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SERIES Q: SWITCHING AND SIGNALLING

Technical Report TRQ.2140: Signalling requirements for the support of narrowband services via broadband transport technologies

ITU-T Q-series Recommendations – Supplement 16

(Formerly CCITT Recommendations)

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SUPPLEMENT 16 TO ITU-T Q-SERIES RECOMMENDATIONS

TECHNICAL REPORT TRQ.2140: SIGNALLING REQUIREMENTS FOR THE SUPPORT OF NARROWBAND SERVICES VIA BROADBAND TRANSPORT TECHNOLOGIES

Summary

This Supplement to ITU-T Q-Series Recommendations is a Technical Report on the procedures, information flows and information elements needed for supporting narrowband services via broadband transport technologies. Its scope is limited to functionality of the Serving Node and the associated protocols at the call control and bearer control levels needed to provide this capability across an ATM backbone network for Capability Set 1.

Source

Supplement 16 to ITU-T Q-series Recommendations was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution 5 procedure on 3 December 1999.

FOREWORD

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Supplement 16 to Q-series Recommendations

TECHNICAL REPORT TRQ.2140: SIGNALLING REQUIREMENTS FOR THE SUPPORT OF NARROWBAND SERVICES VIA BROADBAND TRANSPORT TECHNOLOGIES

1 Scope

This Supplement provides requirements for the support of narrowband services via broadband transport technologies. Its scope is limited to functionality of the Serving Node (SN) and the associated protocols at the call control and bearer control levels needed to provide this capability across an ATM backbone network for Capability Set 1 (CS 1).

1.1 Service Requirements

In principle, it is required that all signalling related features, functions, and services currently supported in the TDM-based trunking network using Narrowband-ISUP (N-ISUP), continue to be supported when replaced by an ATM-based trunking network.

ISDN User Part Capabilities, both national and international, as listed in Tables 1 and 2 in clause 3/Q.761, "*Signalling System No. 7 – ISDN User Part functional description*" are to be supported in capability set 1. Annex A contains a detailed list of the required narrowband services to be included into capability set 1.

1.2 High Level Requirements

1) Provide a means of supporting narrowband ISDN services across a broadband backbone network without impacting the interfaces to the existing N-ISDN network and end-to-end services.

2) Provide functional separation of call and bearer signalling protocols with binding information carried by both protocols allowing separate independent establishment of calls and bearers within the broadband backbone network. Binding information allows the coordination of these independent protocol streams to be correlated at the end points of this ATM backbone network.

3) In CS 1, the call control signalling protocol is based on N-ISUP signalling and the different bearer technology based control signalling protocols are supported (e.g. DSS2 for AAL type 1 and AAL type 2 signalling protocol). IP bearer transport will be considered in later capability sets.

4) The call control signalling protocol should not be aware of the actual bearer transport being employed. The binding information is used to reference the bearer.

5) Functions associated with bearers, such as blocking and echo control, should be handled by the bearer control. Signalling of echo control shall be performed by the call control signalling protocol.

6) The signalling between the ISDN networks and the broadband backbone network is interworked within an Intermediate Service Node (ISN) that will:

   - terminate incoming/outgoing signalling;
   - generate and terminate backbone call and bearer signalling; and
   - map the incoming/outgoing bearer transport technology used between the ISDN networks and the broadband backbone network to the bearer transport technology used within the broadband backbone network.

1.3 Guidelines for protocol development

Even though this Supplement's scope is signalling requirements, this subclause is provided as an understanding of the scope of signalling capabilities requirements that should be developed.

1) The CS 1 services are the ITU-T defined narrowband ISDN services as supported by the 2000 version of ISUP (see Annex A).
2) Only point-to-point bidirectional bearer services will be considered in call control signalling capability set 1 (CS 1).
3) The modifications to the existing N-ISUP procedures should be limited to those necessary to allow for the separation of call control and bearer. Services and functions not related to the bearer transport should not be impacted.
4) The call control protocol at a minimum should be able to be transport on MTP layer 3, 1992 version (or later). In addition, the call control protocol may be transported on MTP layer 3b, 1996 version (or later).
5) Maximum end-to-end set-up delay should not be exceeded as defined for current narrowband networks.
6) The call control and bearer control protocols should be designed to operated over multiple carrier network domains.
7) The protocols used for the support of this capability should not impact the interfaces to the existing ISDN network.

1.4 Functional Reference Model

Figure 1-1 shows the composition of the functional reference model. Refer to clause 3 for the definition of each of the functional entities. The signalling network will be used for the transport of the call control signalling. The interface from the existing network will be N-ISUP.

2 References

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

– ITU-T Recommendation Q.115 (1997), *Logic for the control of echo control devices.*
– ITU-T Recommendation Q.701 (1993), *Functional description of the Message Transfer Part (MTP) of Signalling System No. 7.*
– CCITT Recommendation Q.702 (1988), *Signalling data link.*
– ITU-T Recommendation Q.703 (1996), *Signalling link.*
– ITU-T Recommendation Q.704 (1996), *Signalling network functions and messages.*
– ITU-T Recommendation Q.706 (1993), *Message transfer part signalling performance.*
– ITU-T Recommendation Q.761 (1999), *Signalling System No. 7 – ISDN user part functional description.*
– ITU-T Recommendation Q.762 (1997), *General function of messages and signals of the ISDN user part of Signalling System No. 7.*

– ITU-T Recommendation Q.763 (1997), *Signalling System No. 7 – ISDN user part formats and codes*.

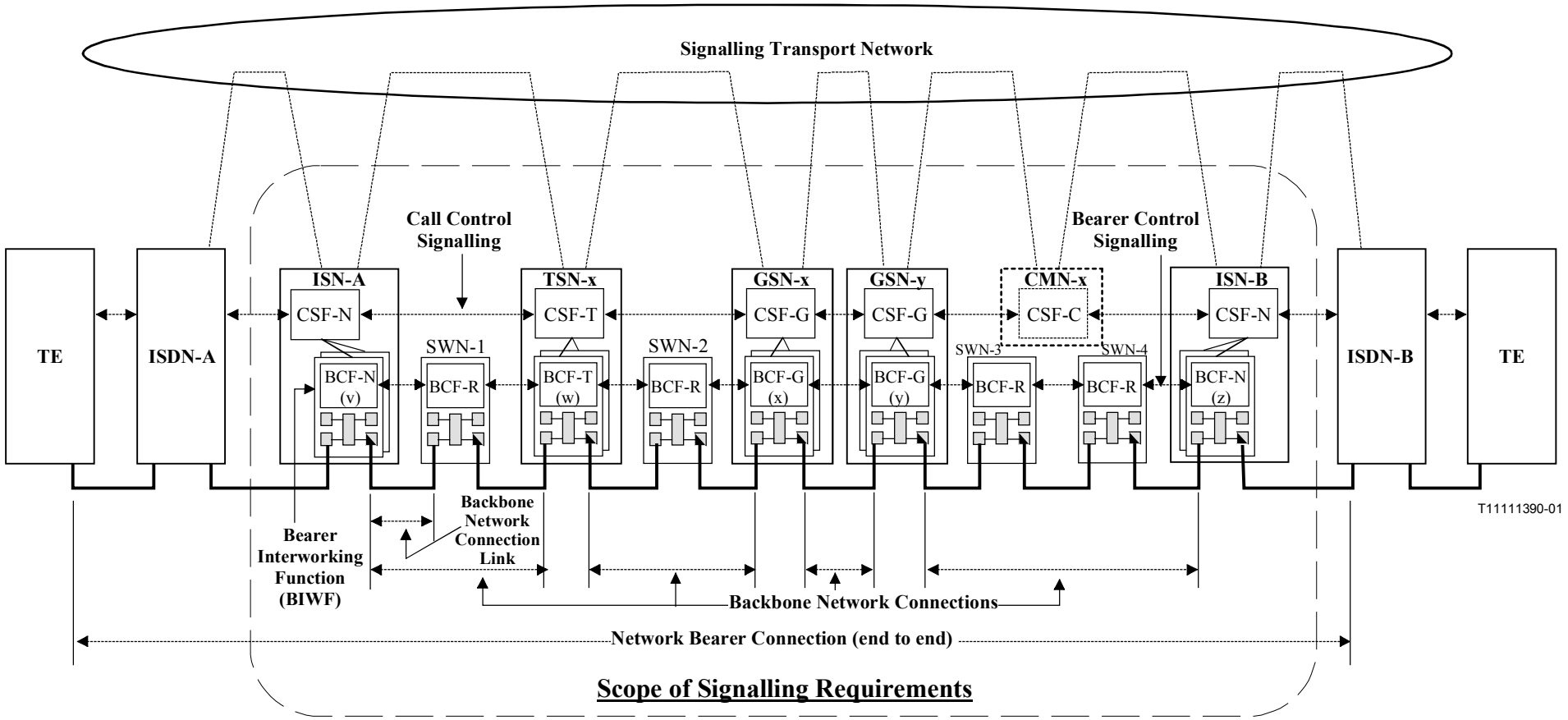
– ITU-T Recommendation Q.764 (1999), *Signalling System No. 7 – ISDN user part signalling procedures.*

– ITU-T Recommendation Q.765 (1998), *Signalling System No. 7 – Application transport mechanism.*

– ITU-T Recommendation Q.766 (1993), *Performance objectives in the integrated services digital network application.*

– 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).*

– ITU-T Recommendation Q.2210 (1996), *Message transfer part level 3 functions and messages using the services of ITU-T Recommendation Q.2140.*



NOTE – Within a network domain, the presence of an intermediate Call Mediation Node (CMN) is a network option of which the inclusion depends on implementation and operator reasoning. The protocol, development, within CS 1, should not preclude the existence of a CMN node.

Figure 1-1 – Composite Functional Reference Model

3 Definitions

3.1 Functional Model Definitions

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

3.1.1 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).

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

3.1.3 Bearer Control Function (BCF): Note that four types of BCFs are illustrated in the above functional model; BCF-G, BCF-N, BCF-R and BCF-T.

- The Bearer Control Nodal Function (BCF-G) provides the control of the bearer switching function, the communication capability with its associated Call Service Function (CSF-G), and the signalling capability necessary to establish and release of the 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 of the backbone network connection to its peer (BCF-N).
- 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-T) provides the control of the bearer switching function, the communication capability with its associated Call Service Function (CSF-T), and the signalling capability necessary to establish and release of the backbone network connection.

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

3.1.5 Bearer Interworking Function (BIWF): A functional entity which provides bearer control and media mapping/switching functions within the scope of an Interface Serving Node (ISN). A BIWF contains one Bearer Control Nodal Function (BCF-N).

3.1.6 Call Control Association (CCA): Represents the signalling association between two adjacent Call Service Functional entities (CSF).

3.1.7 Call Service Function (CSF): Note that four types of CSFs are illustrated in the above functional model, CSF-N, CSF-T, CSF-G, and CSF-C:

- The Call Service Nodal Function (CSF-N) provides the service control nodal actions associated with the narrowband service by interworking with narrowband and Bearer Independent Call Control (BICC) signalling, signalling to its peer (CSF-N) the characteristics of the call, and invoking the Bearer Control Nodal Functions (BCF-N) necessary to transport the narrowband bearer service across the broadband backbone network.
- The Call Service Transit Function (CSF-T) provides the service transit actions necessary to establish and maintain a backbone network call and its associated bearer by relaying signalling between CSF-N peers and invoking the Bearer Control Nodal Functions (BCF-T)

necessary to transport the narrowband bearer service across the broadband backbone network.

– The Call Service Gateway Function (CSF-G) provides the service gateway actions necessary to establish and maintain a backbone network call and its associated bearer by relaying signalling between CSF-N peers and invoking the Bearer Control Nodal Functions (BCF-N) necessary to transport the narrowband bearer service between broadband backbone networks.

– The Call Service Coordination Function (CSF-C) provides the call coordination and mediation actions necessary to establish and maintain a backbone network call by relaying signalling between CSF-N peers. The CSF-C has no association with any BCF. It is only a call control function.

3.1.8 Call Mediation Node (CMN): A functional entity which provides CSF-C functions without an associated BCF entity.

3.1.9 Interface Serving Node (ISN): A functional entity which provides the interface with the ISDN 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 and its peers within the broadband backbone network.

3.1.10 Gateway Serving Node (GSN): A functional entity which provides gateway functionality between two network domains. This functional entity contains one or more call service gateway functions (CSF-G), and one or more Bearer Interworking Functions (BIWF). GSNs interact with other GSNs, in other broadband backbone network domains and other ISNs and TSNs within its own broadband backbone network domain. The network signalling flows for a GSN are equivalent as those for a TSN.

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

3.1.12 Serving Node (SN): A generic term referring to ISN, GSN or TSN nodes.

3.1.13 Switching Node (SWN): A functional entity which provides the switching functions within the broadband backbone network. This functional entity contains a bearer control state machine (BCF-R). SWNs interact with other SWNs, within their own broadband backbone network domain. The SWNs BCF-R also interact with the BCF-N functions contained in BIWF entities.

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

3.1.15 Transit Serving Node (TSN): A functional entity which provides transit functionality between ISNs and GSNs. This functional entity contains one or more call service transit functions (CSF-T), and one or more bearer interworking functions (BIWF). TSNs interact with other TSNs, GSNs and ISNs within their own broadband backbone network domain.

3.2 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.

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

3.2.2 Backbone Network Connect Characteristics (BNC Characteristics): Identifies the selected BNC type (i.e. AAL1 or AAL2).

3.2.3 Backbone Network Connection ID (BNC-ID): This signalling object generically equates to the Virtual Channel Connection Identifier (VCCI) if an ATM Virtual Channel connection is

established between ISNs or a AAL Type 2 Connection Identifier if an AAL Type 2 connection is established between ISNs. This identifier represents the relationship between pair BNCeps.

3.2.4 Backbone Network Connection Link ID (BNCL-ID): Identifies the transport link between two SWNs, or between a SWN and a BIWF. This identifier represents the relationship between a BNCep and a BNCrp or in trunking configurations a pair of BNCeps.

3.2.5 bearer service characteristics: This signalling object specifies the user specified bearer service that should be provided between the requesting user and the terminating user. This signalling object is contained in the intial service request received from the requesting user and is carried within the intial service requests between network nodes and the terminating user.

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

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

3.2.8 Call Control Association ID (CCA-ID): Identifies the signalling association between two logically adjacent call control entities (between CSF-Ns). In ISDN this is a CIC.

3.2.9 Call Service Function Address (CSF-Addr): Identifies the address of CSF-N within the requesting ISN entity. This is the Point Code used by MTP to identify originating and destination CSF-Ns within ISNs.

