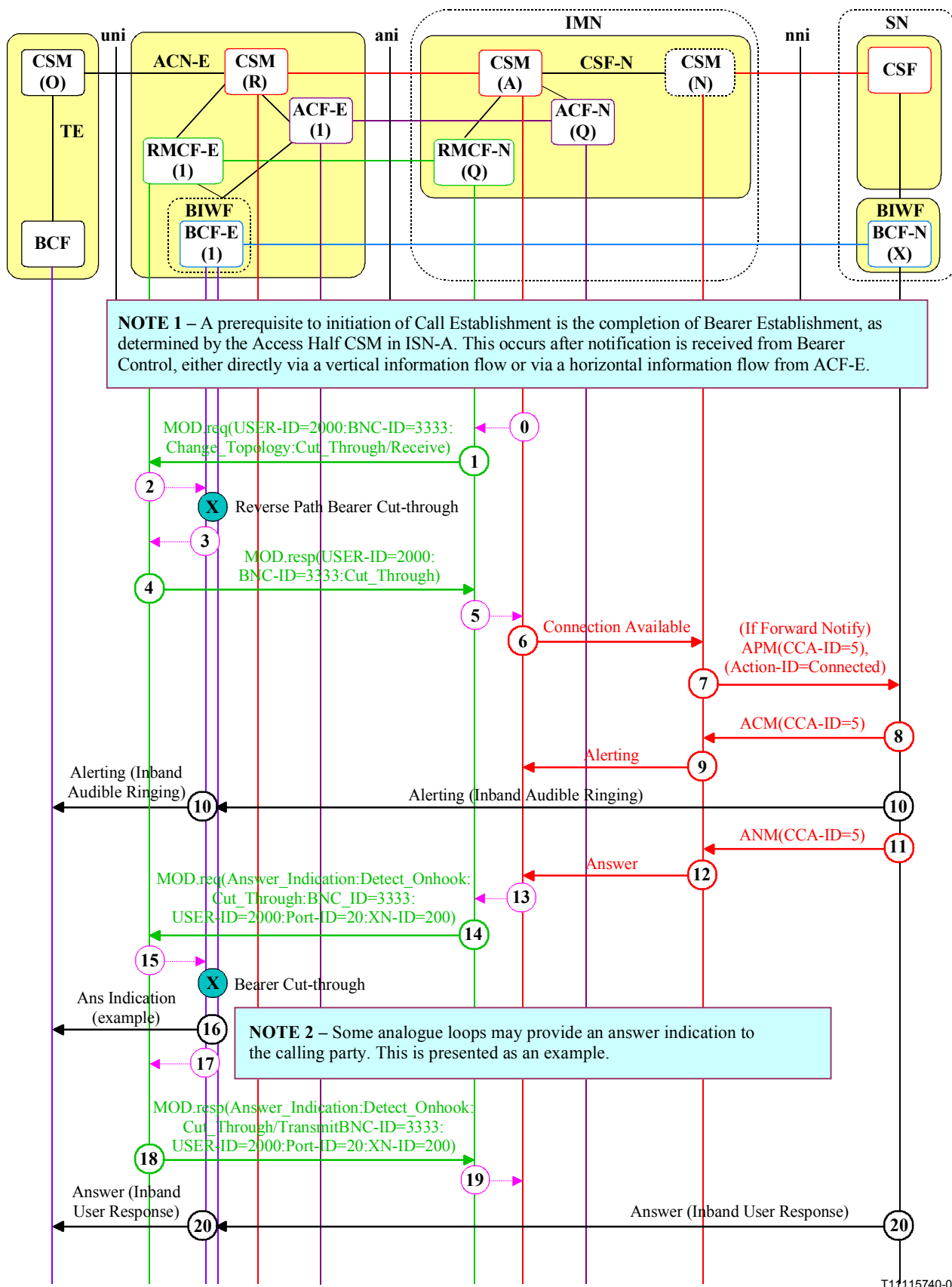


Figure 47 – IMN call establishment – Terminal originated – Stimulus-based

### 16.6.1 Call establishment – Terminal originated – Stimulus-based

The information flows and functional entity actions illustrated in Figure 47 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. Analogue loops vary in the types and sequences of signals used for call admission and call establishment. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 0 | CSM(A) to RMCF-N           |                            |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** BNC establishment was notified to CSM(A).

**Processing upon receipt:** CSM(A) request reversal path cut through in ACN.

---

|   |   |  |                           |
|---|---|--|---------------------------|
| 1 | MODIFY.req (Change_Topology)(Cut_Through/Receive) |  | RMCF-N to RMCF-E          |
|   | <u>Address Information</u>                        | <u>Control information</u>   | <u>Bearer information</u> |
|   |   | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = new<br>Primitive = Change_Topology<br>Primitive = Cut_Through/Receive | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 0.

NOTE – Bearer cut-through in the reverse direction (receive for the originating caller) may be required before ALERTING is received to convey audible ringing from the destination terminal to the originating terminal. Bearer cut-through in the forward direction will be withheld until receipt of an ANSWER message.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the receive direction and joins the terminations in ACN-E associated with both RMCF-E(1) and ACF-E(1). It responds to CSM(A) that cut-through is complete.

---

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 4 | MODIFY.resp                |   | RMCF-E to RMCF-N          |
|   | <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |
|   |                            | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = new<br>Primitive = Change_Topology,<br>Primitive = Cut_Through/Receive | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(A) receives this information flow it responds to CSM(N) that the connection is available.

---

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 6 | Connection Available       |                            | CSM(A) to CSM(N)          |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** CSM(A) can associate the originating and terminating call contexts in IMN.

|  |                            |   |  |
|--|----------------------------|---|--|
| 7  | APM                        | CSM(N) to SN:CSF                                    |  |
|  | <u>Address Information</u> | <u>Control information</u>                          | <u>Bearer information</u>                            |
| <p><b>Initiation of information flow:</b> Processing of information flow 6 and response mode = Forward Notify.</p> <p><b>Processing upon receipt:</b> The call at the SN proceeds.</p>   |                            |   |  |
| 8  | ACM                        | SN:CSF to CSM(N)                                    |  |
|  | <u>Address Information</u> | <u>Control information</u>                          | <u>Bearer information</u>                            |
| <p><b>Initiation of information flow:</b> Alerting or ACM from further node was received.</p>  |                            |   |  |
| 9  | Alerting                   | CSM(N) to CSM(A)                                    |  |
|  | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) | <u>Bearer information</u><br>In-band Audible Ringing |
| <p><b>Initiation of information flow:</b> Alerting signal is received from the network.</p> <p><b>Processing upon receipt:</b> CSM(A) allows this alerting to be passed through the bearer path. It waits for further instructions from CSM(N), CSM(R), or ACF-N.</p>  |                            |   |  |
| 10   | Alerting                   | terminating network to TE                           |  |
|  | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) | <u>Bearer information</u><br>In-band Audible Ringing |
| <p><b>Initiation of information flow:</b> Alerting signal is passed from the called destination or terminating network.</p> <p><b>Processing upon receipt:</b> Calling party awaits answer.</p>  |                            |   |  |
| 11   | ANM                        | SN:CSF to CSM(N)                                    |  |
|  | <u>Address Information</u> | <u>Control information</u>                          | <u>Bearer information</u>                            |
| <p><b>Initiation of information flow:</b> Called Party answered the call.</p>  |                            |   |  |
| 12   | Answer                     | CSM(N) to CSM(A)                                    |  |
|  | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) | <u>Bearer information</u>                            |
| <p><b>Initiation of information flow:</b> The network forwards an answer indication.</p> <p><b>Processing upon receipt:</b> CSM(A) requests cut-through of the transmit path and allows in-band information to be passed through the bearer path. It waits for further instructions from CSM(N), CSM(R), or ACF-N.</p> |                            |   |  |

---

|    |   |                         |
|----|---|-------------------------|
| 14 | <b>MODIFY.req (Cut_Through/Transmit)</b><br><b>(Insert_Answer Indication)(Detect_On-hook)</b> | <b>RMCF-N to RMCF-E</b> |
|----|---|-------------------------|

|                                   |   |   |
|-----------------------------------|---|---|
| <u><b>Address Information</b></u> | <u><b>Control information</b></u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = new<br>Primitive = Cut_Through/Transmit<br>Primitive = Insert_Answer Indication),<br>Primitive = Detect_On-hook | <u><b>Bearer information</b></u><br>BNC-ID = 3333 |
|-----------------------------------|---|---|

**Initiation of information flow:** Processing of information flow 12.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the transmit direction and joins the terminations in ACN-E associated with both RMCF-E(1) and ACF-E(1). It responds to CSM(A) that cut-through is complete. ACN-E may send an answer indication to the terminal equipment or may apply the indication within the port serving the terminal. It monitors for on-hook from the terminal and sends a response to ACF-N.

---

|    |                          |                     |
|----|--------------------------|---------------------|
| 16 | <b>Answer Indication</b> | <b>CSM(R) to TE</b> |
|----|--------------------------|---------------------|

|                                   |   |                                  |
|-----------------------------------|---|----------------------------------|
| <u><b>Address Information</b></u> | <u><b>Control information</b></u><br>Off-hook | <u><b>Bearer information</b></u> |
|-----------------------------------|---|----------------------------------|

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** The terminal equipment may provide an answer indication to the calling party.

---

|    |                    |                         |
|----|--------------------|-------------------------|
| 18 | <b>MODIFY.resp</b> | <b>RMCF-E to RMCF-N</b> |
|----|--------------------|-------------------------|

|                                   |  |   |
|-----------------------------------|--|---|
| <u><b>Address Information</b></u> | <u><b>Control information</b></u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Cut_Through/Transmit<br>Primitive = Insert_Answer Indication),<br>Primitive = Detect_On-hook | <u><b>Bearer information</b></u><br>BNC-ID = 3333 |
|-----------------------------------|--|---|

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** When CSM(A) receives this information flow it completes the connection of the call across the access network, if required. It instructs ACN-E to monitor for call release (on-hook). IMN awaits call release indications from the TE or the network.

---

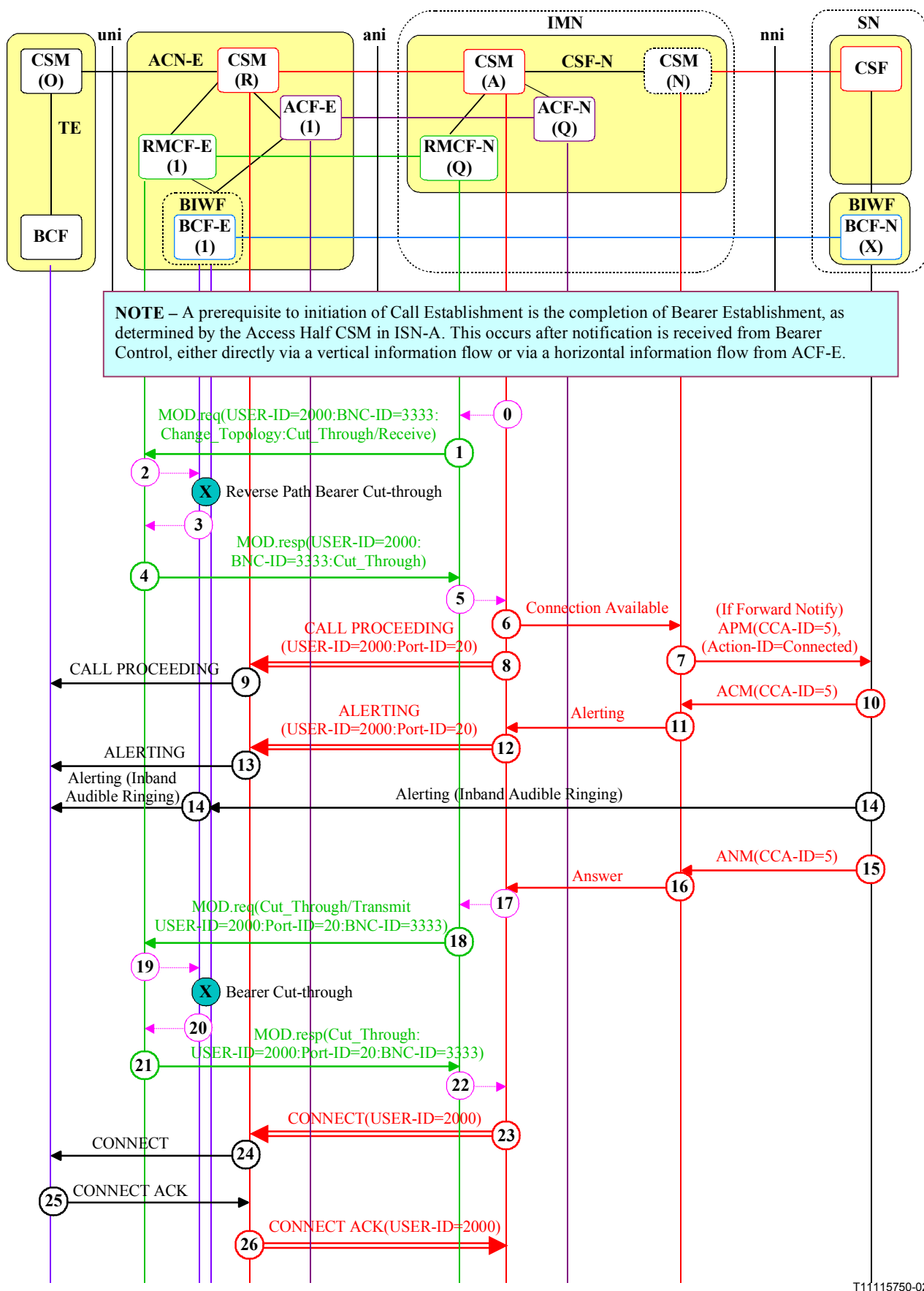
|    |               |                           |
|----|---------------|---------------------------|
| 20 | <b>Answer</b> | <b>Called Party to TE</b> |
|----|---------------|---------------------------|