3.2.10 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.

3.2.11 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.

3.2.12 action indicator: An extended control object, indicating the requested action to be taken at a subsequent SN or an action performed at a previous SN.

3.2.13 bearer service characteristics: Specifies the user requested bearer service. Example values are voiceband services, and circuit mode data. This object equates to the resource component.

Table 1-1 – Mapping of Signalling Object to Call and Bearer Control

Information Flow Signalling Object	Carried by Call Control	Carried by Bearer Control	Binding Information
BNC Characteristics	✓		
(BCS-ID) Bearer Control Segment ID		✓	
(BNC-ID) Backbone Network Connection ID	✓	✓	✓
(BNCL-ID) Backbone Network Connection Link ID		✓	
(Called-Party-Addr) Called Party Address	✓		
(Calling-Party-Addr) Calling Party Address	✓		
(CCA-ID) Call Control Association ID	✓		
(CSF-Addr) Interface Serving Node Address	✓		
(O-BIWF-Addr) Originating Interworking Function Address	✓		
(T-BIWF-Addr) Terminating Interworking Function Address	✓	✓	✓
Action Indicator	✓		
Bearer Service Characteristics	✓		

4 Abbreviations

This Supplement uses the following abbreviatons:

AAL	ATM Adaptation Layer
AESA	ATM End System Address
ATM	Asynchronous Transfer Mode
ATM VCC	ATM Virtual Channel Connection
BCF	Bearer Control Function
BCS	Bearer Control Segment
BIWF	Bearer Interworking Function
BNC	Backbone Network Connection
BNCL	Backbone Network Connection Link
CCA-ID	Call Control Association Identifier
CMN	Call Mediation Node
CSF	Call Service Function
GSN	Gateway Serving Node
IP	Internet Protocol
ISN	Interface Serving Node
NBC	Network Bearer Connection
PDU	Protocol Data Unit
SN	Serving Node
STP	Signalling Transfer Point
SWN	Switching Node
TDM	Time Division Multiplex
TE	Terminal Equipment
TMR	Transmission Medium Requirement
TSN	Transit Serving Node
USI	User Service Information
VCC	Virtual Channel Connection
VPC	Virtual Path Connection

5 Requirements

5.1 General

In CS-1, a route between two ISNs can support one or more BNC types.

5.2 Addressing

5.2.1 Call Control

The ISN/CSF uses existing N-ISUP addressing procedures.

5.2.2 BNC Control

Each type of BNC will use the existing addressing mechanism identified for that BNC.

5.3 Routing

5.3.1 Call Control

The ISN/CSF routes the call control signalling based on the E.164 address.

5.3.2 BIWF Selection Control

The CSF selects a BIWF based on bearer service characteristics, called party, BNC characteristics and the local BIWF address.

5.3.3 BNC Control

Each type of BNC will use existing route selection mechanisms supported for that BNC. The ISN/BCF routes the bearer control signalling based on TMR and USI.

5.4 Symmetry of call and bearer control

5.4.1 Call Control

BICC should support symmetric call control.

5.4.2 BNC Control

Multiple types of BNC transport capabilities can be supported. The BNC control signalling should only support symmetric BNC.

5.5 Connection configuration

The backbone network should support individual symmetric point-to-point BNC connections, in CS-1. There will only be one BNC per call. CS-1 will not support the modification the transfer capability of a bearer connection once the connection is established.

5.6 Essential features of the underlying signalling transport

The network signalling requirements provided in this Supplement are based upon a dependence that an underlying signalling transport for both call signalling and bearer signalling supports:

a) assured data transfer;

b) in sequence delivery of PDU's; and

c) an indication of flow congestion.

NOTE – The Signalling Model can be found in clause 7.

5.7 Flow control

Flow control procedures at the bearer control level may affect the ability to successfully satisfy requests for new bearer connections. Bearer flow control indications are not explicitly communicated to or between ISN/CSFs. Flow control should also be supported on the call control level to enable a call control node to limit the number of new call requests that can be satisfied.

5.8 Independence from underlying signalling transport

The network signalling protocol design should be independent from the underlying signalling transport. As an example, it shall be possible to carry the call signalling messages over multiple or different signalling transport protocol stacks.

The call control protocol (BICC) can be transported on either MTP3 or MTP3b, as shown in Figure 5-1.

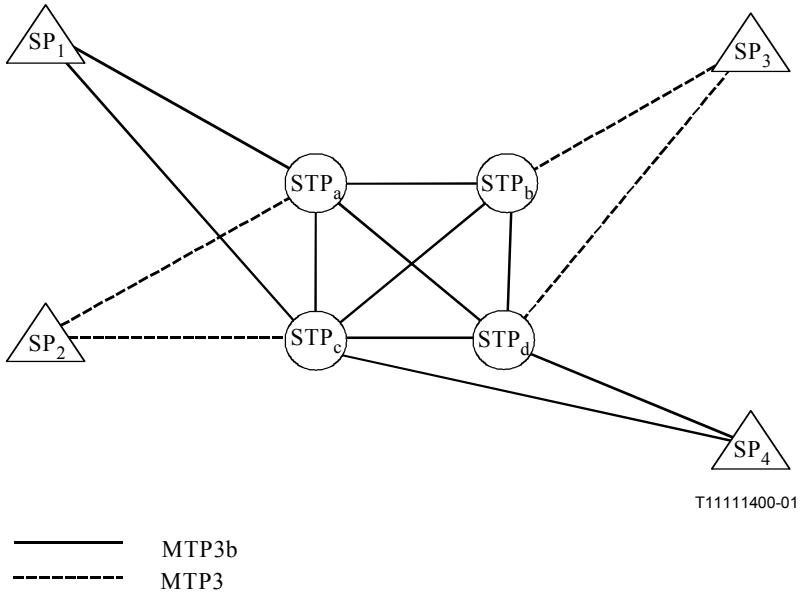


Figure 5-1 – SS7 Network with both MTP3 and MTP3b Signalling Links

5.9 Concatenation

The ISNs should handle calls and bearer connections over a network of nodes, where each connection may be a concatenation of backbone network connection links.

5.10 Contention resolution

The ISN/CSF should be able to resolve all contentions with respect to resource allocation and collisions related to call establishment. Bearer control is responsible for contention resolution of bearer resource allocation and collisions during connection establishment.

5.11 Error reporting

The ISN should include mechanisms for detecting and reporting signalling procedural errors or other failures to network management.

5.12 Unrecoverable failures

The ISN should include mechanisms for returning call instances and bearer network connection instances to a stable state after detection of unrecoverable failures.

5.13 Forward and backward compatibility

The ISN/CSF should include a forward compatibility mechanism and backward compatibility rules.

5.14 Separation between signalling controls

The bearer control signalling is functionally separated from call control signalling.

NOTE – There is no requirement in CS-1 to define the interface between CSF and BCF.

5.15 Performance Requirements

The object is to meet existing narrowband performance requirements and objectives.

5.16 Codec Negotiation

The ability to select (negotiate) a suitable codec must be possible.

5.17 Codec Modification

The ability to modify a codec or codec list must be possible. Codec modification requests and responses shall be supported by the call signalling protocol.

6 Signalling Procedures

A list of the functions and services supported in CS-1 can be found in Annex A.

6.1 Successful Call Set-up

6.1.1 Call Establishment

Both *en bloc* and overlap address signalling is to be supported.

6.1.2 Bearer establishment

The call control signalling interacts only with the backbone network signalling. The transport connection for CS-1 is either an ATM VCC (AAL type 1) or an AAL type 2 connection over a VCC.

6.1.2.1 Establishment of a new bearer

A bearer can be established in either direction. The signalling should be able to support both forward and backward BNCs. The choice of the direction should be provisioned on a per BIWF basis at the call originating end.

NOTE – During BNC set-up, no end-to-end bearer bandwidth negotiation is required in CS-1.

6.1.2.2 Use of idle connections

The use of an idle backbone connection may be supported, in CS-1. Idle connections will only be supported with a single network domain.

NOTE – The reuse of idle bearers may not be applicable to all bearer technologies.

6.2 Unsuccessful Set-up

Unsuccessful set-up could be caused by either call control or bearer control.

6.3 Release of a Successful Call

Three cases of release shall be included in CS-1: Release of a Call and related bearer, Release of the call only, and Release of an idle bearer not associated with any call.

6.4 Error Handling

Separate error handling should be the responsibility of the call and bearer protocols. Interactions between these protocols should also be covered.

6.5 Echo Control Procedure

Only basic echo control procedures are required for CS-1. Enhanced echo control and dynamic echo control procedures are not required for CS-1. Echo control procedures are defined in Recommendation Q.115. Enhanced/dynamic echo control parameters received at the ISDN/ISN interface must be passed unmodified by the call control protocol.

6.6 Blocking and unblocking

Blocking and unblocking of backbone network connections should be supported. BNC resource blocking and unblocking should be handled by BNC control.

6.7 Call Automatic Repeat attempts

The application of call automatic repeat attempt should be supported in CS-1.

6.8 Dual Seizure

Dual seizure should be minimized and the recovery from dual seizure of signalling identifiers when they occur, should be supported in CS-1.

6.9 Reset

The reset of call and bearer resources should be handled by the respective control protocol.

6.10 Support of Codec Negotiation

Provide functionality to convey codec information to all nodes with coding/transcoding functionality. Capability to negotiate among all SN with coding/transcoding functionality with common codec to be used for a specific call. Idle backbone network connection should not be used when codec negotiation is requested.

6.11 Support of Codec Modification

Provide functionality to modify the codec selected. Provide functionality to request codec modification from either end of the BNC connection.

7 General Signalling Transport Requirements

Figure 7-1 shows the signalling transport architecture that provides signalling transport independence by using signalling converters.

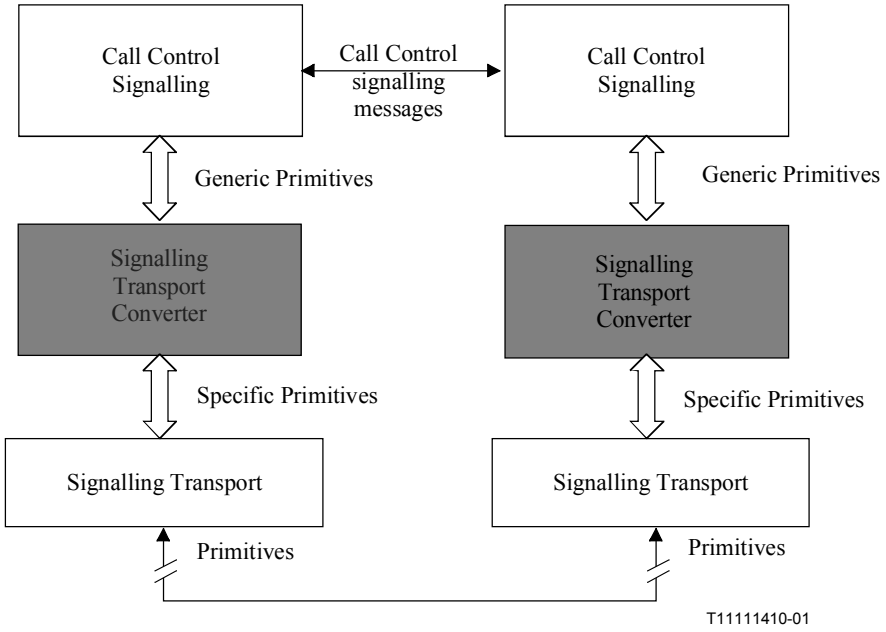


Figure 7-1 – Signalling Transport Architecture

Signalling Transport Converter entity operations may include:

- Passing parameters from the generic primitives to the specific primitives and vice versa.
- Adding parameters to specific primitives issued and ignoring parameters from specific primitives received.
- Issuing specific primitives upon receiving specific primitives without any action on the generic interface, etc.

The call signalling protocol entity has BICC functionality. The signalling transport entity is the provider of the real signalling transport. The generic primitive interface includes signalling transport independent primitives. The specific primitives interface includes signalling transport dependent primitives.

8 Backbone Network Signalling Flows

The method of documenting the signalling flows, involves the definition of a set of information flow names. The following guidelines on defining a set of flow is to use explicit protocol message names for the call control information and use protocol independent information flows for the bearer level. The following naming convention is:

- Call control information flow names = ISUP protocol message names;
- Bearer control information flow names = protocol independent names as follows:
  - Bearer Set-up Request: Used to request the establishment of a bearer.
  - Bearer Set-up Connect: Used to indicate the completion of the bearer set-up.
  - Bearer Set-up Reject: Used to indicate unsuccessful bearer set-up.
  - Bearer Release Request: Used to request the release of a bearer.
  - Bearer Release Acknowledge: Used to indicate completion of the bearer release.

The information flow diagram template to be used in the construction of information flows is contained in Figure 8-1. Note that information flows between call control entities and bearer control entities are shown as dashed arrows in the diagram. These flows would be considered to be internal to the SN for CS-1. Therefore a naming convention was considered to be unnecessary in the process of preparing information flows which would guide the peer-to-peer protocol development.

NOTE – An ISN, GSN or TSN are always transit nodes. The call control protocol is not supported at local nodes.