|                                   |  |                                  |
|-----------------------------------|--|----------------------------------|
| <u><b>Address Information</b></u> | <u><b>Control information</b></u><br>Off-hook (If In-band) | <u><b>Bearer information</b></u> |
|-----------------------------------|--|----------------------------------|

**Initiation of information flow:** The user at the destination responds to alerting signal.

**Processing upon receipt:** CSM(R) allows in-band information to be passed through the bearer path in both directions. It waits for further instructions from CSM(A), TE, or ACF-E.

---



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Figure 48 – IMN call establishment – Terminal originated – Function-based

## 16.6.2 Call establishment – Terminal originated – Function-based

The information flows and functional entity actions illustrated in Figure 48 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 0 | IMN:CSM(A) to RMCF-N       |                            |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** BNC establishment was notified to CSM(A).

**Processing upon receipt:** CSM(A) request reversal path cut through in ACN.

---

|   |   |  |                           |
|---|---|--|---------------------------|
| 1 | MODIFY.req (Change_Topology)(Cut_Through/Receive) |  | RMCF-N to RMCF-E          |
|   | <u>Address Information</u>                        | <u>Control information</u>   | <u>Bearer information</u> |
|   |   | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = new<br>Primitive = Change_Topology<br>Primitive = Cut_Through/Receive | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 0.

NOTE – Bearer cut-through in the reverse direction (receive for the originating caller) may be required before ALERTING is received to convey audible ringing from the destination terminal to the originating terminal. Bearer cut-through in the forward direction will be withheld until receipt of an ANSWER message.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the receive direction and joins the terminations in ACN-E associated with both RMCF-E(1) and ACF-E(1). It responds to CSM(A) that cut-through is complete.

---

|   |                            |   |                           |
|---|----------------------------|---|---------------------------|
| 4 | MODIFY.resp                |   | RMCF-E to RMCF-N          |
|   | <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |
|   |                            | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = new<br>Primitive = Change_Topology,<br>Primitive = Cut_Through/Receive | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(A) receives this information flow it responds to CSM(N) that the connection is available.

---

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 6 | Connection Available       |                            | CSM(A) to CSM(N)          |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** CSM(A) can associate the originating and terminating call contexts in IMN.

---

|   |                            |   |
|---|----------------------------|---|
| 7 | APM                        | CSM(N) to SN:CSF  |
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5<br>Action-ID = Connected |
|   |                            | <u>Bearer information</u>   |

---

**Initiation of information flow:** Processing of information flow 6 and response mode = Forward Notify.

**Processing upon receipt:** The call at the SN proceeds.

---

|   |                            |   |
|---|----------------------------|---|
| 8 | CALL PROCEEDING            | CSM(A) to CSM(R)  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                     |

---

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** CSM(R) relays the CALL PROCEEDING message to the terminal equipment. This indicates that call processing has received complete address information and will accept no more.

---

|   |                            |  |
|---|----------------------------|--|
| 9 | CALL PROCEEDING            | CSM(R) to TE                                       |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|   |                            | <u>Bearer information</u>                          |

---

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** The terminal equipment should end addressing information. It waits for alerting indication from the destination address.

---

|    |                            |  |
|----|----------------------------|--|
| 10 | ACM                        | SN:CSF to CSM(N)                         |
|    | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 |
|    |                            | <u>Bearer information</u>                |

---

**Initiation of information flow:** Alerting or ACM from further node was received.

---

|    |                            |  |
|----|----------------------------|--|
| 11 | Alerting                   | CSM(N) to CSM(A)                                     |
|    | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band)  |
|    |                            | <u>Bearer information</u><br>In-band Audible Ringing |

---

**Initiation of information flow:** Alerting signal is received from the network.

**Processing upon receipt:** CSM(A) sends alerting to CSM(R). It waits for further instructions from CSM(N), CSM(R) or ACF-N.

---

|    |                            |   |
|----|----------------------------|---|
| 12 | ALERTING                   | CSM(A) to CSM(R)  |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|    |                            | <u>Bearer information</u>                                     |

---

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** CSM(R) relays the message to the TE. It waits for further instructions from CSM(A), TE, or ACF-E.

---

|    |                            |  |
|----|----------------------------|--|
| 13 | ALERTING                   | CSM(R) to TE                                       |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|    |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** TE awaits a CONNECT message.

---

|    |                            |  |
|----|----------------------------|--|
| 14 | Alerting                   | terminating network to TE                            |
|    | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band)  |
|    |                            | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Alerting signal is passed from the called destination or terminating network.

**Processing upon receipt:** Calling party awaits answer.

---

|    |                            |  |
|----|----------------------------|--|
| 15 | ANM                        | SN:CSF to CSM(N)                         |
|    | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 |
|    |                            | <u>Bearer information</u>                |

**Initiation of information flow:** Called Party answered the call.

---

|    |                            |   |
|----|----------------------------|---|
| 16 | Answer                     | IMN:CSM(N) to CSM(A)                                |
|    | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band) |
|    |                            | <u>Bearer information</u>                           |

**Initiation of information flow:** The network forwards an answer indication.

**Processing upon receipt:** CSM(A) requests cut-through of the transmit path and allows in-band information to be passed through the bearer path. It waits for further instructions from CSM(N), CSM(R), or ACF-N.

---

|    |                                   |  |
|----|-----------------------------------|--|
| 18 | MODIFY.req (Cut_Through/Transmit) | RMCF-N to RMCF-E   |
|    | <u>Address Information</u>        | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = new<br>Primitive = Cut_Through/Transmit |
|    |                                   | <u>Bearer information</u><br>BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 16.

**Processing upon receipt:** The BIWF cuts through the new Access network connection in the transmit direction and joins the terminations in ACN-E associated with both RMCF-E(1) and ACF-E(1). It responds to CSM(A) that cut-through is complete.

---

|    |                            |   |
|----|----------------------------|---|
| 21 | MODIFY.resp                | RMCF-E to RMCF-N  |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Cut_Through/Transmit |
|    |                            | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flow 18.

**Processing upon receipt:** When CSM(A) receives this information flow it completes the connection of the call across the access network, if required. It instructs ACN-E to monitor for call release (on-hook). IMN awaits call release indications from the TE or the network.

---

|    |                            |   |
|----|----------------------------|---|
| 23 | CONNECT                    | CSM(A) to CSM(R)  |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|    |                            | <u>Bearer information</u>                                     |

**Initiation of information flow:** Processing of information flow 21.

**Processing upon receipt:** CSM(R) relays the message to the TE. It waits for further instructions from CSM(A), TE, or ACF-E.

---

|    |                            |  |
|----|----------------------------|--|
| 24 | CONNECT                    | CSM(R) to TE                                       |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|    |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 23.

**Processing upon receipt:** The TE serving an ISDN or B-ISDN interface may respond with CONNECT ACKNOWLEDGE to confirm the connection.

---

|    |                            |  |
|----|----------------------------|--|
| 25 | CONNECT ACKNOWLEDGE        | TE to CSM(R)                                       |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|    |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 24.

**Processing upon receipt:** CSM(R) inserts or appends USER-ID = 2000 and relays this message to the CSM(A).

---

|    |                            |   |
|----|----------------------------|---|
| 26 | CONNECT ACKNOWLEDGE        | CSM(R) to CSM(A)  |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20 |
|    |                            | <u>Bearer information</u>                                     |

**Initiation of information flow:** Processing of information flow 25.

**Processing upon receipt:** CSM(A) records the response.

---

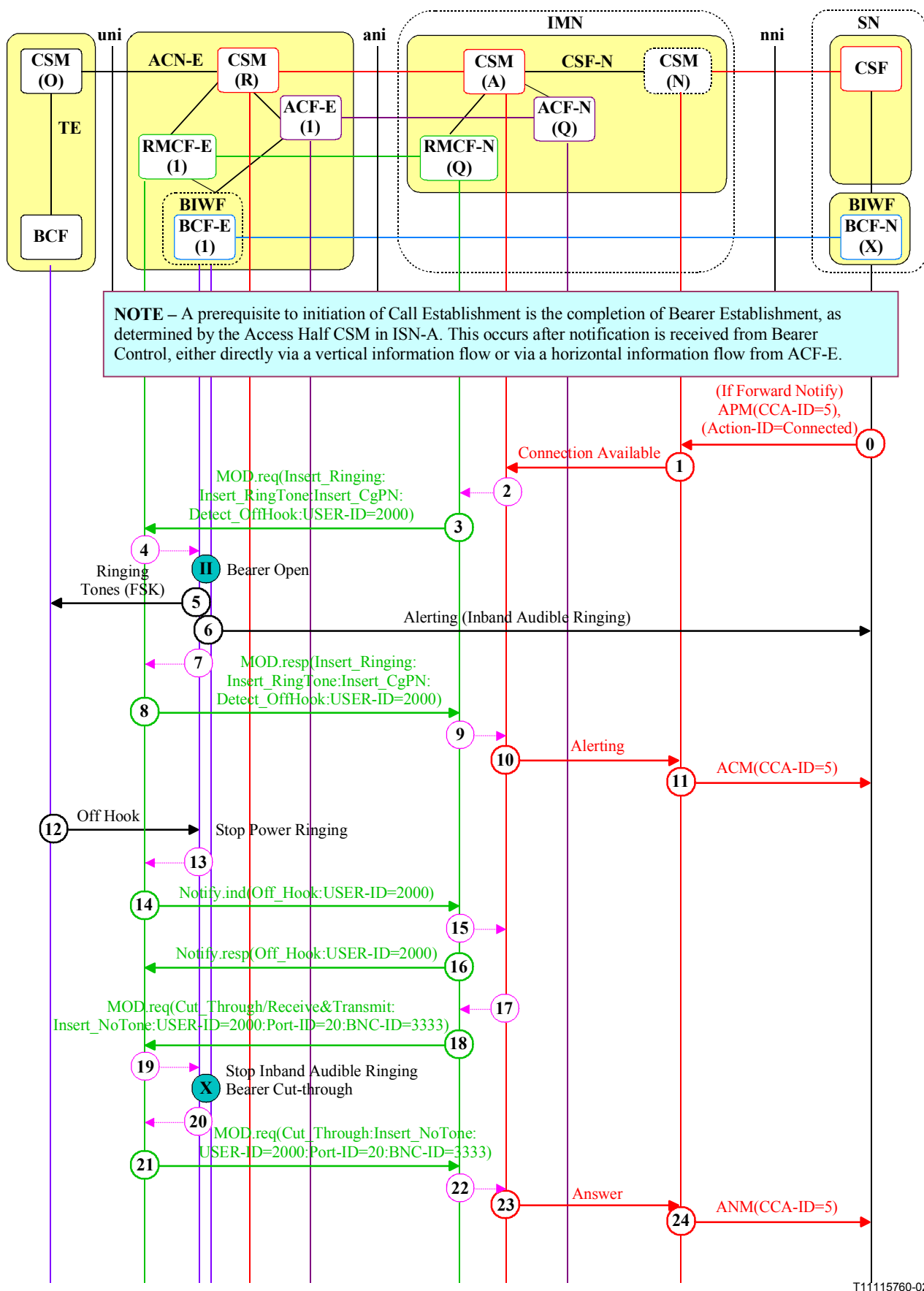


Figure 49 – IMN call establishment – Network originated – Stimulus-based

### 16.6.3 Call establishment – Network originated – Stimulus-based

The information flows and functional entity actions illustrated in Figure 49 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. Analogue loops vary in the types and sequences of signals used for call admission and call establishment. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |   |
|---|----------------------------|---|
| 0 | APM                        | SN:CSF to CSM(N)  |
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5<br>Action-ID = Connected |
|   |                            | <u>Bearer information</u>   |

**Initiation of information flow:** Receipt of information that the network connection and response mode = Forward Notify.

**Processing upon receipt:** issues information flow 1.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 1 | Connection Available       | CSM(N) to CSM(A)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Receipt of information that the network connection is established.

**Processing upon receipt:** CSM(A) initiates flow 4 forwarding loop signals to ACN-E. It awaits further instructions from the CSM(R), CSM(N), or ACF-N.

---

|   |   |  |
|---|---|--|
| 3 | MOD.req (Insert_Ringing)(Insert_RingTone)(Detect_OffHook) | RMCF-N to RMCF-E   |
|   | <u>Address Information</u><br>(ACN Address) = E1,         | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Ringing,<br>Primitive = Insert_RingTone,<br>Primitive = Detect_OffHook |
|   |   | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** ACN-E's RMCF passes instructions to the BIWF to insert ringing cadence on the analogue loop termination (information flow 5) and initiates in-band audible ringing to the reverse bearer path (information flow 11). It awaits off hook or answer.

NOTE – When ringing is applied to an analogue loop, the terminal interface and the ringing source must be disconnected from the associated bearer termination until Ring Trip is received. Cut-through of the access bearer path to the terminal interface in both the forward and reverse directions is accomplished at the terminating ACN-E on receipt of Ring Trip from the called destination.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 5 | Ringing                    | ACN-E to TE                |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:**

|   |                            |  |
|---|----------------------------|--|
| 6 | In-band Ringing            | ACN-E to calling party                               |
|   | <u>Address Information</u> | <u>Control information</u><br>Off-hook (If In-band)  |
|   |                            | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Information flow 3.

**Processing upon receipt:** Calling party awaits answer.

|   |  |  |
|---|--|--|
| 8 | MOD.resp (Insert_Ringing)(Insert_RingTone)(Detect_OffHook) | RMCF-E to RMCF-N   |
|   | <u>Address Information</u>                                 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_Ringing,<br>Primitive = Insert_RingTone,<br>Primitive = Detect_OffHook |
|   |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 4.

**Processing upon receipt:** RMCF-N awaits further instructions. CSM(A) sends an alerting indicator to CSM(N).

|    |                            |  |
|----|----------------------------|--|
| 10 | Alerting                   | CSM(A) to CSM(N)                                     |
|    | <u>Address Information</u> | <u>Control information</u>                           |
|    |                            | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** CSM(N) forwards alerting indication to the network.

|    |                            |  |
|----|----------------------------|--|
| 11 | ACM                        | CSM(N) to SN:CSF                                     |
|    | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5             |
|    |                            | <u>Bearer information</u><br>In-band Audible Ringing |

**Initiation of information flow:** Processing of information flow 10.

|    |                            |  |
|----|----------------------------|--|
| 12 | Off Hook                   | TE to ACN-E                            |
|    | <u>Address Information</u> | <u>Control information</u><br>Off-hook |
|    |                            | <u>Bearer information</u>              |

**Initiation of information flow:** The called party answers the phone.

**Processing:** ACN-E immediately removes power ringing if it is applied to the loop. RMCF-E generates a notification message to RMCF-N indicating that user has answered.

|    |  |   |
|----|--|---|
| 14 | NOTIFY.ind (Off_Hook)                            | RMCF-E to RMCF-N  |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Off_Hook |
|    |  | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 12.

**Processing upon receipt:** When RMCF-N receives this information flow, it sends primitives to CSM(A) indicating the state change of ACN-E. CSM(A) instructs the ACN-E BIWF to cut through the call in both directions.

---

|    |  |   |
|----|--|---|
| 16 | NOTIFY.resp (Off_Hook)                           | RMCF-N to RMCF-E  |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Primitive = Off_Hook |
|    |  | <u>Bearer information</u>   |

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** ACN-E's RMCF awaits further instructions.

---

|    |                                      |  |
|----|--------------------------------------|--|
| 18 | MOD.req (Insert_NoTone)(Cut_Through) | RMCF-N to RMCF-E   |
|    | <u>Address Information</u>           | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert No Tone<br>Primitive = Cut_Through/Transmit<br>Primitive = Cut_Through/Receive |
|    |                                      | <u>Bearer information</u><br>BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 14.

**Processing upon receipt:** BIWF(E1) removes the ringing tone and cuts through the bearer in both directions and responds to CSM(A).

---

|    |                                       |   |
|----|---------------------------------------|---|
| 21 | MOD.resp (Insert_NoTone)(Cut_Through) | RMCF-E to RMCF-N  |
|    | <u>Address Information</u>            | <u>Control information</u><br>USER-ID: = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert No Tone<br>Primitive = Cut_Through/Transmit<br>Primitive = Cut_Through/Receive |
|    |                                       | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flow 18.

**Processing upon receipt:** When CSM(A) receives this information flow it updates the call state and waits for further notifications. It sends an answer indication in flow 23 to CSM(N).

---

|    |                            |                            |
|----|----------------------------|----------------------------|
| 23 | Answer                     | CSM(A) to CSM(N)           |
|    | <u>Address Information</u> | <u>Control information</u> |
|    |                            | <u>Bearer information</u>  |

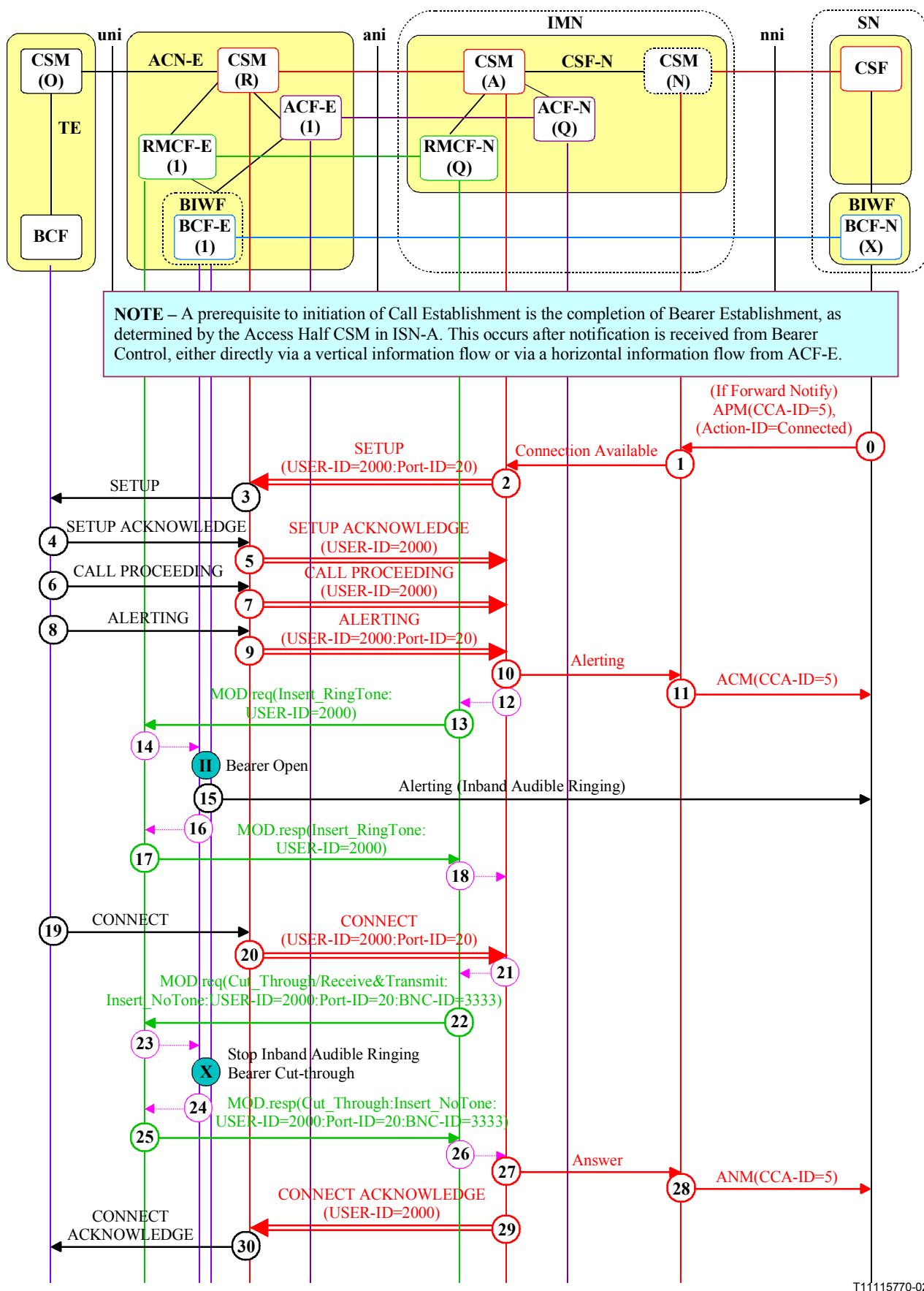
**Initiation of information flow:** Processing of information flow 21.

---

|    |                            |  |
|----|----------------------------|--|
| 24 | ANM                        | CSM(N) to SN:CSF                         |
|    | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 |
|    |                            | <u>Bearer information</u>                |

**Initiation of information flow:** Processing of information flow 23.

---



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**Figure 50 – IMN call establishment – Network originated – Function-based**

#### 16.6.4 Call establishment – Network originated – Function-based

The information flows and functional entity actions illustrated in Figure 50 are described in the following numbered paragraphs. The call establishment information flows follow the bearer establishment information flows and terminate when the call is connected. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

---

|   |                            |   |
|---|----------------------------|---|
| 0 | APM                        | SN:CSF to CSM(N)  |
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5<br>Action-ID = Connected |
|   |                            | <u>Bearer information</u>   |

**Initiation of information flow:** Receipt of information that the network connection and response mode = Forward Notify.

**Processing upon receipt:** issues information flow 1.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 1 | Connection Available       | CSM(N) to CSM(A)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Receipt of information that the network connection is established.

**Processing upon receipt:** CSM(A) initiates flow 2 and awaits further instructions from the CSM(R), CSM(N), or ACF-N.

---

|   |                            |  |
|---|----------------------------|--|
| 2 | SETUP                      | CSM(A) to CSM(R)   |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID: = 2000,<br>Port-ID = 20 |
|   |                            | <u>Bearer information</u>                                      |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** CSM(R) will relay the ISDN or B-ISDN SETUP message to the TE. The CSM(R) awaits further instruction from the terminal equipment. This can be Call Proceeding, Progress, Alerting, or Connect messages.

---

|   |                            |  |
|---|----------------------------|--|
| 3 | SETUP                      | CSM(R) to TE                                       |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call reference |
|   |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** The TE awaits further instructions from the CSM(R) or from the user of the terminal equipment. The TE may notify the network that call information is received and is being processed.

---

|   |                            |  |
|---|----------------------------|--|
| 4 | SETUP ACKNOWLEDGE          | TE to CSM(R)                                       |
|   | <u>Address Information</u> | <u>Control information</u><br>Local Call reference |
|   |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 3.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the SETUP ACKNOWLEDGE message to CSM(A).