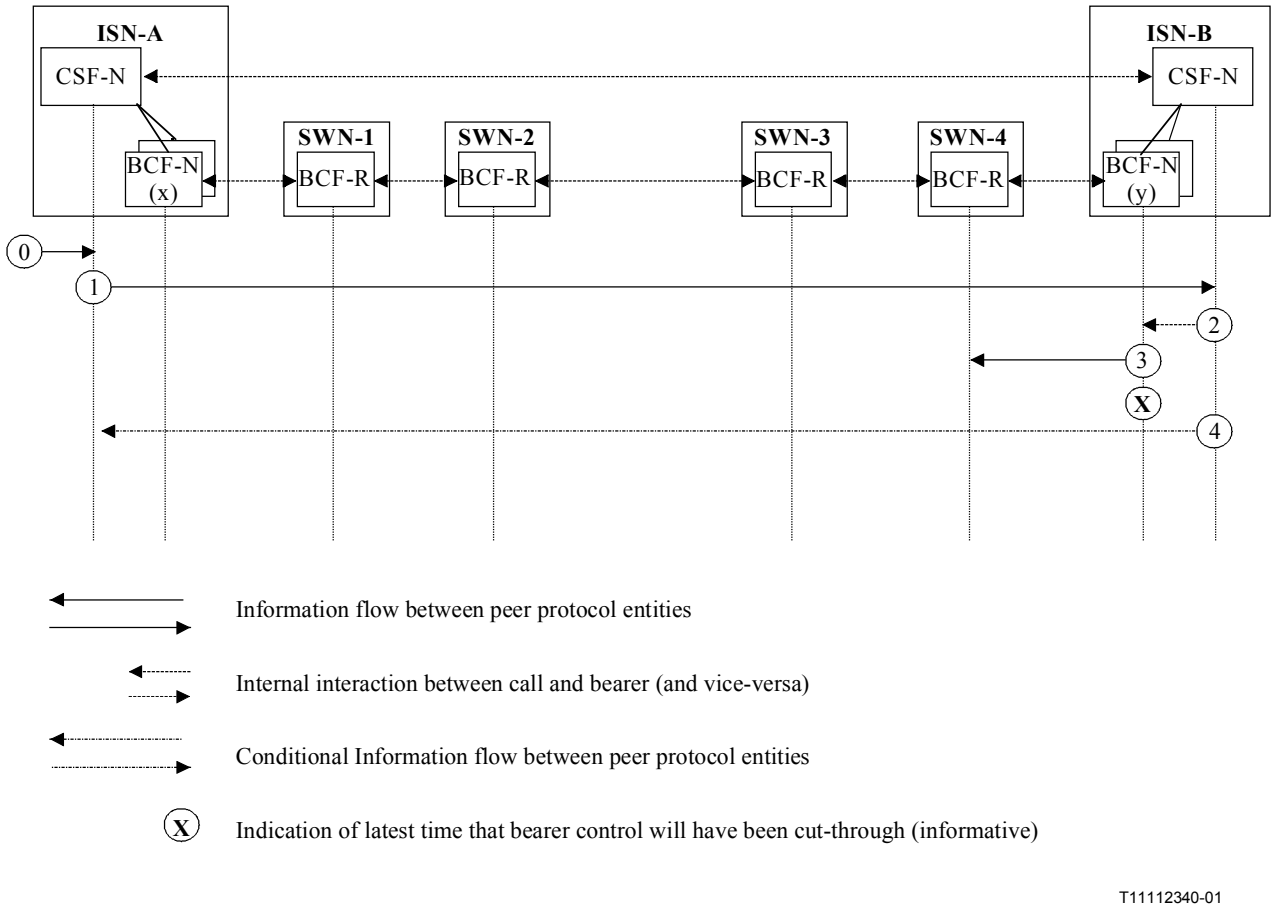


Figure 8-1 – Information Flow Template

The following subclauses contain signalling flows illustrating the establishment and release of a call and backbone network connection.

8.1 Successful Backbone Call and Backbone Network Connection Establishment

8.1.1 Establishment of a Backbone Network Connection

8.1.1.1 Backward Establishment of a Backbone Network Connection

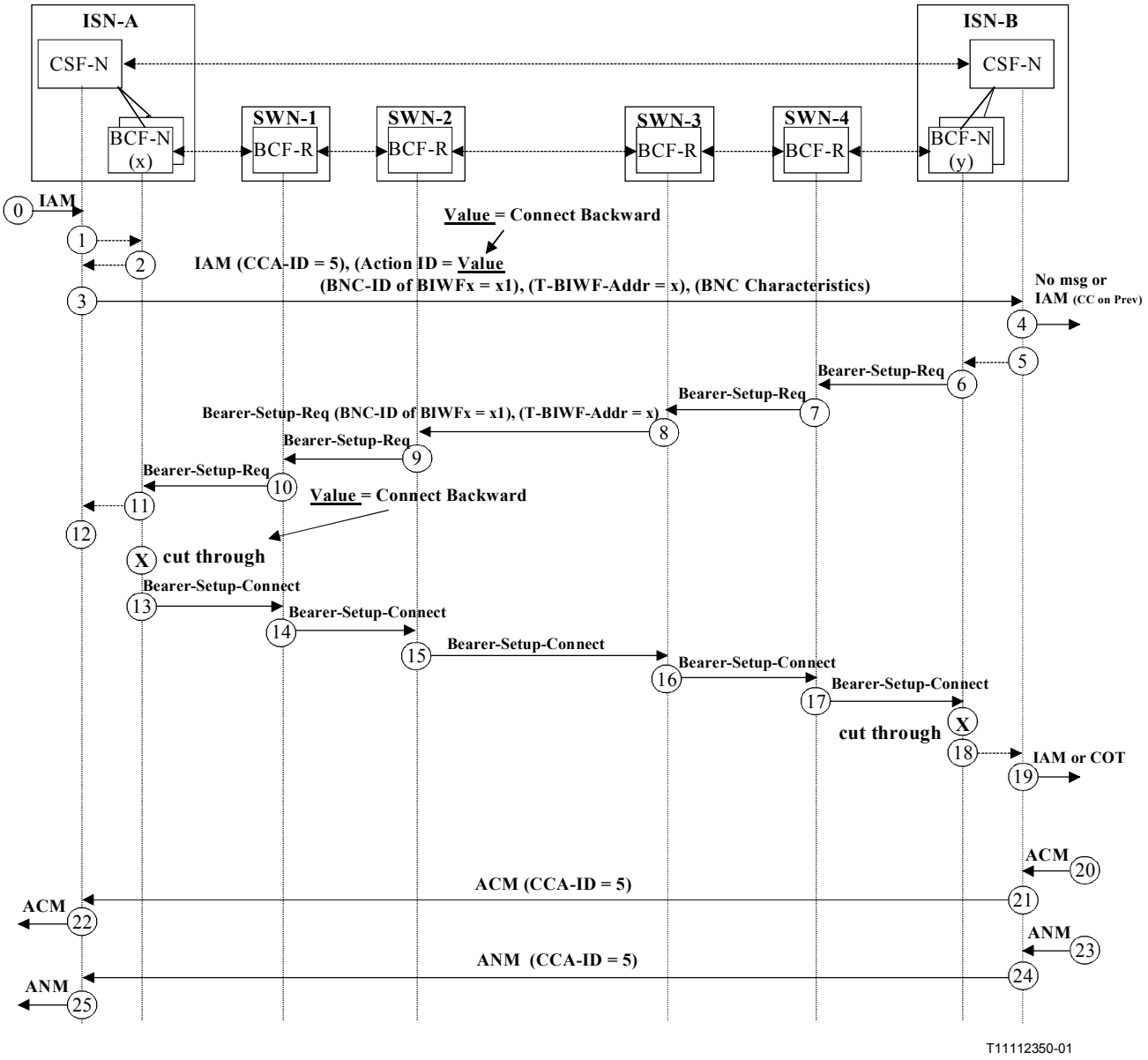


Figure 8-2 – Backward Establishment of a Backbone Network Connection

The information flows and functional entity actions illustrated in Figure 8-2 are described in the following numbered paragraphs. The cut through points illustrated in the figure are the latest point at which cut through has occurred. Depending on the bearer control protocol, cut through may occur at an earlier point in time.

0 IAM **ISDN(A) to ISN(A)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the bearer interworking function (BIWF = x) that will be used to interface with the requesting ISDN associated with the calling party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N chooses a BNC-ID value of 501 and associates this BNC-ID value with the local call reference value. The BCF-N passes the chosen BNC-ID value, BNC characteristics, indication of a backward set-up request and specifies any need to be notified of connection completion to the CSF-N. (Note: This interaction between the CSF and BCF are represented by the information flows 1 and 2.) The CSF-N determines the ISDN network associated with the called party. It then determines the signalling route to that ISDN and issues information flow 3 towards a ISN associated with the designated ISDN network. Information flow 3 indicates that a backward set-up is desired. The ISN(A) awaits the establishment of the backbone connection across the backbone network.

3 IAM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B), T-BIWF-Addr = x,	CCA-ID = 5, Action Indication = Connect Backwards	BNC-ID: = 501, Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected ISN's CSF-N validates the request and determines the bearer interworking function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 4 toward the selected ISDN exchange (ISDN (B)), and issues information flow 5 towards the selected bearer interworking function in order to determine if a pre-established idle backbone network connection exists between it and the bearer interworking function selected by ISN(A) along with the Backward set-up option. The BIWF's BCF-N determines that no existing idle backbone connection meets the requirements and proceeds to establish the requested backbone network connection by issuing information flow 6. The interface serving node awaits the commitment information flow from the selected Bearer Interworking Function. Information flow 5 is not described in this example since it is outside the scope of capability set 1. The bearer interworking function determines the backbone network facility to be used, and issues information flow 6 towards the selected SWN. The bearer BNCL characteristics contained in information flow 6 was determined from the Bearer Service Information contained in information flow 3. The bearer interworking awaits confirmation of the completed backbone network connection establishment procedure.

4a IAM (CC on Previous) **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 3.

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

4b No ISUP Message Forwarded at this Time

6 Bearer-Setup.Req **BIWF(y) to SWN(4)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "15",	BNC-ID: = 501, BNCL-ID = 1004, {BNCL Characteristics},

Initiation of information flow: Processing of information flow 3.

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(4) and BIWF(y). The switching node issues information flow 7 towards SWN(3). Information flow (7)'s link information was determined from the link information received in information flow 6. Switching Node 4 awaits the commitment information from SWN(3).

7 Bearer-Setup.Req **SWN(4) to SWN(3)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "27",	BNC-ID: = 501, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(3) and SWN(2). The switching node issues information flow 8 towards SWN(2). Information flow (8)'s link information was determined from the link information received in information flow 7. Switching Node 3 awaits the commitment information from SWN(2).

8 Bearer-Setup.Req **SWN(3) to SWN(2)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "18",	BNC-ID: = 501, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and SWN(1)(X). The switching node issues information flow 9 towards SWN(1). Information flow (9)'s link information was determined from the link information received in information flow 8. Switching Node 2 awaits the commitment information from SWN(1).

9	Bearer-Setup.Req		SWN(2) to SWN(1)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = "25",	BNC-ID: = 501, BNCL-ID = 1001, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and BIWF(x). The switching node issues information flow 10 towards BIWF(x). Information flow (10)'s link information was determined from the link information received in information flow 9. Switching Node 1 awaits the commitment information from BIWF(x).

10	Bearer-Setup.Req		SWN(1) to BIWF(x)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = "65",	BNC-ID: = 501, BNCL-ID = 1000, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and ISN-B. This is done via information flow 11. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 12 towards the selected BIWF indicating that the bearer is to be connected. Because the Action ID conveyed in information flow 3 indicates Connect Backward, the BIWF cuts through the incoming bearer link from ISDN(A) to the designated outgoing port of the BIWF and issues information flow 13 towards Switching Node 1.

13	Bearer-Setup.Connect		BIWF(x) to SWN(1)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "65"	BNCL-ID = 1000,

Initiation of information flow: Processing of information flow 10.

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 14 towards Switching Node 2.

14	Bearer-Setup.Connect		SWN(1) to SWN(2)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "25"	BNCL-ID = 1001,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 15 towards Switching Node 3.

15	Bearer-Setup.Connect		SWN(2) to SWN(3)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "18"	BNCL-ID = 1002,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 16 towards Switching Node 4.

16	Bearer-Setup.Connect		SWN(3) to SWN(4)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1003,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 17 towards BIWF(y).

17 Bearer-Setup.Connect **SWN(4) to BIWF(y)**

Address information	Control information	Bearer information
	BCS-ID = "15"	BNCL-ID = 1004,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, cuts through the outgoing trunk to the new backbone network connection, and issues information flow 18 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action, and awaits further action responses from the selected ISDN.

19a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 17 and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

19b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 17 and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

20 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 21, and records the alerting condition within its own database.

21 ACM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 22, and records the alerting condition within its own database.

22 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

23 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 24, and records the answer condition within its own database.

24 ANM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 25, and records the answer condition within its own database.

25 ANM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.1.2 Forward Establishment of a Backbone Network Connection

The information flows and functional entity actions illustrated in Figure 8-3 are described in the following numbered paragraphs. The cut-through points illustrated in the figure are the latest point at which cut through has occurred. Depending on the bearer control protocol, cut-through may occur at an earlier point in time. The information elements BNC-ID and O-BIWF-Addr contained in the APM message with an Action ID of "connected", are here for information and do not need to be supported by protocol in CS-1.

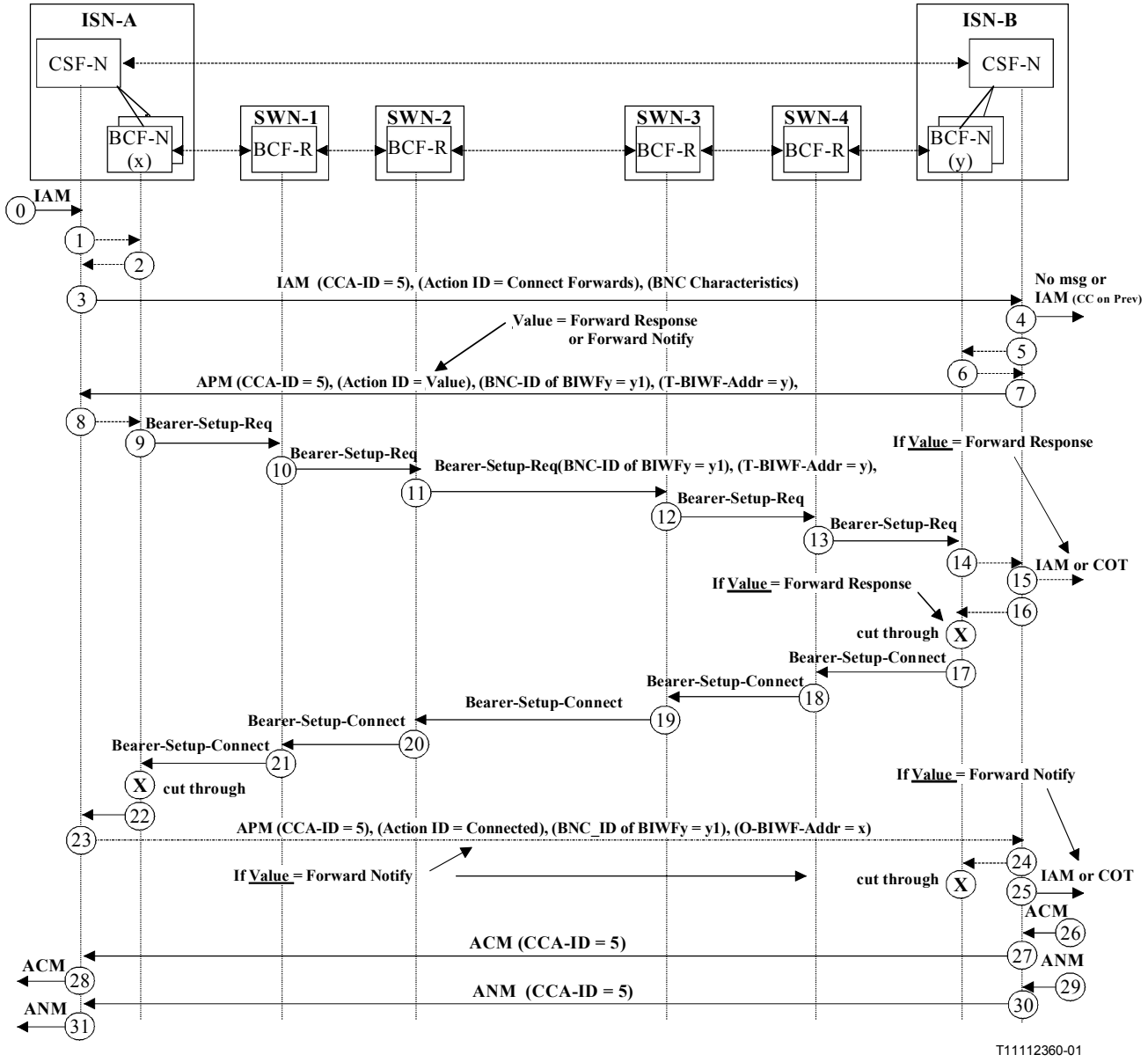


Figure 8-3 – Forward Establishment of a Backbone Connection

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0 IAM **ISDN(A) to ISN(A)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the bearer interworking function (BIWF = x) that will be used to interface with the requesting ISDN associated with the calling party, and the ISN determines the ISDN network associated with the called party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N specifies the information to be carried by the BNC Characteristics parameter, and an indication of a forward set-up request and passes this information to the CSF-N. (Note: This interaction between the CSF and BCF is represented by information flows 1 and 2.) The CSF-N then determines the signalling route to the destination ISDN and issues information flow 3 towards a ISN associated with the destination ISDN network. Information flow 3