---

|   |                   |                  |
|---|-------------------|------------------|
| 5 | SETUP ACKNOWLEDGE | CSM(R) to CSM(A) |
|---|-------------------|------------------|

---

|                            |
|----------------------------|
| <u>Address Information</u> |
|----------------------------|

|                            |
|----------------------------|
| <u>Control information</u> |
|----------------------------|

USER-ID = 2000,  
Port-ID = 20

|                           |
|---------------------------|
| <u>Bearer information</u> |
|---------------------------|

**Initiation of information flow:** Processing of information flow 4.

**Processing:** CSM(A) waits for further instructions from CSM(R).

---

|   |                 |              |
|---|-----------------|--------------|
| 6 | CALL PROCEEDING | TE to CSM(R) |
|---|-----------------|--------------|

---

|                            |
|----------------------------|
| <u>Address Information</u> |
|----------------------------|

|                            |
|----------------------------|
| <u>Control information</u> |
|----------------------------|

Local Call reference

|                           |
|---------------------------|
| <u>Bearer information</u> |
|---------------------------|

**Initiation of information flow:** Processing of information flow 3.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the CALL PROCEEDING message to CSM(A).

---

|   |                 |                  |
|---|-----------------|------------------|
| 7 | CALL PROCEEDING | CSM(R) to CSM(A) |
|---|-----------------|------------------|

---

|                            |
|----------------------------|
| <u>Address Information</u> |
|----------------------------|

|                            |
|----------------------------|
| <u>Control information</u> |
|----------------------------|

USER-ID = 2000,  
Port-ID = 20

|                           |
|---------------------------|
| <u>Bearer information</u> |
|---------------------------|

**Initiation of information flow:** Processing of information flow 6.

**Processing:** CSM(A) waits for further instructions from CSM(R).

---

|   |          |              |
|---|----------|--------------|
| 8 | ALERTING | TE to CSM(R) |
|---|----------|--------------|

---

|                            |
|----------------------------|
| <u>Address Information</u> |
|----------------------------|

|                            |
|----------------------------|
| <u>Control information</u> |
|----------------------------|

Local Call Reference

|                           |
|---------------------------|
| <u>Bearer information</u> |
|---------------------------|

**Initiation of information flow:** Processing of information flow 3.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the ALERTING message to CSM(A).

---

|   |          |                  |
|---|----------|------------------|
| 9 | ALERTING | CSM(R) to CSM(A) |
|---|----------|------------------|

---

|                            |
|----------------------------|
| <u>Address Information</u> |
|----------------------------|

|                            |
|----------------------------|
| <u>Control information</u> |
|----------------------------|

USER-ID = 2000,  
Port-ID = 20

|                           |
|---------------------------|
| <u>Bearer information</u> |
|---------------------------|

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** CSM(A) sends an alerting signal toward CSM(N) and instructs ACN-E to insert in-band audible ringing to the calling party.

---

|    |          |                  |
|----|----------|------------------|
| 10 | Alerting | CSM(A) to CSM(N) |
|----|----------|------------------|

---

|                            |
|----------------------------|
| <u>Address Information</u> |
|----------------------------|

|                            |
|----------------------------|
| <u>Control information</u> |
|----------------------------|

|                           |
|---------------------------|
| <u>Bearer information</u> |
|---------------------------|

In-band Audible Ringing

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** CSM(N) forwards alerting indication to the network.

|    |                            |                            |                           |
|----|----------------------------|----------------------------|---------------------------|
| 11 | ACM                        | CSM(N) to SN:CSF           |                           |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|    |                            | CCA-ID = 5                 | In-band Audible Ringing   |

**Initiation of information flow:** Processing of information flow 10.

|    |                            |   |                           |
|----|----------------------------|---|---------------------------|
| 13 | MOD.req (Insert_RingTone)  | RMCF-N to RMCF-E  |                           |
|    | <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |
|    | (ACN Address) = E1,        | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_RingTone, |                           |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** RMCF-E passes instructions to the BIWF to insert in-band audible ringing to the reverse bearer path (information flow 15).

|    |                            |                            |                           |
|----|----------------------------|----------------------------|---------------------------|
| 15 | In-band Ringing            | ACN-E to calling party     |                           |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|    |                            | Off-hook (If In-band)      | In-band Audible Ringing   |

**Initiation of information flow:** Information flow 13.

**Processing upon receipt:** Calling party awaits answer.

|    |                            |   |                           |
|----|----------------------------|---|---------------------------|
| 17 | MOD.resp (Insert_RingTone) | RMCF-E to RMCF-N  |                           |
|    | <u>Address Information</u> | <u>Control information</u>  | <u>Bearer information</u> |
|    |                            | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Insert_RingTone, |                           |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** RMCF-N confirms insertion of audible ringing to CSM(A) and awaits further instructions.

|    |                            |                            |                           |
|----|----------------------------|----------------------------|---------------------------|
| 19 | CONNECT                    | TE to CSM(R)               |                           |
|    | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|    |                            | Local Call Reference       |                           |

**Initiation of information flow:** The called ISDN answers.

**Processing:** The CSM(R) inserts or attaches the access network USER-ID = 2000 and relays the CONNECT message to CSM(A).

|    |                            |                                 |                           |
|----|----------------------------|---------------------------------|---------------------------|
| 20 | CONNECT                    | CSM(R) to CSM(A)                |                           |
|    | <u>Address Information</u> | <u>Control information</u>      | <u>Bearer information</u> |
|    |                            | USER-ID = 2000,<br>Port-ID = 20 |                           |

**Initiation of information flow:** Processing of information flow 19.

**Processing upon receipt:** CSM(A) instructs ACN-E to remove audible ringing and to cut-through the bearer in both directions. It may issue a CONNECT ACKNOWLEDGE message toward CSM(R). It waits for further instructions from CSM(N), or CSM(R).

---

|    |                                      |                  |
|----|--------------------------------------|------------------|
| 22 | MOD.req (Insert_NoTone)(Cut_Through) | RMCF-N to RMCF-E |
|----|--------------------------------------|------------------|

**Address Information**

**Control information**

**Bearer information**

USER-ID = 2000,  
Port-ID = 20,  
Connection ID = 200  
Primitive = Insert No Tone  
Primitive = Cut\_Through/Transmit  
Primitive = Cut\_Through/Receive

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 20.

**Processing upon receipt:** BIWF(E1) removes the ringing tone and cuts through the bearer in both directions and responds to CSM(A).

---

|    |                                       |                  |
|----|---------------------------------------|------------------|
| 25 | MOD.resp (Insert_NoTone)(Cut_Through) | RMCF-E to RMCF-N |
|----|---------------------------------------|------------------|

**Address Information**

**Control information**

**Bearer information**

USER-ID: = 2000,  
Port-ID = 20,  
Connection ID = 200  
Primitive = Insert No Tone  
Primitive = Cut\_Through/Transmit  
Primitive = Cut\_Through/Receive

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 20.

**Processing upon receipt:** When CSM(A) receives this information flow it updates the call state and waits for further notifications. It sends an answer indication in flow 23 to CSM(N).

---

|    |        |                  |
|----|--------|------------------|
| 27 | Answer | CSM(A) to CSM(N) |
|----|--------|------------------|

**Address Information**

**Control information**

**Bearer information**

**Initiation of information flow:** Processing of information flow 25.

---

|    |     |                  |
|----|-----|------------------|
| 28 | ANM | CSM(N) to SN:CSF |
|----|-----|------------------|

**Address Information**

**Control information**

**Bearer information**

CCA-ID = 5

**Initiation of information flow:** Processing of information flow 27.

---

|    |                     |                  |
|----|---------------------|------------------|
| 29 | CONNECT ACKNOWLEDGE | CSM(2) to CSM(R) |
|----|---------------------|------------------|

**Address Information**

**Control information**

**Bearer information**

USER-ID = 2000,  
Port-ID = 20

**Initiation of information flow:** Processing of information flow 25.

**Processing upon receipt:** The CSM(R) relays this message to the TE.

---

|    |                     |              |
|----|---------------------|--------------|
| 30 | CONNECT ACKNOWLEDGE | CSM(R) to TE |
|----|---------------------|--------------|

**Address Information**

**Control information**

**Bearer information**

Local Call Reference

**Initiation of information flow:** Processing of information flow 29.

**Processing upon receipt:** The TE records the response.

## 16.7 Call release

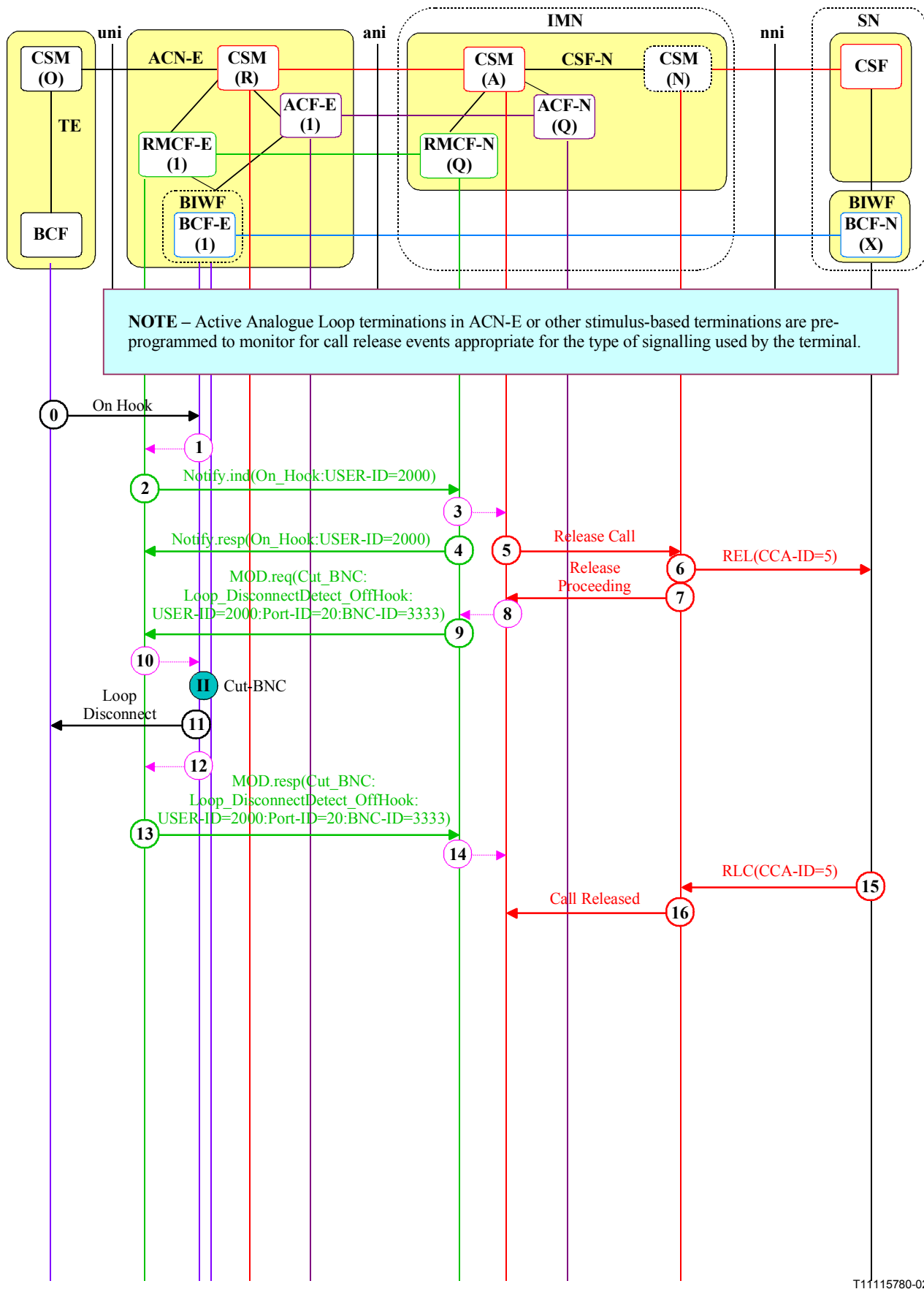


Figure 51 – IMN call release – Terminal released – Stimulus-based

### 16.7.1 Call release – Terminal released – Stimulus-based

The information flows and functional entity actions illustrated in Figure 51 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Additional messages between IMN and ACN-E, as well as between ACN-E and TE may be present in the loop protocols. They are dependent on the type of terminal equipment. These messages must be conveyed across the access network before the USER-ID is released. They are neither described nor numbered. The timing and procedures for loop protocol apply independently of the access network signalling procedures.

NOTE – These release information flows do not vary with respect to the direction in which the call was established.

---

|   |                            |                                       |
|---|----------------------------|---------------------------------------|
| 0 | On Hook                    | TE to ACN-E                           |
|   | <u>Address Information</u> | <u>Control information</u><br>On hook |
|   |                            | <u>Bearer information</u>             |

**Initiation of information flow:** A user associated with the TE requests disconnect for an analogue line.

**Processing upon receipt:** When ACN-E receives this information flow, it sends a notification to IMN.

---

|   |  |  |
|---|--|--|
| 2 | NOTIFY.ind (On_Hook)                             | RMCF-E to RMCF-N   |
|   | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = On_Hook |
|   |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When RMCF-N receives this information flow, it sends primitives to CSM(A) indicating the state change of ACN-E. CSM(A) request the ACN-E to sever the access bearer path from the network termination, after it determines that the call and bearer are to be released and to disconnect the analogue loop. It also sends a release call indication in flow 5 to CSM(N).

---

|   |  |  |
|---|--|--|
| 4 | NOTIFY.resp (On_Hook)                            | RMCF-N to RMCF-E   |
|   | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = On_Hook |
|   |  | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** RMCF-E awaits further instructions.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 5 | Release Call               | CSM(A) to CSM(N)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 2.

**Processing upon receipt:** When CSM(N) receives this information flow it forwards the release to the network. It then responds with a Release Proceeding.

|   |                            |  |                           |
|---|----------------------------|--|---------------------------|
| 6 | REL                        | CSM(A) to SN:CSF                         |                           |
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** CSM(N) waits for Release Complete from the network

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 7 | Release Proceeding         | CSM(2) to CSM(1)           |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 5 by CSM(N).

**Processing upon receipt:** When CSM(A) receives this information flow it proceeds to release the call in the access network.

|   |  |   |  |
|---|--|---|--|
| 9 | MOD.req (Cut_BNC)(Loop_Disconnect)(Detect_Offhook) | RMCF-N to RMCF-E  |  |
|   | <u>Address Information</u>                         | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Cut_BNC,<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Offhook | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 7.

**Processing upon receipt:** The BIWF in ACN-E severs the bearer path and responds to CSM(A). The ACN-E sends loop disconnect to the TE if this message is required by the analogue loop protocol that is in use. It awaits an off-hook indication for a new call admission from the TE.

|    |                            |   |                           |
|----|----------------------------|---|---------------------------|
| 11 | Loop Disconnect            | ACN-E to TE                                   |                           |
|    | <u>Address Information</u> | <u>Control information</u><br>Loop Disconnect | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** The terminal port in ACN-E notes the change in loop state and forwards an indication to the TE if required.

---

|    |   |   |
|----|---|---|
| 13 | MOD.resp (Cut_BNC)(Loop_Disconnect)(Detect_OffHook) | RMCF-E to RMCF-N  |
|    | <u>Address Information</u>                          | <u>Control information</u>  |
|    |   | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Cut_BNC,<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Offhook |
|    |   | <u>Bearer information</u>   |
|    |   | BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** When CSM(A) receives this information flow it updates the call state and waits for further notifications.

---

|    |                            |                            |
|----|----------------------------|----------------------------|
| 15 | RLC                        | SN:CSF to CSM(N)           |
|    | <u>Address Information</u> | <u>Control information</u> |
|    |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 6 (CSM(N) receives confirmation from the network that the call is released).

**Processing upon receipt:** CSM(N) proceeds to release the bearer associated with the call in the access network.

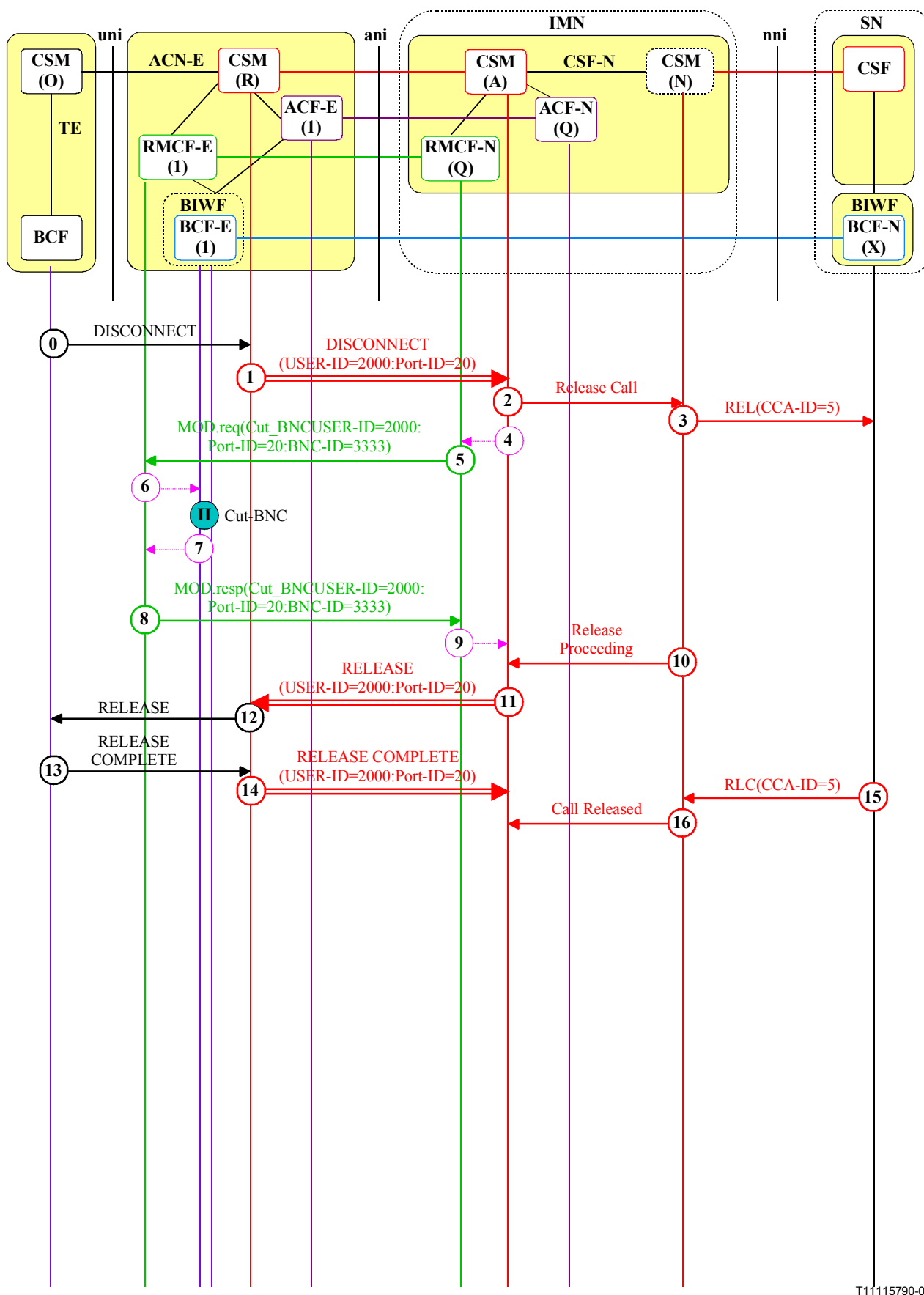
---

|    |                            |                            |
|----|----------------------------|----------------------------|
| 16 | Call Released              | CSM(N) to CSM(A)           |
|    | <u>Address Information</u> | <u>Control information</u> |
|    |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** When CSM(A) receives this information flow it proceeds to release the bearer associated with the call in the access network, if it has not already done so.

---



T11115790-02

Figure 52 – IMN call release – Terminal released – Function-based

### 16.7.2 Call release – Terminal released – Function-based

The information flows and functional entity actions illustrated in Figure 52 are described in the following numbered paragraphs. The call release information flows precede the bearer release information flows. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Three stage release procedures are illustrated in the following information flows. They include exchange of three messages between IMN and ACN-E: DISCONNECT, RELEASE, and RELEASE COMPLETE. They represent the release procedures for DSS1. The timing and procedures for DSS1 apply independently of the access network signalling procedures. Two stage release procedures for DSS2 are noted in the information flow text. The DSS2 release procedure includes RELEASE and RELEASE COMPLETE messages, rather than the DISCONNECT and RELEASE used in DSS1.

NOTE – These release information flows do not vary with respect to the direction in which the call was established.

| 0 | DISCONNECT (DSS2 – RELEASE) |  | TE to ACN-E               |
|---|-----------------------------|--|---------------------------|
|   | <u>Address Information</u>  | <u>Control information</u><br>Local Call Reference | <u>Bearer information</u> |

**Initiation of information flow:** A user associated with the TE requests disconnect for an ISDN interface.

**Processing upon receipt:** When CSM(R) receives this information flow, it inserts or appends USER-ID = 2000 and relays the message to CSM(A).

| 1 | DISCONNECT (DSS2 – RELEASE) |   | CSM(R) to CSM(A)          |
|---|-----------------------------|---|---------------------------|
|   | <u>Address Information</u>  | <u>Control information</u><br>USER-ID: = 2000<br>Port-ID = 20 | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** CSM(A) sends a release call indication to CSM(N). It requests ACN-E to sever the connection between the ISDN bearer on the access side and the network. It sends a message in response to CSM(R).

| 2 | Release Call               |                            | CSM(A) to CSM(N)          |
|---|----------------------------|----------------------------|---------------------------|
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When CSM(N) receives this information flow it forwards the release to the network. It then responds with a Release Proceeding.

| 3 | REL                        |  | CSM(N) to SN:CSF          |
|---|----------------------------|--|---------------------------|
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 | <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** CSM(N) waits for Release Complete from the network.

---

5                      MOD.req (Cut\_BNC)    RMCF-N to RMCF-E

**Address Information**

**Control information**

**Bearer information**

USER-ID = 2000,  
Port-ID = 20,  
Connection ID = 200  
Primitive = Cut\_BNC,

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** The BIWF in ACN-E severs the bearer path and responds to CSM(A).

---

8                      MOD.resp (Cut\_BNC)    RMCF-E to RMCF-N

**Address Information**

**Control information**

**Bearer information**

USER-ID = 2000,  
Port-ID = 20,  
Connection ID = 200  
Primitive = Cut\_BNC,

BNC-ID = 3333

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** When CSM(A) receives this information flow it updates the call state and waits for further notifications.

---

10                      Release Proceeding    CSM(N) to CSM(A)

**Address Information**

**Control information**

**Bearer information**

**Initiation of information flow:** Processing of information flow 2 by CSM(2).

**Processing upon receipt:** When CSM(A) receives this information flow it proceeds to release the call and bearer in the access network, if it has not already done so.

---

11                      RELEASE (DSS2 – RELEASE COMPLETE)    CSM(A) to CSM(R)

**Address Information**

**Control information**

**Bearer information**

USER-ID = 2000,  
Port-ID = 20

**Initiation of information flow:** Processing of information flow 8.

**Processing upon receipt:** The CSM(R) relays this message to the TE.

---

12                      RELEASE (DSS2 – RELEASE COMPLETE)    CSM(R) to TE

**Address Information**

**Control information**

**Bearer information**

Local Call Reference

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** The TE records the response.

---

13                      RELEASE COMPLETE    TE to ACN-E

**Address Information**

**Control information**

**Bearer information**

Local Call Reference

**Initiation of information flow:** A user associated with the TE receives a RELEASE for an ISDN interface.

**Processing upon receipt:** When CSM(R) receives this information flow, it inserts or appends USER-ID = 2000 and relays the message to CSM(A).