indicates that a forward set-up of the bearer is desired. The ISN(A) awaits the response indicating the address of the destination BIWF and its associated BNC-ID value.

3	**IAM**		**ISN(A) to ISN(B)**
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B),	CCA-ID = 5, Action Indication = Connect Forwards	Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected ISN validates the request and determines the bearer interworking function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 4 towards ISDN B. It then communicates with the selected bearer interworking function indicating a forward set-up request, along with a local call reference in order to determine the BNC-ID to be associated with this new connection. The BIWF's BCF-N chooses a BNC-ID value of 710, selects the response mode to be associated with the Action ID (Forward Response or Forward Notify) based on the bearer service characteristics, and proceeds to notify its associated CSF-N of these information objects (information flow 6). The CSF-N proceeds to notify ISN(A) that it will need to begin to establish the backbone network connection between its selected BIWF and the selected BIWF within the scope of ISN(B) and indicates if a notification is necessary. This is accomplished by issuing information flow 7. ISN(B) awaits the completion of the backbone network connection.

NOTE – Setting the Action ID to "Forward response" will result in:

1) an IAM or COT being forwarded as shown in information flow 15;
2) cut-through occurring after information flow 16;
3) no APM message being sent as in information flow 23.

Setting the Action ID to "Forward Notify" will result in:

1) an IAM or COT being forwarded in information flow 25;
2) cut-through occurring before information flow 24;
3) an APM message being sent as in information flow 23, indicating continuity.

4a	**IAM (CC on Prev)**		**ISN(B) to ISDN(B)**
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 3

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

4b No ISUP Message is Forwarded at this time

7	**APM**		**ISN(B) to ISN(A)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	CCA-ID = 5, Action Indication = Forward response or Forward Notify	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(x) to begin bearer establishment between BIWF(x) and BIWF(y) via information flow 8. The bearer interworking function issues information flow 9 which begins the forward direction backbone network connection establishment.

9	**Bearer-Setup.Req**		**BIWF(X) to SWN(1)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y	BCS-ID = "65",	BNC-ID: = 710, BNCL-ID = 1000, {BNCL characteristics},

Initiation of information flow: Processing of information flow 7

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and SWN(2). The switching node issues information flow 10 towards SWN(2). Information flow (10)'s link information was determined from the link information received in information flow 0. Switching Node 1 awaits the commitment information from SWN(2).

10	**Bearer-Setup.Req**		**SWN(1) to SWN(2)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = "25",	BNC-ID: = 710, BNCL-ID = 1001, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and SWN(3). The switching node issues information flow 11 towards SWN(3). Information flow (11)'s link information was determined from the link information received in information flow 9. Switching Node 2 awaits the commitment information from SWN(3).

11	**Bearer-Setup.Req**		**SWN(2) to SWN(3)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = "18",	BNC-ID: = 710,, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(3) and SWN(4). The switching node issues information flow 12 towards SWN(4). Information flow (12)'s link information was determined from the link information received in information flow 10. Switching Node 3 awaits the commitment information from SWN(4).

12	**Bearer-Setup.Req**		**SWN(3) to SWN(4)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = "27",	BNC-ID: = 501, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(4) and BIWF(y). The switching node issues information flow 13 towards BIWF(y). Information flow (13)'s link information was determined from the link information received in information flow 11. Switching Node 4 awaits the commitment information from BIWF(y).

13 Bearer-Setup.Req **SWN(4) to BIWF(y)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	BCS-ID = "15",	BNC-ID: = 710, BNCL-ID = 1004, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and ISN-B. This is done via information flow 14. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 16 towards the selected BIWF indicating that the bearer is to be connected. If the Action ID conveyed in information flow 5 was a Forward Response indication, the BIWF cuts through the incoming bearer link from ISN(A) to the designated outgoing port of the BIWF and issues information flow 17 towards Switching Node 4. In addition, the call service function issues information flow 15 towards the terminating ISDN(B). If the Action ID conveyed in information flow 11 was a Forward Notify indication, the BIWF will not cut through the incoming bearer link to the designated outgoing port of the BIWF nor issue information flow 15, but will issue information flow 17 towards Switching node 4.

15a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 13 (conditional upon an Action ID = Forward Response in information flow 7) and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

15b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 13 (conditional upon an Action ID = Forward Response in information flow 7) and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE are outside the scope of these signalling requirements.

17 Bearer-Setup.Connect **BIWF(y) to SWN(4)**

Address information	Control information	Bearer information
	BCS-ID = "15"	BNCL-ID = 1004,

Initiation of information flow: Processing of information flow 13

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 18 towards Switching Node 3.

18 Bearer-Setup.Connect **SWN(4) to SWN(3)**

Address information	Control information	Bearer information
	BCS-ID = "27"	BNCL-ID = 1003,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 19 towards Switching Node 2.

19 Bearer-Setup.Connect **SWN(3) to SWN(2)**

Address information	Control information	Bearer information
	BCS-ID = "18"	BNCL-ID = 1002,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 20 towards Switching Node 1.

20 Bearer-Setup.Connect **SWN(2) to SWN(1)**

Address information	Control information	Bearer information
	BCS-ID = "25"	BNCL-ID = 1001,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 21 towards Interface Serving Node -A.

21 Bearer-Setup.Connect **SWN(1) to BIWF(X)**

Address information	Control information	Bearer information
	BCS-ID = "65"	BNCL-ID = 1000,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, performs cut-through of the incoming trunk to the BNC Link established between the two BIWFs, and issues information flow 22 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action, and if the Action ID conveyed in information 7 was a Forward Notify indication, the CSF issues information flow 23. In either case it awaits further action responses from the selected ISN.

23 APM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 21

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(y) to cut through via information flow 24, and issues information flow 25 towards the terminating ISDN.

25a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 23 (conditional upon Action ID = Forward Notify in information flow 7) and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

25b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 23 (conditional upon Action ID = Forward Notify in information flow 7) and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE are outside the scope of these signalling requirements.

---

26 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 27, and records the alerting condition within its own database.

---

27 ACM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 28, and records the alerting condition within its own database.

---

28 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

---

29 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 30, and records the answer condition within its own database.

---

30 ANM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 31, and records the answer condition within its own database.

---

31 ANM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.2 Establishment of a Backbone Network Connection with Transit Serving Node

8.1.2.1 Backward Establishment of a Backbone Network Connection with Transit Serving Node

The information flows and functional entity actions illustrated in Figure 8-4 are described in the following numbered paragraphs. The cut-through points illustrated in the figure are the latest point at which cut-through has occurred. Depending on the bearer control protocol, cut-through may occur at an earlier point in time.

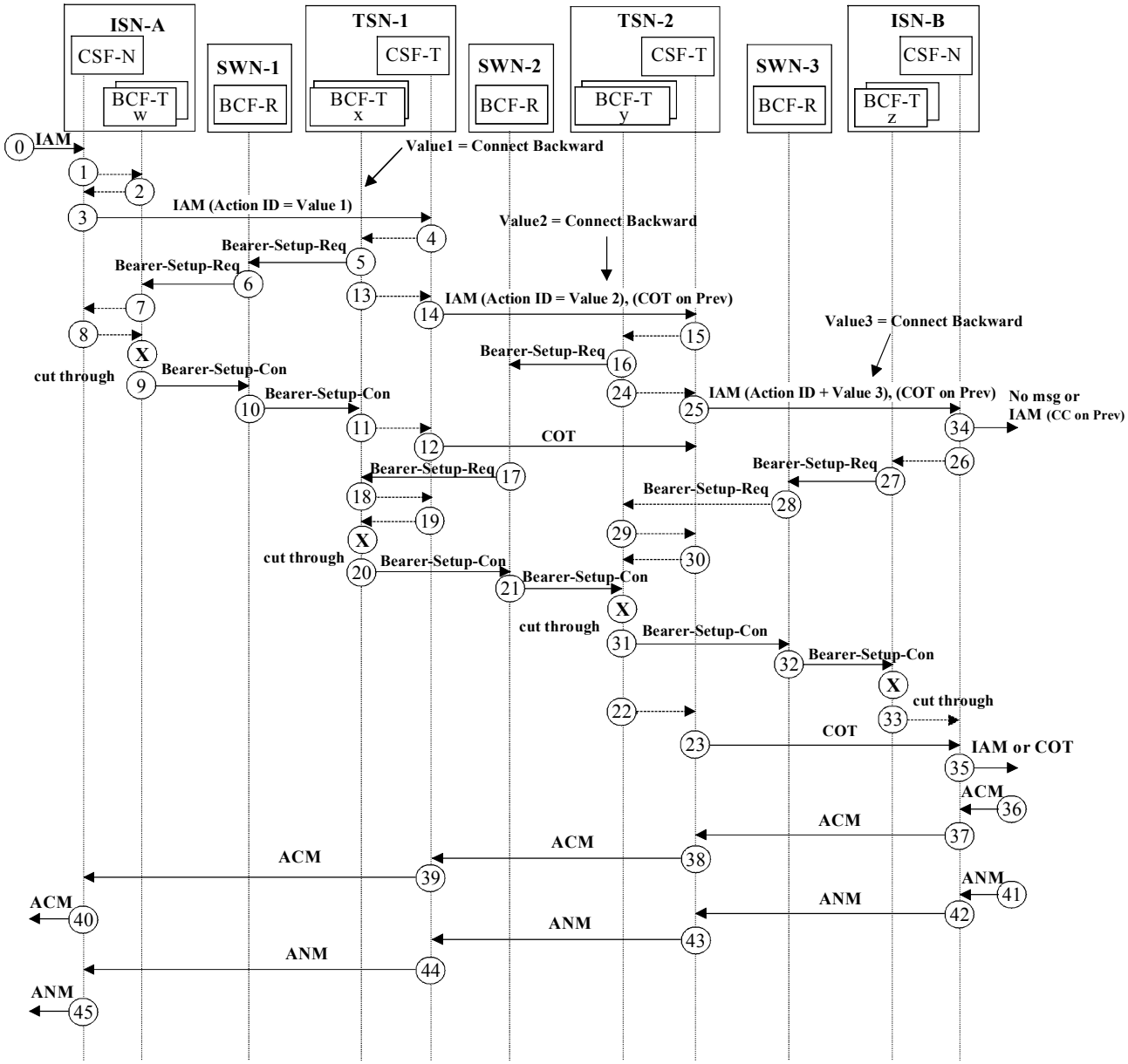

Figure 8-4 – Backward Connection Set-up with Transit Serving Node

0	IAM		ISDN(A) to ISN(A)
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the bearer interworking function (BIWF = w) that will be used to interface with the requesting ISDN associated with the calling party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The The BCF-N chooses a BNC-ID value of 501 and associates this BNC-ID value with the local call reference value. The BCF-N passes the chosen BNC-ID value, BNC Characteristics, an indication of backward set-up request, and specifies any need to be notified of connection completion to the CSF-N. (Note: This interaction between the CSF and BCF are represented by the information flows 1 and 2.) The CSF-N determines the ISDN network associated with the called party. It then determines the signalling route to that ISDN and issues information flow 3 towards a ISN associated with the designated ISDN network. Information flow 3 indicates that a backward set-up and possibly the need to be notified by ISN-B of the bearer establishment is desired. The ISN(A) awaits the establishment of the backbone connection across the backbone network.

3	IAM		ISN(A) to TSN(1)
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-TSN Addr = TSN-1, T-BIWF-Addr = w,	CCA-ID = 5, Action Indication = Connect Backward	BNC-ID: = 501, Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected TSN's CSF-N validates the request and determines the bearer interworking function (BIWF = x) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 4 towards the selected bearer interworking function in order to determine if a pre-established idle backbone network connection exists between it and the bearer interworking function selected by ISN(A). It also passes a local call reference value. The BIWF's BCF-N determines that no existing idle backbone connection meets the requirements and proceeds to establish the requested backbone network connection by issuing information flow 5. The BIWF chooses a BNC-ID of 701 to be used to associate the backbone bearer connection between TSN-1 and TSN-2. This BNC-ID value along with its BNC Characteristics and an indication of backward set-up request are passed to the CSF-N via information flow 15. The CSF-N then issues information flow 16 towards TSN(2) containing the BNC-ID value of 701. The TSN awaits the commitment information flow from the selected interworking function. Information flow 4 is not described in this example since it is outside the scope of capability set 1. The bearer interworking function determines the backbone network facility to be used and issues information flow 5 towards the selected SWN. The bearer BNCL characteristics contained in information flow 5 was determined from the Bearer Service Information contained in information flow 3. The bearer interworking function awaits confirmation of the completed backbone network connection establishment procedures.

5	Bearer-Setup.Req		BIWF(x) to SWN(1)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = w,	BCS-ID = "15",	BNC-ID: = 501, BNCL-ID = 1004, {BNCL characteristics},

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and BIWF(w). The switching node issues information flow 6 towards BIWF(w). Information flow (6)'s link information was determined from the link information received in information flow 5. Switching Node 1 awaits the commitment information from BIWF(w).

6	Bearer-Setup.Req		SWN(1) to BIWF(w)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = w,	BCS-ID = "27",	BNC-ID: = 501, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and TSN-1. This is done via information flow 7. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 8 towards the selected BIWF indicating that the bearer is to be connected. If the Action ID conveyed in information flow 3 indicates Connect Backward, the BIWF cuts through the incoming bearer link from ISDN(A) to the designated outgoing port of the BIWF and issues information flow 9 towards Switching Node 1.

9	Bearer-Setup.Connect		BIWF(w) to SWN(1)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1003

Initiation of information flow: Processing of information flow 6

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 10 towards BIWF(x).

10	Bearer-Setup.Connect		SWN(1) to BIWF(x)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "15"	BNCL-ID = 1004,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, and issues information flow 11 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action and issues information flow 14 towards TSN-2, and awaits further action responses from TSN-2.

12	COT		TSN(1) to TSN(2)
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5	

Initiation of information flow: Reception of information flow 10 and conditional upon an IAM (with CC on previous) being sent in information flow 14.

Processing upon receipt: When TSN(2) receives this information flow and information flow 22, it issues a COT information flow 23 to ISN(B) and awaits further responses from ISN(B)

14 IAM **TSN(1) to TSN(2)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-T(TSN-1), D-CSF Addr = CSF-T(TSN-2), T-BIWF-Addr = x,	CCA-ID = 25, Action Indication = Connect Backward "COT on Previous"	BNC-ID: = 701, Bearer Service Characteristics BNC Characteristics

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The selected TSN's CSF-N validates the request and determines the bearer interworking function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 15 towards the selected bearer interworking function in order to determine if a pre-established idle backbone network connection exists between it and the bearer interworking function selected by TSN(1). It also passes a local call reference value. The BIWF's BCF-N determines that no existing idle backbone connection meets the requirements and proceeds to establish the requested backbone network connection by issuing information flow 14. The BIWF chooses a BNC-ID of 402 to be used to associate the backbone bearer connection between TSN-2 and ISN-B. This BNC-ID value along with the BNC and an indication of backward set-up request are passed to the CSF-N via information flow 26. The CSF-N then issues information flow 24 towards ISN-B containing this new BNC-ID value of 402. The interface serving node awaits the commitment information flow from the selected interworking function. Information flow 15 is not described in this example since it is outside the scope of capability set 1. The bearer interworking function determines the backbone network facility to be used and issues information flow 16 towards the selected SWN. The bearer BNCL characteristics contained in information flow 16 was determined from the Bearer Service Information contained in information flow 14. The bearer interworking function awaits confirmation of the completed backbone network connection establishment procedures.

16 Bearer-Setup.Req **BIWF(y) to SWN(2)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "15",	BNC-ID: = 701, BNCL-ID = 1001, {BNCL characteristics},

Initiation of information flow: Processing of information flow 14

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and BIWF(x). The switching node issues information flow 17 towards BIWF(x). Information flow (17)'s link information was determined from the link information received in information flow 16. Switching Node 2 awaits the commitment information from BIWF(x).

17 Bearer-Setup.Req **SWN(2) to BIWF(x)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "27",	BNC-ID: = 701, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between TSN-2 and TSN-1. This is done via information flow 18. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 21 towards the selected BIWF indicating that the bearer is to be connected. Because the Action ID conveyed in information flow 14 indicated Connect Backwards, the BIWF cuts through the incoming bearer link from ISN-A to the designated outgoing port of the BIWF and issues information flow 20 towards Switching Node 2.

20	Bearer-Setup.Connect		BIWF(x) to SWN(2)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1002

Initiation of information flow: Processing of information flow 19

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 21 towards BIWF(y).

21	Bearer-Setup.Connect		SWN(2) to BIWF(y)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "15"	BNCL-ID = 1001,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, and issues information flow 22 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action and has received information flow 12, it issues information flow 23 towards ISN-B, and awaits further action responses from ISN.

23	COT		TSN(2) to ISN(B)
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5	

Initiation of information flow: Reception of information flows 12, 21 and an IAM (with CC on previous) being sent in information flow 25.

Processing upon receipt: When ISN(B) receives these information flows and it receives information flow 32, it issues a COT or IAM information flow 35 to ISDN(B) and awaits further responses from ISN(B).

25	IAM		TSN(2) to ISN(B)
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-T(TSN-2), D-CSF Addr = CSF-T(ISN-B), T-BIWF-Addr = y,	CCA-ID = 35, Action Indication = Connect Backward "COT on Previous"	BNC-ID: = 402, Bearer Service Characteristics BNC Characteristics

Initiation of information flow: Processing of information flow 14

Processing upon receipt: The selected ISN's CSF-N validates the request and determines the bearer interworking function (BIWF = z) to be used to carry the new backbone connection between TSN(2) and ISN(B). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 36 towards the selected ISDN exchange (ISDN B), and issues information flow 26 towards the selected bearer interworking function in order to determine if a pre-established idle backbone network connection exists between it and the bearer interworking function selected by TSN(2) along with the Backward set-up option. The BIWF's BCF-N determines that no existing idle backbone connection meets the requirements and proceeds to establish the requested backbone network connection by issuing information flow 26. The interface serving node awaits the commitment information flow from the selected interworking function. Information flow 26 is not described in this example since it is outside the scope of capability set 1. The bearer interworking function determines the backbone network facility to be used and issues information flow 27 towards the selected SWN. The bearer BNCL characteristics contained in information flow 27 was determined from the Bearer Service Information contained in information flow 25. The bearer interworking function awaits confirmation of the completed backbone network connection establishment procedure.

27	Bearer-Setup.Req		BIWF(z) to SWN(3)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = "15",	BNC-ID: = 402, BNCL-ID = 1001, {BNCL characteristics},

Initiation of information flow: Processing of information flow 25

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(3) and BIWF(y). The switching node issues information flow 28 towards BIWF(y). Information flow (28)'s link information was determined from the link information received in information flow 27. Switching Node 3 awaits the commitment information from BIWF(y).

28	Bearer-Setup.Req		SWN(3) to BIWF(y)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = "27",	BNC-ID: = 402, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between TSN-2 and ISN-B. This is done via information flow 33. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 34 towards the selected BIWF indicating that the bearer is to be connected. If the Action ID conveyed in information flow 29 indicated Connect Backward, the BIWF cuts through the incoming bearer link from TSN(1) to the designated outgoing port of the BIWF and issues information flow 35 towards Switching Node 3.

31	Bearer-Setup.Connect		BIWF(y) to SWN(3)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1002

Initiation of information flow: Processing of information flow 28

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 32 towards BIWF(z).

32	Bearer-Setup.Connect		SWN(3) to BIWF(z)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "15"	BNCL-ID = 1001,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, and issues information flow 33 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action, and issues information flow 35 towards ISDN B if information flow 23 has been received, and awaits further action responses from ISDN B.

34a IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 25.

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside of the scope of these signalling requirements.

OR

34b No ISUP Message Forwarded at this Time.

35a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flows 23, 32, and IAM (with CC on previous) being sent in information flow 34.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

35b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flows 23, 32, and no IAM being forwarded in information flow 34.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE are outside the scope of these signalling requirements.

36 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 37, and records the alerting condition within its own database.

37 ACM **ISN(B) to TSN(2)**

Address information	Control information	Bearer information
	CCA-ID = 35,	

Processing upon receipt: When the TSN(2) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 38, and records the alerting condition within its own database.

38 ACM **TSN(2) to TSN(1)**

Address information	Control information	Bearer information
	CCA-ID = 25,	

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 39, and records the alerting condition within its own database.

39 ACM **TSN(1) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 40, and records the alerting condition within its own database.

40 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

41 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 42, and records the answer condition within its own database.

42 ANM **ISN(B) to TSN(2)**

Address information	Control information	Bearer information
	CCA-ID = 35	

Processing upon receipt: When the TSN(2) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 43, and records the answer condition within its own database.

43 ANM **TSN(2) to TSN(1)**

Address information	Control information	Bearer information
	CCA-ID = 25	

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 44, and records the answer condition within its own database.

44 ANM **TSN(1) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 45, and records the answer condition within its own database.

45 ANM		ISN(A) to ISDN(A)
Address information	**Control information** CIC-ID = 5000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.2.2 Forward Connection Set-up with Transit Serving Node

The information flows and functional entity actions illustrated in Figure 8-5 are described in the following numbered paragraphs. The cut-through points illustrated in the figure are the latest point at which cut-through has occurred. Depending on the bearer control protocol , cut through may occur at an earlier point in time. The information elements BNC-ID and O-BIWF-Addr contained in the APM message with an Action ID of "connected", are here for information and do not need to be supported by protocol in CS-1.

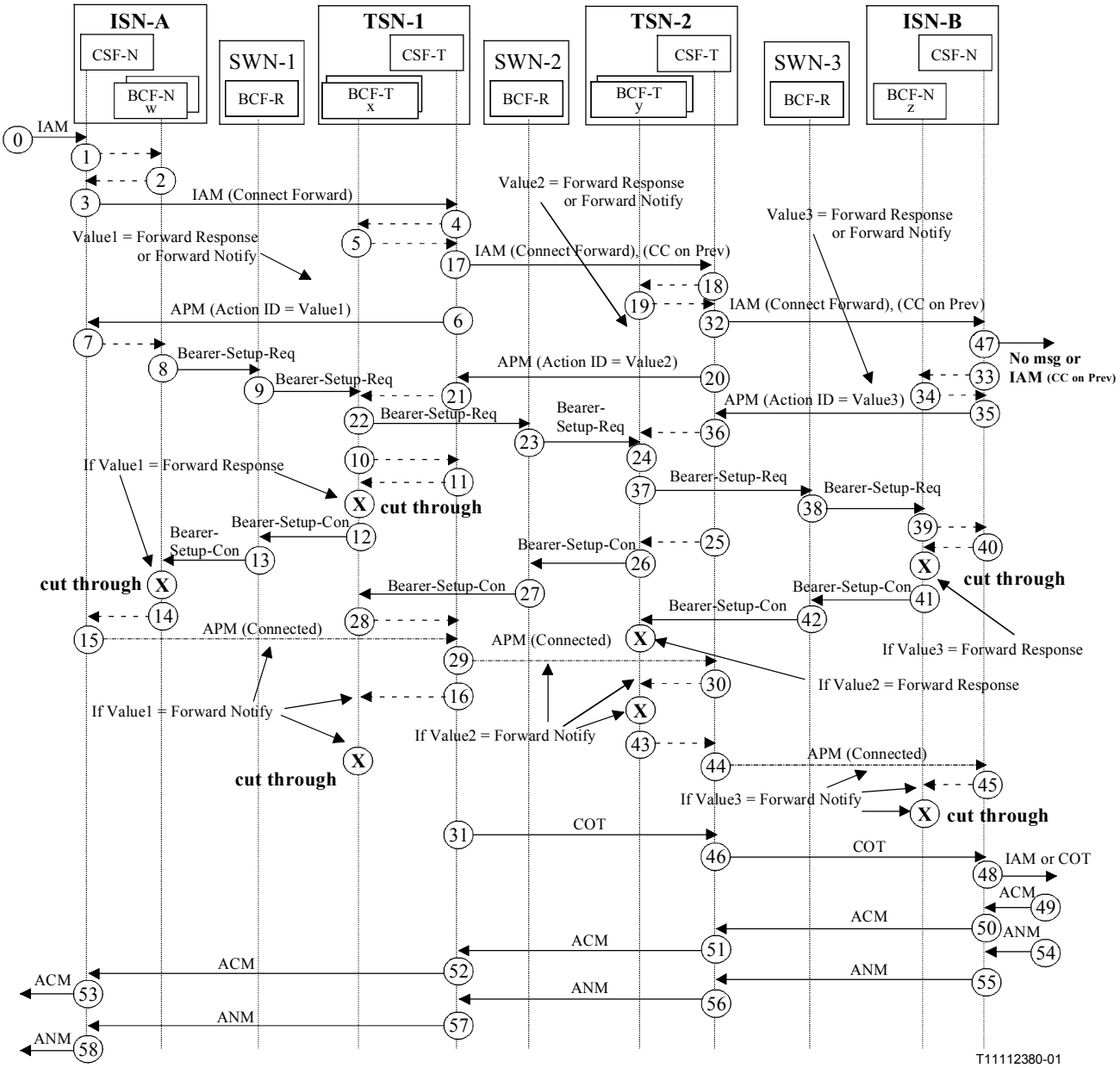

Figure 8-5 – Forward Connection Set-up with Transit Serving Node

0 IAM **ISDN(A) to ISN(A)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the Bearer Interworking Function (BIWF = w) that will be used to interface with the requesting ISDN associated with the calling party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N specifies the information to be carried by the BNC Characteristics parameter, indicates a forward set-up request, and passes this information to the CSF-N. (Note: This interaction between the CSF and the BCF are represented by information flows 1 and 2.) The CSF-N determines the ISDN network associated with the called party. It then determines the signalling route to that ISDN and issues information flow 3 towards a TSN associated with the designated ISDN network. Information flow 3 indicates that a forward set-up of the bearer is desired. The ISN(A) awaits the response indicating the address of the destination BIWF and its associated BNC-ID value.

3 IAM **ISN(A) to TSN(1)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B),	CCA-ID = 5 Action Indication = Connect Forward	Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected TSN validates the request and determines the Bearer Interworking Function (BIWF = x) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N issues information flow 4 towards the selected bearer interworking function along with a local call reference in order to determine the BNC-ID to be associated with this new connection. The BIWF's BCF-N indicates a froward set-up request, chooses a BNC-ID value of 710, selects the response mode to be associated with the Action ID (Forward Response or Forward Notify) based on the bearer service characteristics, and proceeds to notify its associated CSF-N of these information objects (information flow 5). The CSF-N proceeds to notify ISN(A) that it will need to begin to establish the backbone network connection between its selected BIWF and the selected BIWF within the scope of TSN(1). This is accomplished by issuing information flow 6. The CSF-N determines the route towards the ISN associated with the called party and issues information flow 17. TSN(1) awaits the completion of the backbone network connection.