---

|    |                            |  |
|----|----------------------------|--|
| 14 | RELEASE COMPLETE           | CSM(R) to CSM(A)   |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID: = 2000,<br>Port-ID = 20 |
|    |                            | <u>Bearer information</u>                                      |

**Initiation of information flow:** Processing of information flow 13.

**Processing upon receipt:** CSM(A) notes the call release.

---

|    |                            |                            |
|----|----------------------------|----------------------------|
| 15 | RLC                        | SN:CSF to CSM(N)           |
|    | <u>Address Information</u> | <u>Control information</u> |
|    |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 3 (CSM(N) receives confirmation from the network that the call is released).

**Processing upon receipt:** CSM(N) proceeds to release the bearer associated with the call in the access network.

---

|    |                            |                            |
|----|----------------------------|----------------------------|
| 16 | Call Released              | CSM(N) to CSM(A)           |
|    | <u>Address Information</u> | <u>Control information</u> |
|    |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** When CSM(A) receives this information flow it proceeds to release the bearer associated with the call in the access network, if it has not already done so.

---

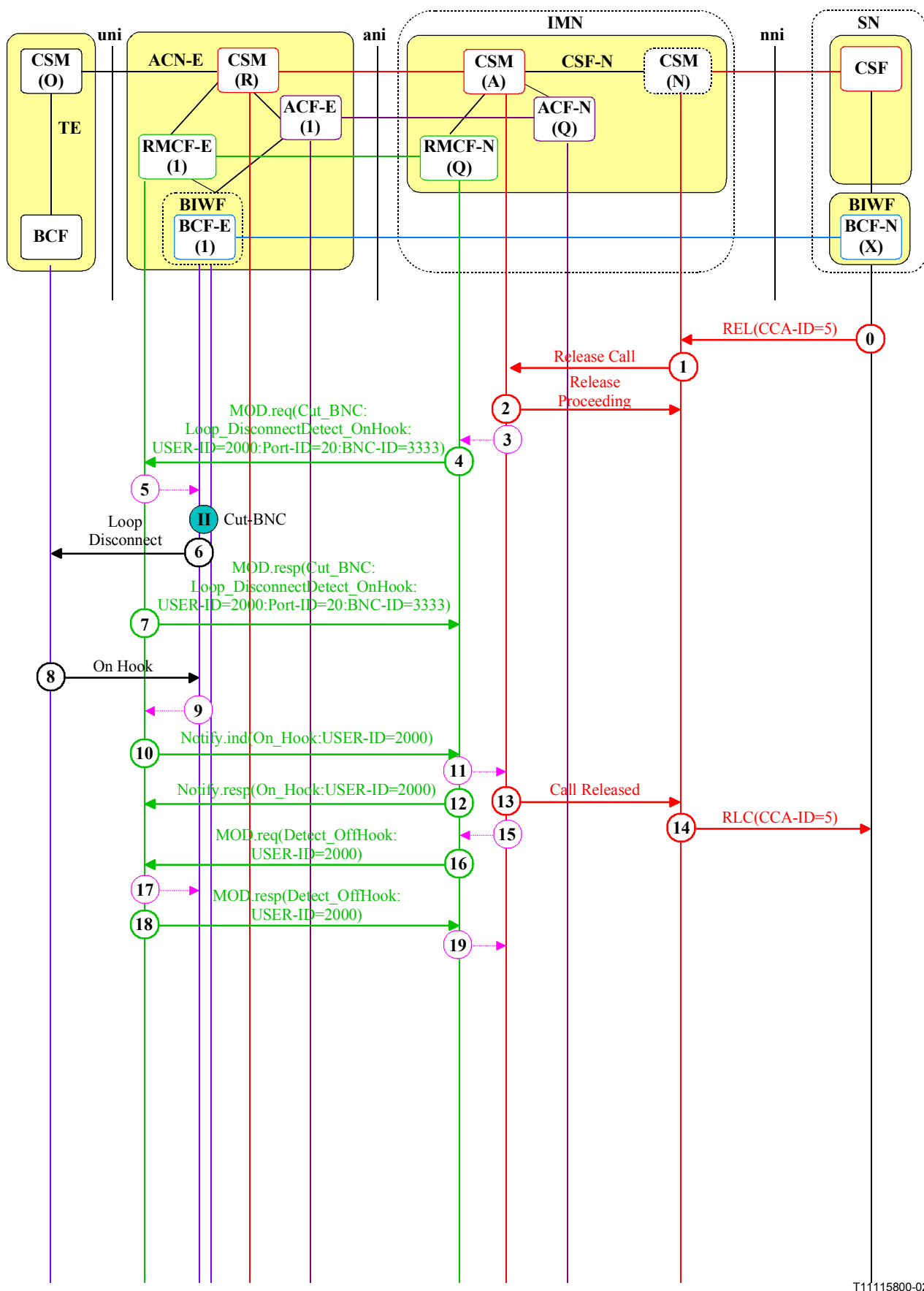


Figure 53 – IMN call release – Network released – Stimulus-based

### 16.7.3 Call release – Network released – Stimulus-based

The information flows and functional entity actions illustrated in Figure 53 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Additional messages between IMN and ACN-E, as well as between ACN-E and TE may be present in the loop protocols. They are dependent on the type of terminal equipment. These messages must be conveyed across the access network before the USER-ID is released. They are neither described nor numbered. The timing and procedures for loop protocol apply independently of the access network signalling procedures.

NOTE – These release information flows do not vary with respect to the direction in which the call was established.

---

|   |                            |  |
|---|----------------------------|--|
| 0 | REL                        | SN:CSF to CSM(N)                         |
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 |
|   |                            | <u>Bearer information</u>                |

---

**Initiation of information flow:** The network requests to release the call.

**Processing upon receipt:** CSM(N) forwards the request to CSM(A).

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 1 | Release Call               | CSM(N) to CSM(A)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

---

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** CSM(A) determines that the call is to be disconnected. It requests ACN-E to disconnect the analogue loop and responds to CSM(N) that the release is proceeding.

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 2 | Release Proceeding         | CSM(A) to CSM(N)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

---

**Initiation of information flow:** Processing of information flow 2 by CSM(2).

**Processing upon receipt:** When CSM(N) receives this information flow it proceeds to confirm the release the call across the network.

---

|   |  |  |
|---|--|--|
| 4 | MOD.req (Cut_BNC)(Loop_Disconnect)(Detect_On-hook) | RMCF-N to RMCF-E   |
|   | <u>Address Information</u>                         | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Cut_BNC,<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Onhook |
|   |  | <u>Bearer information</u>  |

---

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** The BIWF in ACN-E severs the bearer path and responds to CSM(A). ACN-E sends loop disconnect to the TE if this message is required by the analogue loop protocol that is in use. It awaits an on-hook indication from the TE.

|   |                            |   |
|---|----------------------------|---|
| 6 | Loop Disconnect            | ACN-E to TE                                   |
|   | <u>Address Information</u> | <u>Control information</u><br>Loop Disconnect |
|   |                            | <u>Bearer information</u>                     |

| 7 | MOD.resp (Cut_BNC)(Loop_Disconnect)(Detect_On-hook) | RMCF-E to RMCF-N   |
|---|---|--|
|   | <u>Address Information</u><br>                      | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Loop_Disconnect,<br>Primitive = Detect_Onhook |
|   |   | <u>Bearer information</u>  |

| 8 | On Hook                    | TE to ACN-E                           |
|---|----------------------------|---------------------------------------|
|   | <u>Address Information</u> | <u>Control information</u><br>On-hook |
|   |                            | <u>Bearer information</u>             |

|    |  |  |
|----|--|--|
| 10 | NOTIFY.ind (On_Hook)                             | RMCF-E to RMCF-N   |
|    | <u>Address Information</u><br>(ACN Address) = E1 | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = On Hook |
|    |  | <u>Bearer information</u>  |

|    |   |   |   |
|----|---|---|---|
| 12 | <p><b>NOTIFY.resp (On_Hook)</b></p> <p><u><b>Address Information</b></u><br/>(ACN Address) = E1</p> | <p><b>RMCF-N to RMCF-E</b></p> <p><u><b>Control information</b></u><br/>USER-ID = 2000,<br/>Port-ID = 20,<br/>Connection ID = 200<br/>Primitive = On Hook</p> | <p><u><b>Bearer information</b></u></p> |
|----|---|---|---|

---

|    |                            |  |
|----|----------------------------|--|
| 13 | Call Released              | CSM(A) to CSM(N)                                     |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** When CSM(N) receives this information flow it notes the change in state and sends confirmation to the network that the call is released.

---

|    |                            |  |
|----|----------------------------|--|
| 14 | RLC                        | CSM(N) to SN:CSF                                     |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |
|    |                            | CCA-ID = 5   |

**Initiation of information flow:** Processing of information flow 13.

---

|    |                            |   |
|----|----------------------------|---|
| 16 | MOD.req (Detect_OffHook)   | RMCF-N to RMCF-E  |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u>                                  |
|    |                            | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Detect_OffHook |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** ACN-E awaits an off-hook indication for a new call admission from the TE.

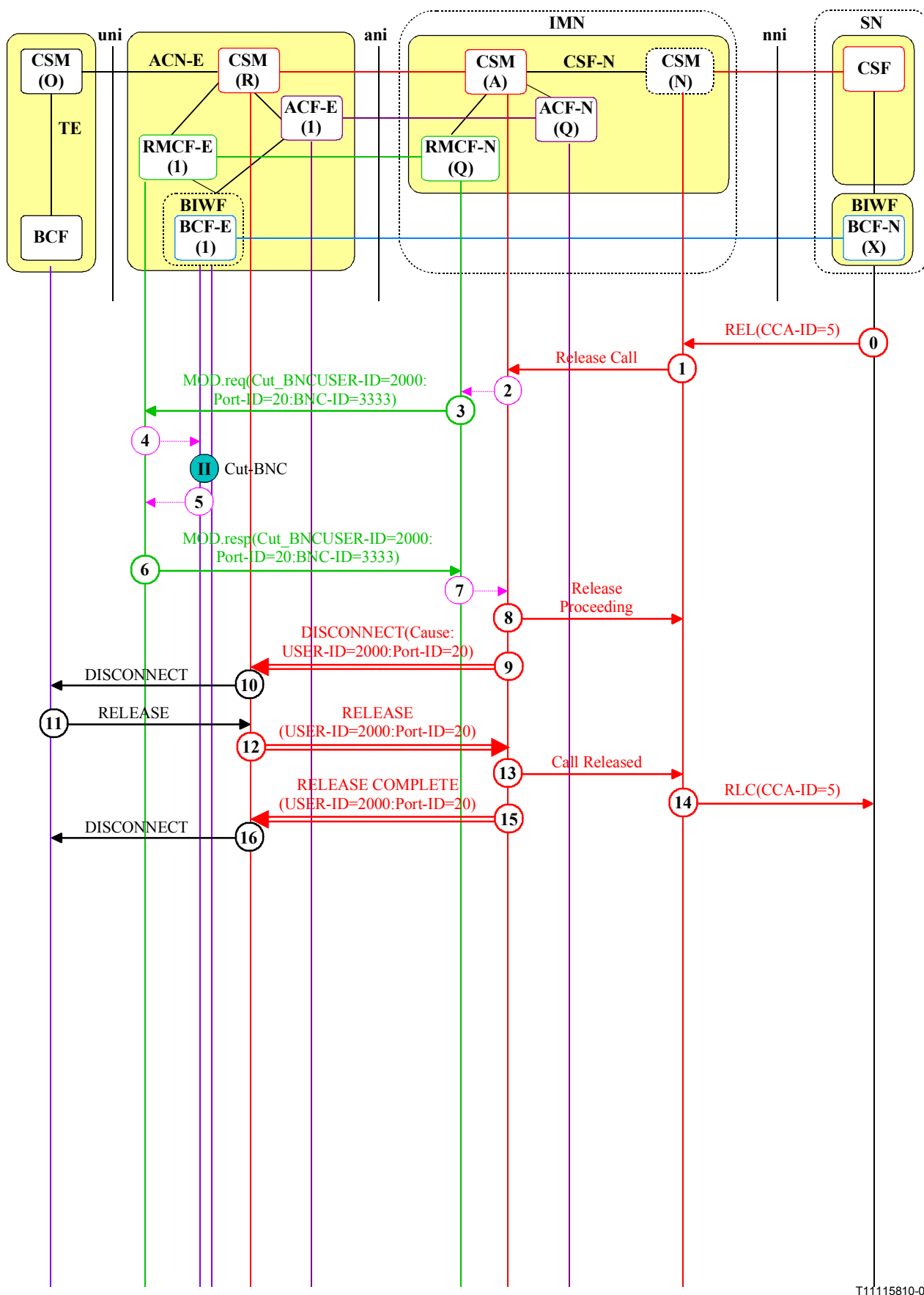
---

|    |                            |   |
|----|----------------------------|---|
| 18 | MOD.resp (Detect_OffHook)  | RMCF-E to RMCF-N  |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u>                                  |
|    |                            | USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Detect_OffHook |

**Initiation of information flow:** Processing of information flow 16.

**Processing upon receipt:** When CSM(A) receives this information flow it updates the call state and waits for further notifications

---



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Figure 54 – IMN call release – Network released – Function-based

#### 16.7.4 Call release – Network released – Function-based

The information flows and functional entity actions illustrated in Figure 54 are described in the following numbered paragraphs. The call release information flows precede the bearer release information flows. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

Three stage release procedures are illustrated in the following information flows. They include exchange of three messages between IMN and ACN-E: DISCONNECT, RELEASE, and RELEASE COMPLETE. They represent the release procedures for DSS1. The timing and procedures for DSS1 apply independently of the access network signalling procedures. Two stage release procedures for DSS2 are noted in the information flow text. The DSS2 release procedure includes RELEASE and RELEASE COMPLETE messages, rather than the DISCONNECT and RELEASE used in DSS1.