6 APM **TSN(1) to ISN(A)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	CCA-ID = 5, Action Indication = Forward Response or Forward Notify	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The Interface Serving node records the response mode (Forward Response or Forward Notify), and notifies its bearer interworking unit BIWF(w) to begin bearer establishment between BIWF(w) and BIWF(x) via information flow 7. The Bearer Interworking Function issues information flow 8 which begins the forward direction backbone network connection establishment.

8	Bearer-Setup.Req		BIWF(w) to SWN(1)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x	BCS-ID = "65",	BNC-ID: = 710,, BNCL-ID = 1000, {BNCL characteristics},

Initiation of information flow: Processing of information flow 6

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and BIWF(x). The switching node issues information flow 9 towards BIWF(x). Information flow (9)'s link information was determined from the link information received in information flow 0. Switching Node 1 awaits the commitment information from TSN(1).

9	Bearer-Setup.Req		SWN(1) to BIWF(x)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = "15",	BNC-ID: = 710,, BNCL-ID = 1004, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and TSN(1). This is done via information flow 10. The CSF-N correlates the incoming bearer request with the incoming call request and issues information flow 11 towards the selected BIWF indicating that the bearer is to be connected. If the response mode carried by information flow 6 was a Forward Response, the BIWF will cut through the backbone network connection between ISN(A) and TSN(1) and the outgoing Backbone network connection initiated by information flow 22. The BIWF issues information flow 12 towards Switching Node 1.

12	Bearer-Setup.Connect		TSN(1) to SWN(1)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "25"	BNCL-ID = 1001,

Initiation of information flow: Processing of information flow 9

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 13 towards Interface Serving Node -A.

13	Bearer-Setup.Connect		SWN(1) to BIWF(w)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "65"	BNCL-ID = 1000,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, cuts through the incoming bearer link to the designated outgoing port of the Bearer Interworking Function, and issues information flow 14 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action. The CSF-N may issue information flow 15 dependent on the response mode received in information flow 6. If the response mode was Forward Notify, the CSF-n issues information flow 15. If the response mode is Forward Response, information flow 15 will not be issued. In either case the ISN awaits further action responses from the selected TSN.

15 APM **ISN(A) to TSN (1)**

Address information	Control information	Bearer information
O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 13 and conditional upon the Action Indicator being set to "Forward Notify" in information flow 6.

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(x) to cut through the backbone network connection between ISN(A) and TSN(1) to the outgoing backbone network connection between TSN(1) and TSN(2) via information flow 16.

17 IAM **TSN(1) to TSN(2)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B),	CCA-ID = 25 Action Indication = Connect Forward	Bearer Service Characteristics BNC Characteristics

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The selected TSN validates the request and determines the Bearer Interworking Function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N issues information flow 18 towards the selected bearer interworking along with a local call reference in order to determine the BNC-ID to be associated with this new connection. The BIWF's BCF-N indicates a forward set-up request, chooses a BNC-ID value of 402, the backbone network connection between ISN(A) and TSN(1) to the outgoing backbone network connection between TSN(1) and TSN(2), selects the response mode to be associated with the Action ID (Forward Response or Forward Notify) based on the bearer control characteristics, and proceeds to notify its associated CSF-N of these information objects (information flow 19). The CSF-N proceeds to notify TSN(1) that it will need to begin to establish the backbone network connection between its selected BIWF and the selected BIWF within the scope of TSN(2). This is accomplished by issuing information flow 20. The CSF-N determines the route towards the ISN associated with the called party and issues information flow 32. TSN(2) awaits the completion of the backbone network connection.

20 APM **TSN(2) to TSN(1)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	CCA-ID = 25, Action Indication = Forward Response or Forward Notify	BNC-ID: = 402,

Initiation of information flow: Processing of information flow 17

Processing upon receipt: The Transit Serving node records the response mode (Forward Response or Forward Notify), and notifies its bearer interworking unit BIWF(x) to begin bearer establishment between BIWF(x) and BIWF(y) via information flow 21. The Bearer Interworking Function issues information flow 22 which begins the forward direction backbone network connection establishment.

22	Bearer-Setup.Req		BIWF(x) to SWN(2)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y	BCS-ID = “65”,	BNC-ID: = 402,, BNCL-ID = 1000, {BNCL characteristics},

Initiation of information flow: Processing of information flow 20

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and BIWF(y). The switching node issues information flow 23 towards BIWF(y). Information flow (23)'s link information was determined from the link information received in information flow 4. Switching Node 2 awaits the commitment information from TSN(2).

23	Bearer-Setup.Req		SWN(2) to BIWF(y)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = “15”,	BNC-ID: = 402,, BNCL-ID = 1004, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between TSN(1) and TSN(2). This is done via information flow 24. The CSF-N correlates the incoming bearer request with the incoming call request and issues information flow 25 towards the selected BIWF indicating that the bearer is to be connected. If the response mode carried by information flow 20 was a Forward Response, the BIWF will cut through the backbone network connection between TSN(1) and TSN(2) and the outgoing Backbone network connection initiated by information flow 37. The BIWF issues information flow 26 towards Switching Node 2.

26	Bearer-Setup.Connect		TSN(2) to SWN(2)
	Address information	**Control information**	**Bearer information**
		BCS-ID = “25”	BNCL-ID = 1001,

Initiation of information flow: Processing of information flow 23

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 27 towards Transit Serving Node -1.

27	Bearer-Setup.Connect		SWN(2) to BIWF(x)
	Address information	**Control information**	**Bearer information**
		BCS-ID = “65”	BNCL-ID = 1000,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, cuts through the incoming bearer link to the designated outgoing port of the Bearer Interworking Function and issues information flow 28 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action. The CSF-N may issue information flow 29 dependent on the response mode received in information flow 20. If the response mode was Forward Notify, the CSF-N issues information flow 29. If the response mode is Forward Response, information flow 29 will not be issued. In either case the TSN issues information flow 31 and awaits further action responses from the selected TSN.

29 APM **TSN(1) to TSN(2)**

Address information	Control information	Bearer information
O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 15 and conditional upon the Action Indicator being set to "Forward Notify" in information flow 20.

Processing upon receipt: The TSN notifies its bearer interworking unit BIWF(y) to cut through the backbone network connection between ISN(A) and TSN(1) to the outgoing backbone network connection between TSN(1) and TSN(2) via information flow 30, if information flow 31 has been received.

31 COT **TSN(1) to TSN(2)**

Address information	Control information	Bearer information
	CCA-ID = 5	

Initiation of information flow: Processing of information flow 27 and IAM (with CC on previous) being sent in information flow 17.

Processing upon receipt: When the TSN(2) receives this information flow and information 29, it issues a COT information flow 46 to ISN(B) and awaits further responses from ISN(B).

32 IAM **TSN(2) to ISN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B),	CCA-ID = 25 Action Indication = Forward Response or Forward Notify	Bearer Service Characteristics BNC Characteristics

Initiation of information flow: Processing of information flow 17

Processing upon receipt: The selected ISN validates the request and determines the Bearer Interworking Function (BIWF = z) to be used to carry the new backbone connection between TSN(2) and ISN(B). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 33 towards the selected Bearer Interworking Function indicating a forward set-up request, along with a local call reference in order to determine the BNC-ID to be associated with this new connection. The BIWF's BCF-N chooses a BNC-ID value of 307, selects the response mode to be associated with the Action ID (Forward Response or Forward Notify) based on bearer service characteristics, and proceeds to notify its associated CSF-N of these information objects (information flow 34). The CSF-N proceeds to notify TSN(2) that it will need to begin to establish the backbone network connection between its selected BIWF and the selected BIWF within the scope of ISN(B). This is accomplished by issuing information flow 35. The ISN(B) issues information flow 47 towards the ISDN associated with the called party. ISN(B) awaits the completion of the backbone network connection.

35 APM **ISN(B) to TSN(2)**

Address information	Control information	Bearer information
T-BIWF Addr = z,	CCA-ID = 25, Action Indication = Forward Response or Forward Notify	BNC-ID: = 307,

Initiation of information flow: Processing of information flow 32

Processing upon receipt: The Transit Serving node records the response mode (Forward Response or Forward Notify) and notifies its bearer interworking unit BIWF(y) to begin bearer establishment between BIWF(y) and BIWF(z) via information flow 36. The Bearer Interworking Function issues information flow 37 which begins the forward direction backbone network connection establishment.

37 Bearer-Setup.Req **BIWF(y) to SWN(3)**

Address information	Control information	Bearer information
T-BIWF Addr = z	BCS-ID = "65",	BNC-ID: = 307,, BNCL-ID = 1000, {BNCL characteristics},

Initiation of information flow: Processing of information flow 35

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(3) and BIWF(z). The switching node issues information flow 38 towards BIWF(z). Information flow (37)'s link information was determined from the link information received in information flow 17. Switching Node 3 awaits the commitment information from ISN(B).

38 Bearer-Setup.Req **SWN(3) to BIWF(z)**

Address information	Control information	Bearer information
T-BIWF Addr = z,	BCS-ID = "15",	BNC-ID: = 307,, BNCL-ID = 1004, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between TSN(2) and ISN(B). This is done via information flow 39. The CSF-N correlates the incoming bearer request with the incoming call request and issues information flow 40 towards the selected BIWF indicating that the bearer is to be connected. If the response mode carried by information flow 35 was a Forward Response, the BIWF will cut through the backbone network connection between TSN(2) and ISN(B). The BIWF issues information flow 41 towards Switching Node 3.

41 Bearer-Setup.Connect **ISN(B) to SWN(3)**

Address information	Control information	Bearer information
	BCS-ID = "25"	BNCL-ID = 1001,

Initiation of information flow: Processing of information flow 38

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 42 towards Transit Serving Node -2.

42 Bearer-Setup.Connect **SWN(3) to BIWF(y)**

Address information	Control information	Bearer information
	BCS-ID = "65"	BNCL-ID = 1000,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, cuts through the incoming bearer link to the designated outgoing port of the Bearer Interworking Function and issues information flow 43 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action. The CSF-N may issue information flow 44 dependent on the response mode received in information flow 35. If the response mode was Forward Notify, the CSF-N issues information flow 44. If the response mode is Forward Response, information flow 44 will not be issued. In either case the TSN issues information flow 46 towards ISN(B) and awaits further action responses from the selected ISN.

44 APM **TSN(2) to ISN(B)**

Address information	Control information	Bearer information
O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 42 and conditional upon the Action Indicator being set to "Forward Notify" in information flow 35.

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(z) to cut through the backbone network connection between ISN(B) and TSN(2) to the outgoing backbone network connection between ISN(B) and ISDN(B) via information flow 45.

46 COT **TSN(2) to ISN(B)**

Address information	Control information	Bearer information
	CCA-ID = 5	

Initiation of information flow: Processing of information flow 38 and IAM (with CC on previous) being sent in information flow 32.

Processing upon receipt: When the ISN(B) receives this information flow, it determines that the backbone network connection between TSN(2) and ISN(B) is available. The CSF-N will issue information flow 48.

47a IAM (CC on Prev) **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 32

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

47b No ISUP Message is Forwarded at this Time

48a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 46 and IAM (with CC on previous) being sent in information flow 47.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

48b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 46 and no ISUP being forwarded in information flow 47.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

---

49 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 50, and records the alerting condition within its own database.

---

50 ACM **ISN(B) to TSN(2)**

Address information	Control information	Bearer information
	CCA-ID = 35,	

Processing upon receipt: When the TSN(2) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 51, and records the alerting condition within its own database.

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51 ACM **TSN(2) to TSN(1)**

Address information	Control information	Bearer information
	CCA-ID = 25,	

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 52, and records the alerting condition within its own database.

---

52 ACM **TSN(1) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 53, and records the alerting condition within its own database.

---

53 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

---

54 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 55, and records the answer condition within its own database.

55	ANM		ISN(B) to TSN(2)
	Address information	**Control information** CCA-ID = 35	**Bearer information**

Processing upon receipt: When the TSN(2) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 56, and records the answer condition within its own database.

56	ANM		TSN(2) to TSN(1)
	Address information	**Control information** CCA-ID = 25	**Bearer information**

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 57, and records the answer condition within its own database.

57	ANM		TSN(1) to ISN(A)
	Address information	**Control information** CCA-ID = 5	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 58, and records the answer condition within its own database.

58	ANM		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.3 Reuse of an Idle Backbone Network Connection

8.1.3.1 Backward Reuse of an Idle Backbone Network Connection

The information flows and functional entity actions illustrated in Figure 8-6 are described in the following numbered paragraphs. The cut through points illustrated in the figure are the latest point at which cut through has occurred. Depending on the bearer control protocol, cut through may occur at an earlier point in time. The information element BNC-ID contained in the APM message with an Action ID of "switched," is here for information and does not need to be supported by protocol in CS-1.

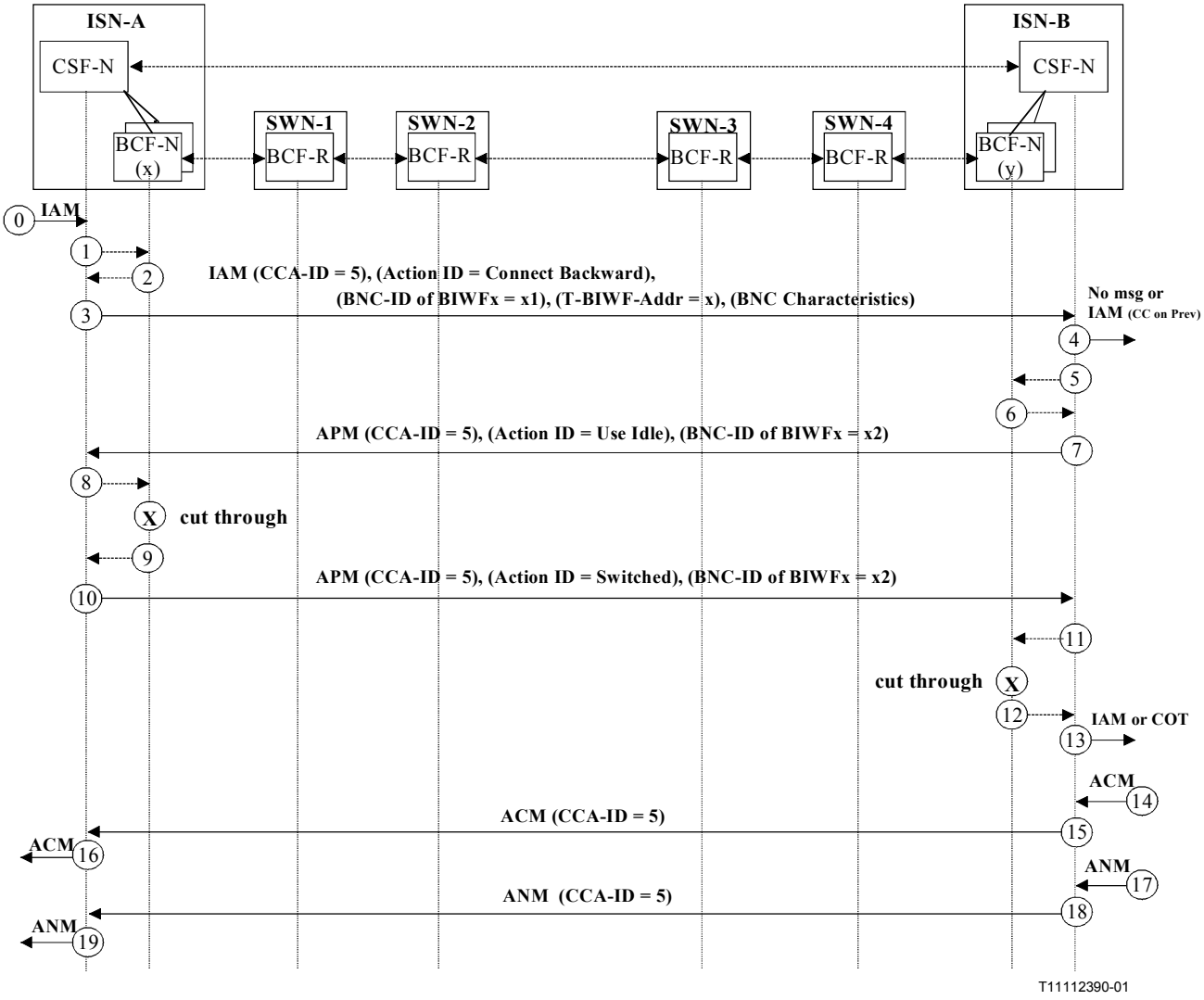

Figure 8-6 – Backward Reuse of an Idle Backbone Network Connection

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0 IAM **ISDN(A) to ISN(A)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the bearer interworking function (BIWF = x) that will be used to interface with the requesting ISDN associated with the calling party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N chooses a BNC-ID value of 501 and associates this BNC-ID value with the local call reference value. The BCF-N passes the chosen BNC-ID value to the CSF-N. (Note: This interaction between the CSF and BCF is represented by the information flows 1 and 2.) The CSF-N determines the ISDN network associated with the called party. It then determines the signalling route to that ISDN and issues information flow 3 towards an ISN associated with the designated ISDN network. Information flow 3 indicates that a backward set-up of the bearer is desired. The ISN(A) awaits the establishment of the backbone connection across the backbone network.

3 IAM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B), T-BIWF-Addr = x,	CCA-ID = 5, Action Indication = Connect Backwards	BNC-ID: = 501, Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected ISN's CSF-N validates the request and determines the Bearer Interworking Function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 4 towards the selected ISDN exchange (ISDN B), and issues information flow 5 towards the selected Bearer Interworking Function in order to determine if a pre-established idle backbone network connection exists between it and the Bearer Interworking Function selected by ISN(A) along with the Backward set-up option. The BIWF's BCF-N determines that there is an existing idle backbone connection which meets the requirements and proceeds to notify its associated CSF-N of this fact. The BCF-N provides the BNC-ID (701) of the existing backbone connection to the CSF-N via information flow 6. The CSF-N issues information flow 7 towards ISN(A) requesting the selection of this idle connection. Information flow 5 is not described in this example since it is outside the scope of capability set 1. The Bearer Interworking Function awaits confirmation of the completed backbone network connection establishment procedure.

4a IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 3

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

4b No ISUP Message Forwarded at this Time

7 APM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
T-BIWF-Addr = y,	CCA-ID = 5, Action Indication = Use Idle	BNC-ID: = 701,

Initiation of information flow: Processing of information flow 3.

Processing upon receipt: The requesting ISN's CSF-N validates the request and notifies the Bearer Interworking Function (BIWF = x) that it is to use an idle backbone network connection whose BNC-ID value is 701 via information flow 8. The BIWF's BCF connects the incoming trunk to this idle backbone network connection, associates this connection to the local call reference it received in information flow 1, and discards the BNC-ID value previously chosen (501). It then notifies its associated CSF-N of the connection establishment completion via information flow 9. The CSF-N issues information flow 10 towards ISN(B) indicating connection completion and awaits further responses from ISN(B).

10 APM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 701,

Initiation of information flow: Processing of information flow 7

Processing upon receipt: The selected ISN's CSF-N validates the request and records the completion of the bearer action and issues information flow 13 towards the selected terminating ISDN, and notifies its associated BIWF that the connection is available. The BIWF performs cut-through of the incoming BNC link to the outgoing trunk. The CSF-N awaits further action responses from the selected ISDN.

13a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 10 and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

13b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 10 and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE are outside the scope of these signalling requirements.

14 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 15, and records the alerting condition within its own database.

15 ACM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 16, and records the alerting condition within its own database.

16 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

17 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 18, and records the answer condition within its own database.

18 ANM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 19, and records the answer condition within its own database.

19 ANM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.3.2 Forward Reuse of an Idle Backbone Network Connection

The information flows and functional entity actions illustrated in Figure 8-7 are described in the following numbered paragraphs. The cut through points illustrated in the figure are the latest point at which cut through has occurred. Depending on the bearer control protocol, cut through may occur at an earlier point in time. The information element BNC-ID contained in the APM message with an Action ID of "switched," is here for information and does not need to be supported by protocol in CS-1.

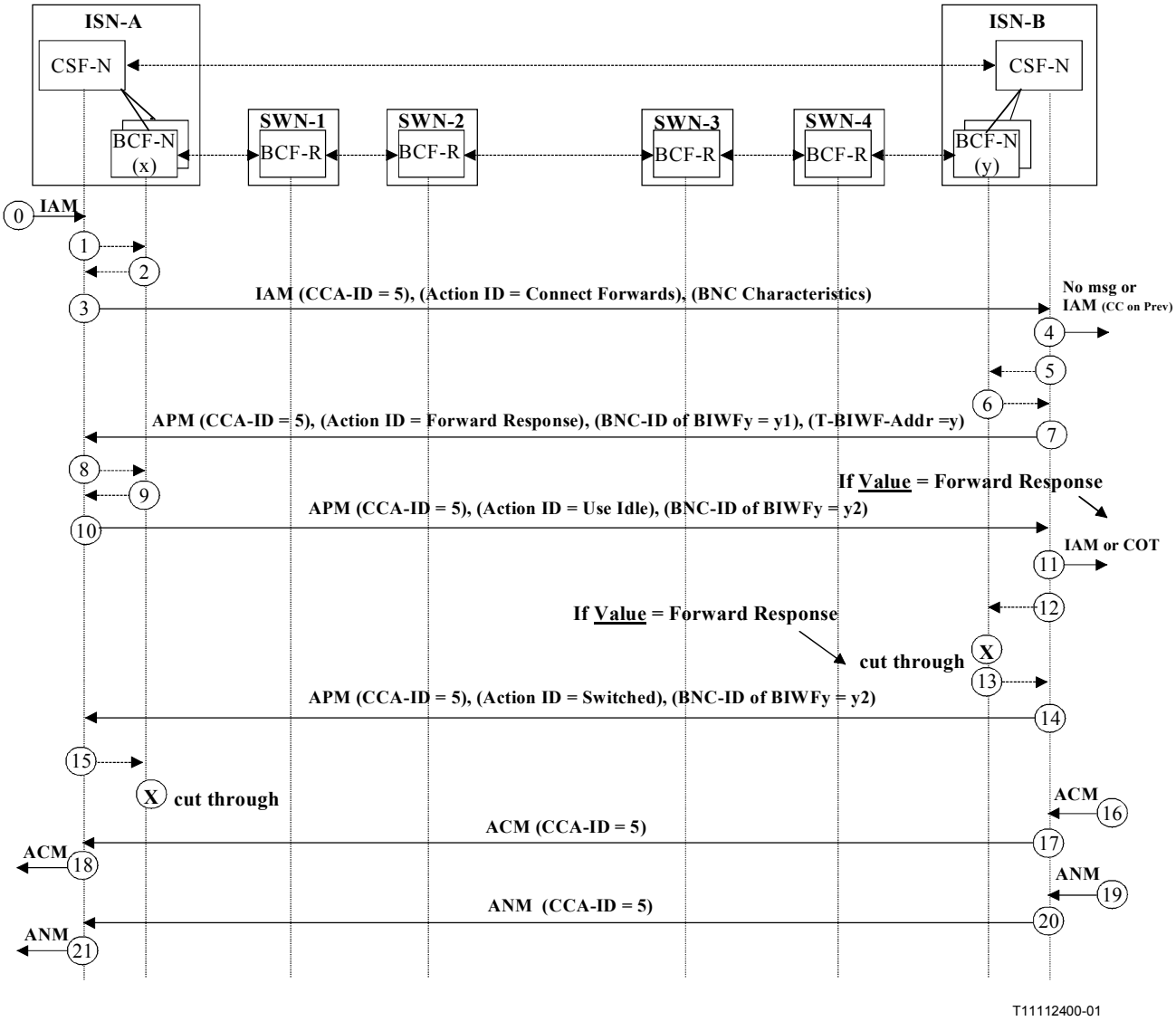

Figure 8-7 – Forward Reuse of an Idle Backbone Network Connection

0 IAM **ISDN(A) to ISN(A)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling Party-Addr) = User A,	CIC-ID = 2000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the Bearer Interworking Function (BIWF = x) that will be used to interface with the requesting ISDN associated with the calling party, and the ISN determines the ISDN network associated with the called party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N specifies the information to be carried by the BNC Characteristics parameter, indicates a forward set-up request, and passes this information to the CSF-N. (Note: This interaction between the CSF and BCF are represented by information flows 1 and 2.) The CSF-N then determines the signalling route to that ISDN and issues information flow 3 towards a ISN associated with the designated ISDN network. Information flow 1 indicates that a forward set-up of the bearer is desired. The ISN(A) awaits the response indicating the address of the destination BIWF and its associated BNC-ID value.

3 IAM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B),	CCA-ID = 5 Action Indication = Connect Forwards	Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected ISN validates the request and determines the Bearer Interworking Function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 4 towards ISDN(B). It then communicates with the selected Bearer Interworking Function indicating a forward set-up request along with the local call reference in order to determine the BNC-ID value to be associated with this new connection. The BIWF's BCF-N chooses a BNC-ID value of 710 and proceeds to notify its associated CSF-N of this value. The CSF-N proceeds to notify ISN(A) that it will need to begin to establish the backbone network connection between its selected BIWF and the selected BIWF within the scope of ISN(B). This is accomplished by issuing information flow 7. ISN(B) awaits the completion of the backbone network connection.

4a IAM (CC on Prev) **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 3

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

4b No ISUP Message is Forwarded at this Time

7 APM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	CCA-ID = 5, Action Indication = Forward response	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The Interface Serving node notifies the bearer interworking unit BIWF(x) to begin bearer establishment between BIWF(x) and BIWF(y) via information flow 8. The Bearer Interworking Function determines that there is an idle backbone network connection between BIWF(x) and BIWF(y) which meets the service characteristic for this call. It notifies its associated CSF-N of the idle connection and its BNC-ID value of 510 via information flow 9. The CSF-N issues information flow 10 notifying ISN(B) of the idle connection and requests that it connects to this BNC-ID value via information flow 10. The ISN awaits additional responses from ISN(B).

10 APM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
T-BIWF Addr = x	CCA-ID = 5, Action Indication = Use Idle	BNC-ID = 510

Initiation of information flow: Processing of information flow 7

Processing upon receipt: The Interface Serving node communicates with BIWF(y) requesting that it connect the previous selected outgoing trunk to the specified (BNC_ID = 510) backbone network connection. And notifies the ISDN associated with the called party that the connection is available via information flow 11. The BIWF's BCF connects to the idle connection and indicates action completion via information flow 13. The CSF-N notifies ISN(A) that the connection is available by issuing information flow 14.

11a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 10 and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

11b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 10 and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

14	APM		ISN(A) to ISN(B)
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5, Action Indication = Switched	BNC-ID = 510

Initiation of information flow: Processing of information flow 10

Processing upon receipt: The Interface Serving node communicates with BIWF(x) indicating that the connection is available by issuing information flow 15.

16	ACM		ISDN(B) to ISN(B)
	Address information	**Control information**	**Bearer information**
		CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 17, and records the alerting condition within its own database.

17	ACM		ISN(B) to ISN(A)
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 18, and records the alerting condition within its own database.

18	ACM		ISN(A) to ISDN(A)
	Address information	**Control information**	**Bearer information**
		CIC-ID = 2000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

19	ANM		ISDN(B) to ISN(B)
	Address information	**Control information**	**Bearer information**
		CCA-ID = CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 20, and records the answer condition within its own database.

20	ANM		ISN(B) to ISN(A)
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 21, and records the answer condition within its own database.

21	ANM	ISN(A) to ISDN(A)
Address information	**Control information** CIC-ID = 2000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.4 Establishment of a Backbone Network Connection with Codec Negotiation

8.1.4.1 Backward Establishment of a Backbone Network Connection with Codec Negotiation

The information flows and functional entity actions illustrated in Figure 8-8 are described in the following numbered paragraphs. The cut through points illustrated in the figure are the latest point at which cut-through has occurred. Depending on the bearer control protocol, cut through may occur at an earlier point in time.