NOTE – These release information flows do not vary with respect to the direction in which the call was established.

---

|   |                            |  |
|---|----------------------------|--|
| 0 | REL                        | SN:CSF to CSM(N)                         |
|   | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 |
|   |                            | <u>Bearer information</u>                |

**Initiation of information flow:** The network requests to release the call.

**Processing upon receipt:** CSM(N) forwards the request to CSM(A).

---

|   |                            |                            |
|---|----------------------------|----------------------------|
| 1 | Release Call               | CSM(N) to CSM(A)           |
|   | <u>Address Information</u> | <u>Control information</u> |
|   |                            | <u>Bearer information</u>  |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** CSM(A) determines that the call is to be disconnected. It requests ACN-E to disconnect the analogue loop and responds to CSM(N) that the release is proceeding.

---

|   |                            |   |
|---|----------------------------|---|
| 3 | MOD.req (Cut_BNC)          | RMCF-N to RMCF-E  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Cut_BNC, |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** The BIWF in ACN-E severs the bearer path and responds to CSM(A).

---

|   |                            |   |
|---|----------------------------|---|
| 6 | MOD.resp (Cut_BNC)         | RMCF-E to RMCF-N  |
|   | <u>Address Information</u> | <u>Control information</u><br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Cut_BNC, |
|   |                            | <u>Bearer information</u><br>BNC-ID = 3333  |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** When CSM(A) receives this information flow it updates the call state and waits for further notifications.

---

|   |                            |  |
|---|----------------------------|--|
| 8 | Release Proceeding         | CSM(A) to CSM(N)                                     |
|   | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** When CSM(N) receives this information flow it proceeds to confirm the release the call across the network.

---

|   |                             |  |
|---|-----------------------------|--|
| 9 | DISCONNECT (DSS2 – RELEASE) | CSM(A) to CSM(R)                                     |
|   | <u>Address Information</u>  | <u>Control information</u> <u>Bearer information</u> |
|   |                             | USER-ID: = 2000,<br>Port-ID = 20                     |

**Initiation of information flow:** Processing of information flow 6.

**Processing upon receipt:** CSM(R) relays the message to the TE.

---

|    |                             |  |
|----|-----------------------------|--|
| 10 | DISCONNECT (DSS2 – RELEASE) | CSM(R) to TE   |
|    | <u>Address Information</u>  | <u>Control information</u> <u>Bearer information</u> |
|    |                             | Local Call Reference                                 |

**Initiation of information flow:** Processing of information flow 9.

**Processing upon receipt:** The TE initiates release and sends a response to CSM(A) through CSM(R).

---

|    |                                   |  |
|----|-----------------------------------|--|
| 11 | RELEASE (DSS2 – RELEASE COMPLETE) | TE to CSM(R)   |
|    | <u>Address Information</u>        | <u>Control information</u> <u>Bearer information</u> |
|    |                                   | Local Call Reference                                 |

**Initiation of information flow:** Processing of information flow 10.

**Processing upon receipt:** The CSM(R) relays this message to CSM(A).

---

|    |                                   |  |
|----|-----------------------------------|--|
| 12 | RELEASE (DSS2 – RELEASE COMPLETE) | CSM(R) to CSM(A)                                     |
|    | <u>Address Information</u>        | <u>Control information</u> <u>Bearer information</u> |
|    |                                   | USER-ID = 2000,<br>Port-ID = 20                      |

**Initiation of information flow:** Processing of information flow 11.

**Processing upon receipt:** CSM(A) indicates to CSM(N) that the call is released and instructs ACF-N to release the BNC. It may send a RELEASE COMPLETE message in response to CSM(R).

---

|    |                            |  |
|----|----------------------------|--|
| 13 | Call Released              | CSM(A) to CSM(N)                                     |
|    | <u>Address Information</u> | <u>Control information</u> <u>Bearer information</u> |

**Initiation of information flow:** Processing of information flow 12.

**Processing upon receipt:** When CSM(N) receives this information flow it notes the change in state.

---

|    |                            |  |
|----|----------------------------|--|
| 14 | RLC                        | CSM(N) to SN:CSF                         |
|    | <u>Address Information</u> | <u>Control information</u><br>CCA-ID = 5 |
|    |                            | <u>Bearer information</u>                |

**Initiation of information flow:** Processing of information flow 13.

---

|    |                            |  |
|----|----------------------------|--|
| 15 | RELEASE COMPLETE           | CSM(2) to CSM(R)   |
|    | <u>Address Information</u> | <u>Control information</u><br>USER-ID: = 2000,<br>Port-ID = 20 |
|    |                            | <u>Bearer information</u>                                      |

**Initiation of information flow:** Processing of information flow 12.

**Processing upon receipt:** CSM(R) relays the message to the TE.

---

|    |                            |  |
|----|----------------------------|--|
| 16 | RELEASE COMPLETE           | ACN-E to TE  |
|    | <u>Address Information</u> | <u>Control information</u><br>Local Call Reference |
|    |                            | <u>Bearer information</u>                          |

**Initiation of information flow:** Processing of information flow 15.

**Processing upon receipt:** The TE records the release complete.

---

## 16.8 Bearer release

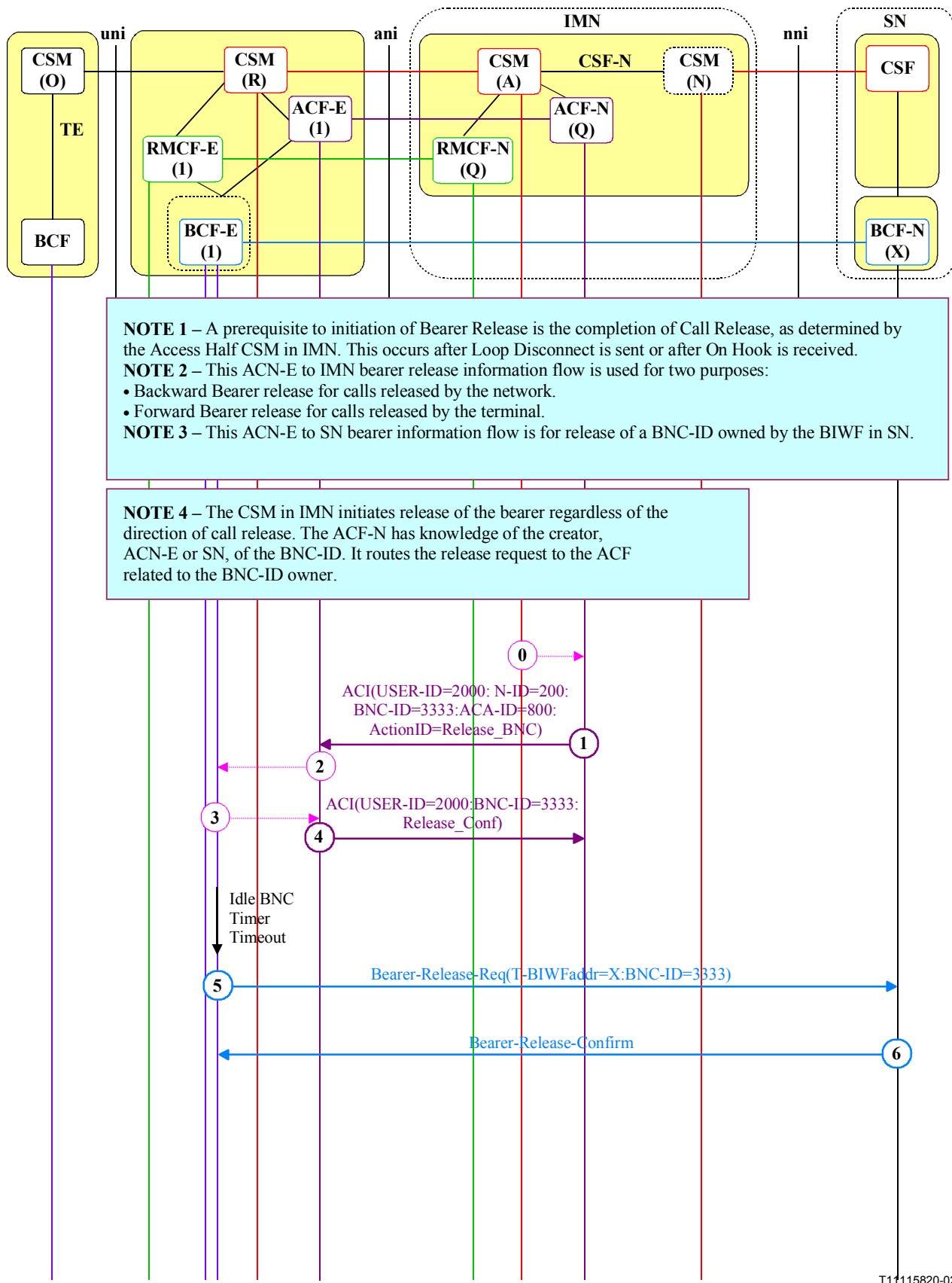


Figure 55 – IMN bearer release – ACN-E to SN – Terminal independent

### 16.8.1 Bearer release – ACN-E to SN – Terminal independent

The information flows and functional entity actions illustrated in Figure 55 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

A prerequisite to initiation of Bearer Release is the completion of Call Release, as determined by the Access Half CSM in IMN. This occurs after Loop Disconnect is sent or after on-hook is received. This ACN-E to SN bearer information flow is for release of a BNC-ID owned by the BIWF in ACN-E.

NOTE – These release information flows do not vary with respect to the direction in which the call was established.

---

|                            |  |                           |                 |
|----------------------------|--|---------------------------|-----------------|
| 0                          |  |                           | CSM(A) to ACF-N |
| <u>Address Information</u> | <u>Control information</u>   | <u>Bearer information</u> |                 |
| BIWF Addr = x,             | USER-ID: = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = 555<br>Primitive = Release_BNC | BNC-ID: = 3333            |                 |

**Initiation of information flow:** CSM in IMN receives an on-hook from an analogue line, a DISCONNECT or a RELEASE message from an ISDN line, or a RELEASE or RELEASE COMPLETE message from a B-ISDN.

**Processing upon receipt:** When ACF-N receives this information flow it notes that IMN has requested release of the bearer. It determines that ACN-E is the creator and owner of the BNC-ID related to the call, and sends a release request for the BNC to ACN-E. It notifies ACN-E that the USER-ID is released.

---

|   |                            |  |                           |
|---|----------------------------|--|---------------------------|
| 1 | ACI (Release_BNC)          | ACF-N to ACF-E   |                           |
|   | <u>Address Information</u> | <u>Control information</u>   | <u>Bearer information</u> |
|   |                            | ACA-ID = 800,<br>USER-ID: = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Release_BNC | BNC-ID = 3333             |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-E receives this information flow it notes that IMN has acknowledged call release processing. It initiates release of the bearer when it determines that the bearer will not be retained as idle. It initiates information flow to ACF-N confirming the call and bearer release. ACN-E may release resources associated with the call and with the bearer from the port termination of the terminal equipment. ACN-E notes that the USER-ID is released and dissociates it from the BNC-ID = 3333. The USER-ID can be marked as available by ACN-E, if ACN-E is the assigning entity for the call reference.

|   |                            |   |
|---|----------------------------|---|
| 4 | ACI (Release_Confirm)      | ACF-E to ACF-N  |
|   | <u>Address Information</u> | <u>Control information</u>  |
|   |                            | ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Release_Confirm |
|   |                            | <u>Bearer information</u>   |
|   |                            | BNC-ID = 3333   |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When ACF-N receives this information flow it notes the response from ACN-E. The USER-ID can be marked as available by CSF-N, if CSF-N is the assigning entity for the call reference.

|   |  |   |   |
|---|--|---|---|
| 5 | Bearer-Release.Reg   | ACN(E1) to SN:BIWF(X)                       |   |
|   | <u>Address Information</u><br>(ACN Address) = E1,<br>BIWF Addr = X | <u>Control information</u><br>BCS-ID = "15" | <u>Bearer information</u><br>BNC-ID: = 3333,<br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 1.

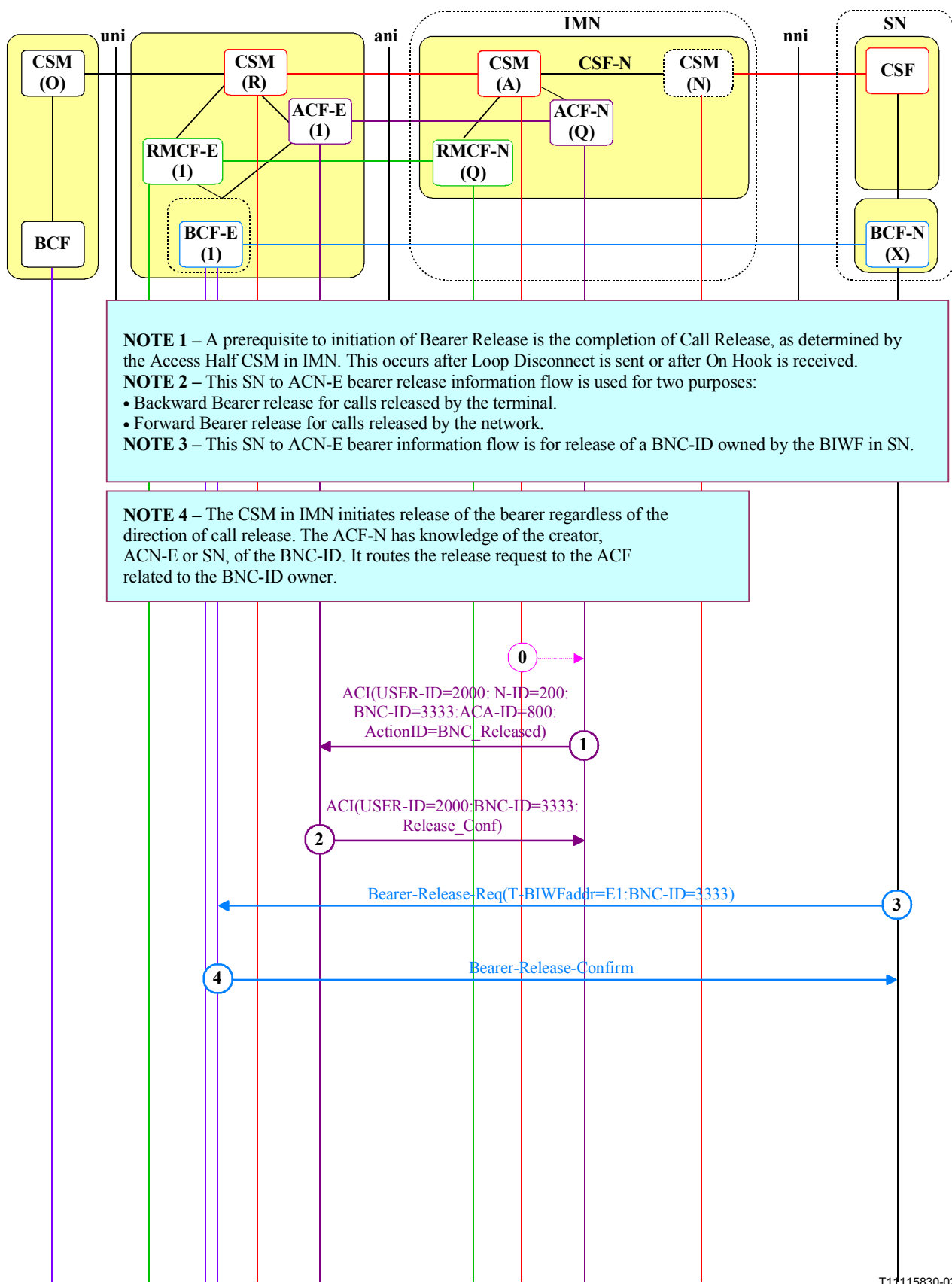
**Processing upon receipt:** The selected access node validates the request and releases the connection to BIWF(X). BIWF(X) issues information flow 6 toward Access Node 1 to confirm the bearer release.

|   |                            |                            |                           |
|---|----------------------------|----------------------------|---------------------------|
| 6 | Bearer-Release.Confirm     | SN:BIWF(X) to ACN(E1)      |                           |
|   | <u>Address Information</u> | <u>Control information</u> | <u>Bearer information</u> |
|   |                            | BCS-ID = "15"              | BNCL-ID = 1004,           |

**Initiation of information flow:** Processing of information flow 5.

**Processing upon receipt:** ACN-E records the release of the Access connection.

---



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Figure 56 – IMN bearer release – SN to ACN-E – Terminal independent

## 16.8.2 Bearer release – SN to ACN-E – Terminal independent

The information flows and functional entity actions illustrated in Figure 56 are described in the following numbered paragraphs. The information flows are prepared to assist development of protocol and illustrate one of many possible implementations. Actual flows may be subject to national or local requirements.

A prerequisite to initiation of Bearer Release is the completion of Call Release, as determined by the Access Half CSM in IMN. This occurs after Loop Disconnect is sent or after on-hook is received. This SN-A to ACN-E bearer information flow is for release of a BNC-ID owned by the BIWF in SN.

NOTE – These release information flows do not vary with respect to the direction in which the call was established.

---

|   |  |  |   |
|---|--|--|---|
| 0 | CSM(A) to ACF-N                              |  |   |
|   | <u>Address Information</u><br>BIWF Addr = x, | <u>Control information</u><br>USER-ID: = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>ContextID = 555<br>Primitive = Release_BNC | <u>Bearer information</u><br>BNC-ID: = 3333 |

**Initiation of information flow:** CSM in IMN receives an on-hook from an analogue line, a DISCONNECT or a RELEASE message from an ISDN line, or a RELEASE or RELEASE COMPLETE message from a B-ISDN.

**Processing upon receipt:** When ACF-N receives this information flow it notes that IMN has requested release of the bearer. It determines that BIWF(X) is the creator and owner of the BNC-ID related to the call. It notifies ACF-E of the release of the BNC and the USER-ID.

---

|   |                            |   |  |
|---|----------------------------|---|--|
| 1 | ACI (BNC_Released)         |   |  |
|   | <u>Address Information</u> | <u>Control information</u><br>ACA-ID = 800,<br>USER-ID: = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = BNC_Released | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 0.

**Processing upon receipt:** When the ACF-E receives this information flow it notes that IMN has acknowledged call release and BNC release. It initiates information flow to ACF-N confirming the call release. ACN-E may release resources associated with the call and with the bearer from the port termination of the terminal equipment. The USER-ID can be marked as available by ACN-E, if ACN-E is the assigning entity for the call reference.

---

|   |                            |   |  |
|---|----------------------------|---|--|
| 2 | ACI (Release_Confirm)      |   |  |
|   | <u>Address Information</u> | <u>Control information</u><br>ACA-ID = 800,<br>USER-ID = 2000,<br>Port-ID = 20,<br>Connection ID = 200<br>Primitive = Release_Confirm | <u>Bearer information</u><br>BNC-ID = 3333 |

**Initiation of information flow:** Processing of information flow 1.

**Processing upon receipt:** When ACF-N receives this information flow it notes the response from ACN-E. The USER-ID can be marked as available by CSF-N, if CSF-N is the assigning entity for the call reference.

---

|          |   |  |
|----------|---|--|
| <b>3</b> | <b>Bearer-Release.Reg</b>   | <b>SN:BIWF(X) to ACN(E1)</b>   |
|          | <u><b>Address Information</b></u><br>(ACN Address) = E1,<br>BIWF Addr = x | <u><b>Control information</b></u><br>BCS-ID = "15",                    |
|          |   | <u><b>Bearer information</b></u><br>BNC-ID: = 3333,<br>BNCL-ID = 1004, |

**Initiation of information flow:** Release of the bearer initiated in BIWF(X).

**Processing upon receipt:** The selected access node validates the request and releases the connection to the Access Control Node. The selected Bearer Control Function validates the request and may notify its associated Access Control function that a bearer has been released between SN and ACN-E with BNC-ID = 3333. BCF-E issues information flow 4 toward BIWF(X) 1 to confirm the bearer release.

---

|          |                                   |   |
|----------|-----------------------------------|---|
| <b>4</b> | <b>Bearer-Release.Confirm</b>     | <b>ACN(E1) to SN:BIWF(X)</b>                        |
|          | <u><b>Address Information</b></u> | <u><b>Control information</b></u><br>BCS-ID = "15"  |
|          |                                   | <u><b>Bearer information</b></u><br>BNCL-ID = 1004, |

**Initiation of information flow:** Processing of information flow 3.

**Processing upon receipt:** The Bearer Interworking Function records the release of the Access connection.

---

## 17 Summary guide to information flows

This clause provides a guide to the application of information flows in clauses 15 and 16.

The information flows in this Supplement are segmented into stages to assist with illustration of the concepts in access networks that support BICC. The segments are to be sequentially concatenated to obtain the composite information flows of selected call scenarios within the access network functional configurations presented in this supplement. The stages for call establishment are Call Admission, Bearer Establishment, and Call Establishment. The stages for release are Call Release, and Bearer Release.

Table 1 summarizes the examples of the concatenation of information flows.

**Table 1 – Summary of concatenation for information flows**

|                          |                              | Index to concatenation of information flow figures |                  |                  |                  |
|--------------------------|------------------------------|--|------------------|------------------|------------------|
| Functional configuration |                              | ISN  |                  | IMN              |                  |
| Terminal Type            |                              | Stimulus   | Functional       | Stimulus         | Functional       |
| Call action              | Bearer action                | (Figure numbers)                                   | (Figure numbers) | (Figure numbers) | (Figure numbers) |
| Terminal origination     | Forward setup                | 16-(18 or 21)-24                                   | 34-(18 or 21)-36 | 16-45-47         | 34-45-48         |
| Terminal origination     | Backward setup               | 16-(19 or 22)-24                                   | 34-(19 or 22)-36 | 16-43-47         | 34-43-48         |
| Network origination      | Backward setup               | 17-(19 or 22)-25                                   | 35-(19 or 22)-37 | 17-46-49         | 35-46-50         |
| Network origination      | Forward setup                | 17- (18 or 21)-25                                  | 35-(18 or 21)-37 | 17-44-49         | 35-44-50         |
| Intra-ISN/IMN            | Forward followed by backward | 16-17-20-27-25                                     | 34-35-20-37-36   | 16-17-20-27-25   | 34-35-20-37-36   |
| Terminal release         | SN to ACN                    | 28-(30 or 32)                                      | 38-(30 or 32)    | 51-56            | 52-56            |
| Terminal release         | ACN to SN                    | 28-(31 or 33)                                      | 38-(31 or 33)    | 51-55            | 52-55            |
| Network release          | SN to ACN                    | 29-(30 or 32)                                      | 39-(30 or 32)    | 53-56            | 54-56            |
| Network release          | ACN to SN                    | 29-(31 or 33)                                      | 39-(31 or 33)    | 53-55            | 54-55            |





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