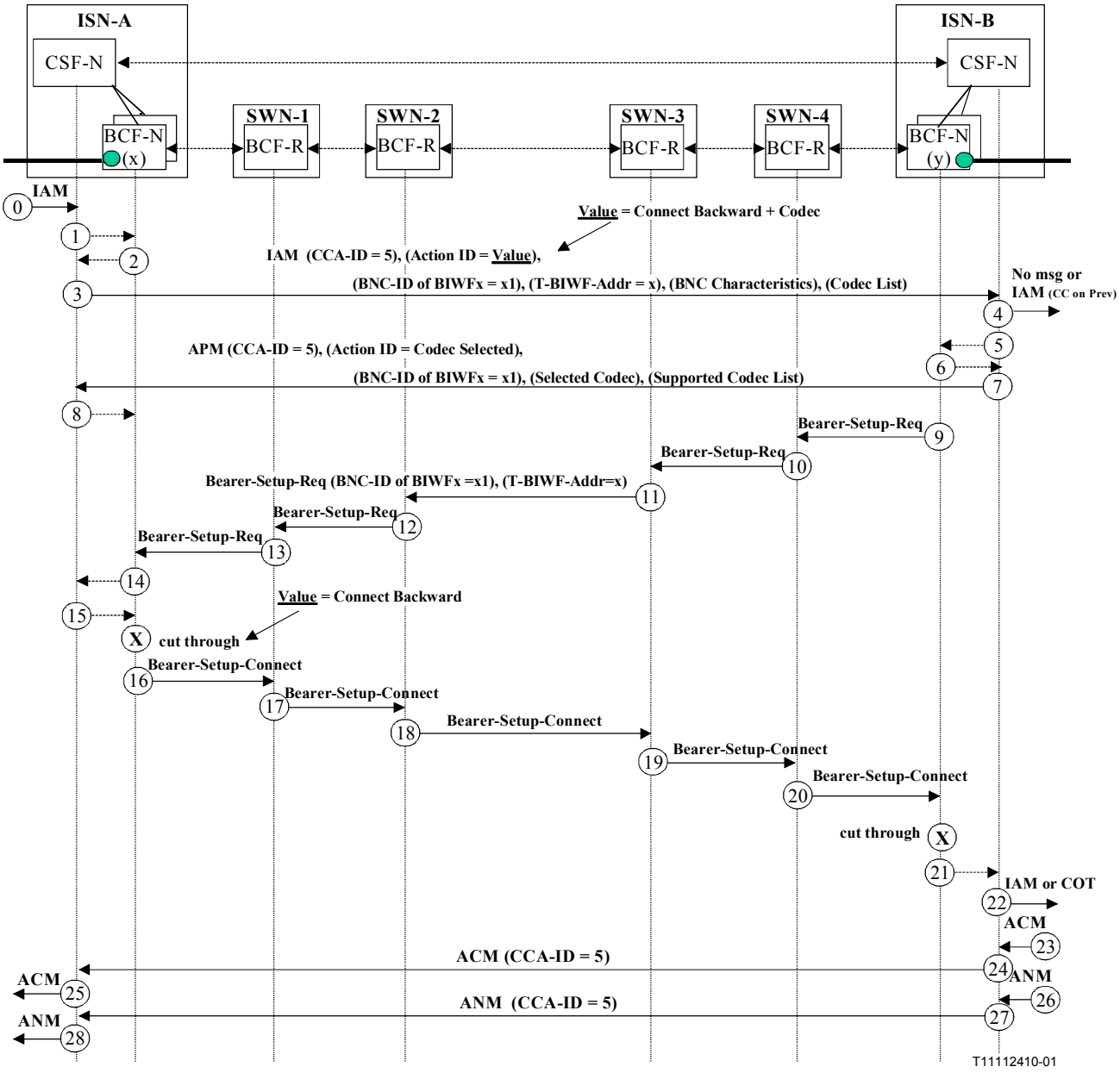

Figure 8-8 – Backward Connection Set-up with Codec Negotiation

0	IAM		ISDN(A) to ISN(A)
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the Bearer Interworking Function (BIWF = x) that will be used to interface with the requesting ISDN associated with the calling party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N indicates a backward set-up request, chooses a BNC-ID value of 501 and associates this BNC-ID value with the local call reference value. The BCF-N passes the chosen BNC-ID value, BNC characteristics, Codec List, and specifies any need to be notified of connection completion to the CSF-N. (Note: This interaction between the CSF and BCF are represented by the information flows 1 and 2.) The CSF-N determines the ISDN network associated with the called party. It then determines the signalling route to that ISDN and issues information flow 3 towards an ISN associated with the designated ISDN network. Information flow 3 indicates that a backward set-up with Codec and possibly the need to be notified by ISN-B of the bearer establishment completion (Connect Backward + Codec), and also contain the Codec List. The ISN(A) awaits the establishment of the backbone connection across the backbone network.

3	IAM		ISN(A) to ISN(B)
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B), T-BIWF-Addr = x,	CCA-ID = 5, Action Indication = Connect Backwards + Codec	BNC-ID: = 501, Bearer Service Characteristics BNC Characteristics Codec List

Processing upon receipt: The selected ISN's CSF-N validates the request and determines the Bearer Interworking Function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 4 towards the selected ISDN exchange (ISDN B), and issues information flow 5 towards the selected Bearer Interworking Function in order to determine if a pre-established idle backbone network connection exists between it and the Bearer Interworking Function selected by ISN(A) along with the Backward setup option and the Codec List. The BIWF's BCF-N determines that no existing idle backbone connection meets the requirements and proceeds to establish the requested backbone network connection by issuing information flow 9. In addition, the BCF-N reviews the Codec List and selects the Codec to be used. In addition, it may specify a subset or indicate that all of the codecs within the list are supported. The BCF communicates the selected codec and the list of supported codecs to its associated CSF-N via information flow 6. The CSF issues information flow 7 towards ISN(A) indicating the selected codec and the supported codec list. The interface serving node awaits the backbone bearer establishment commitment information flow from the selected Bearer Interworking Function. Information flows 5 and 6 are not described in this example since it is outside the scope of capability set 1. The Bearer Interworking Function determines the backbone network facility to be used, and issues information flow 9 towards the selected SWN. The bearer BNCL characteristics contained in information flow 9 was determined from the Bearer Service Information contained in information flow 3. The Bearer Interworking Function awaits confirmation of the completed backbone network connection establishment procedure.

4a IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 3

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

4b No ISUP Message Forwarded at this Time

7 APM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
T-BIWF Addr =y	CCA-ID = 5 Action ID = Codec Selected	Bearer Service Characteristics Selected Codec Supported codecs list

Initiation of information flow: Processing of information flow 3

Processing upon receipt: When ISN(A) receives this information flow, it notes that a codec has been selected. The CSF-N records the supported codec list and passes the selected codec to its associated BIWF via information flow 8. The BCF-N records the codec to be used when the connection is completed.

9 Bearer-Setup.Req **BIWF(y) to SWN(4)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "15",	BNC-ID: = 501, BNCL-ID = 1004, {BNCL characteristics},

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(4) and BIWF(y). The switching node issues information flow 10 towards SWN(3). Information flow (10)'s link information was determined from the link information received in information flow 9. Switching Node 4 awaits the commitment information from SWN(3).

10 Bearer-Setup.Req **SWN(4) to SWN(3)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "27",	BNC-ID: = 501, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(3) and SWN(2). The switching node issues information flow 11 towards SWN(2). Information flow (11)'s link information was determined from the link information received in information flow 10. Switching Node 4 awaits the commitment information from SWN(3). Switching Node 3 awaits the commitment information from SWN(2).

11 Bearer-Setup.Req **SWN(3) to SWN(2)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "18",	BNC-ID: = 501, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and SWN(1)(X). The switching node issues information flow 12 towards SWN(1). Information flow (12)'s link information was determined from the link information received in information flow 11. Switching Node 2 awaits the commitment information from SWN(1).

12 Bearer-Setup.Req **SWN(2) to SWN(1)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "25",	BNC-ID: = 501, BNCL-ID = 1001, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and BIWF(x). The switching node issues information flow 13 towards BIWF(x). Information flow (13)'s link information was determined from the link information received in information flow 12. Switching Node 1 awaits the commitment information from BIWF(x).

13 Bearer-Setup.Req **SWN(1) to BIWF(x)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "65",	BNC-ID: = 501, BNCL-ID = 1000, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and ISN-B. This is done via information flow 14. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 15 towards the selected BIWF indicating that the bearer is to be connected. Because the Action ID conveyed in information flow 3 indicates Connect Backward, the BIWF cuts through the incoming bearer link from ISDN(A) to the designated outgoing port of the BIWF and issues information flow 16 towards Switching Node 1.

16 Bearer-Setup.Connect **BIWF(x) to SWN(1)**

Address information	Control information	Bearer information
	BCS-ID = "65"	BNCL-ID = 1000,

Initiation of information flow: Processing of information flow 13

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 17 towards Switching Node 2.

17 Bearer-Setup.Connect **SWN(1) to SWN(2)**

Address information	Control information	Bearer information
	BCS-ID = "25"	BNCL-ID = 1001,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 18 towards Switching Node 3.

18 Bearer-Setup.Connect **SWN(2) to SWN(3)**

Address information	Control information	Bearer information
	BCS-ID = "18"	BNCL-ID = 1002,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 19 towards Switching Node 4.

19 Bearer-Setup.Connect **SWN(3) to SWN(4)**

Address information	Control information	Bearer information
	BCS-ID = "27"	BNCL-ID = 1003,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 20 towards BIWF(y) .

20 Bearer-Setup.Connect **SWN(4) to BIWF(y)**

Address information	Control information	Bearer information
	BCS-ID = "15"	BNCL-ID = 1004,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, cuts through the outgoing trunk to the new backbone network connection, and issues information flow 21 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action, and awaits further action responses from the selected ISDN.

22a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 20 and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

22b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 20 and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

23 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 24, and records the alerting condition within its own database.

24	ACM		ISN(B) to ISN(A)
	Address information	**Control information** CCA-ID = 5,	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 25, and records the alerting condition within its own database.

25	ACM		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

26	ANM		ISDN(B) to ISN(B)
	Address information	**Control information** CIC-ID = 6000	**Bearer information**

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow, and records the answer condition within its own database.

27	ANM		ISN(B) to ISN(A)
	Address information	**Control information** CCA-ID = 5,	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 28, and records the answer condition within its own database.

28	ANM		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.4.2 Forward Establishment of a new Backbone Network Connection with Codec Negotiation

The information flows and functional entity actions illustrated in Figure 8-9 are described in the following numbered paragraphs. The cut-through points illustrated in the figure are the latest point at which cut-through has occurred. Depending on the bearer control protocol, cut through may occur at an earlier point in time. The information elements BNC-ID and O-BIWF-Addr contained in the APM message with an Action ID of "connected," are here for information and do not need to be supported by protocol in CS-1.

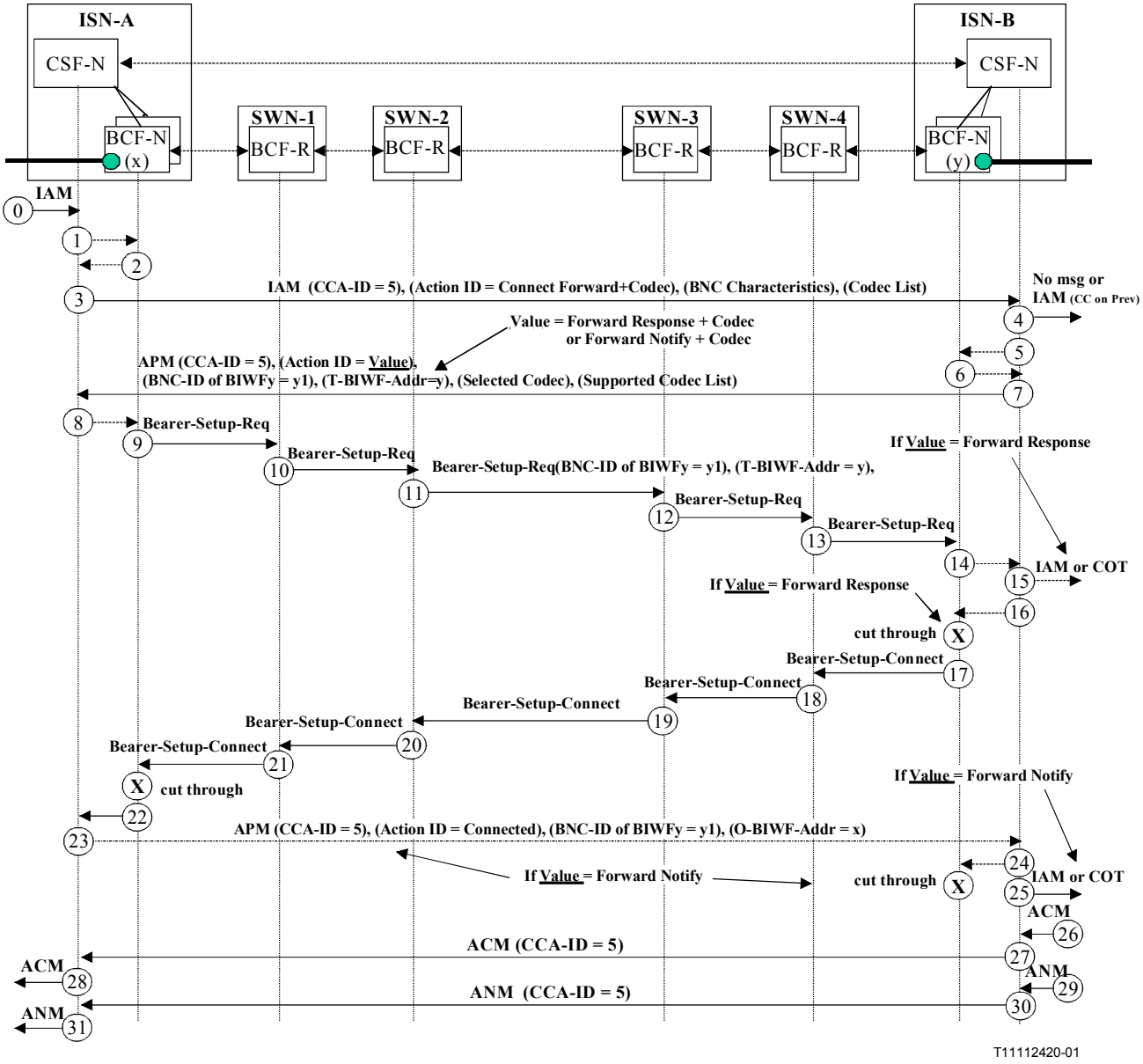

Figure 8-9 – Forward Establishment of a new Backbone Network Connection with Codec Negotiation

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0 IAM **ISDN(A) to ISN(A)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the Bearer Interworking Function (BIWF = x) that will be used to interface with the requesting ISDN associated with the calling party, and the ISN determines the ISDN network associated with the called party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWFs BCF-N. The BCF-N specifies the information to be carried by the BNC Characteristics parameter and indicates a forward set-up request, and passes this information to the CSF-N. (Note: This interaction between the CSF and BCF are represented by information flows 1 and 2.) CSF-N then determines the signalling route to that ISDN and issues information flow 3

towards an ISN associated with the designated ISDN network. Information flow 3 indicates that a forward set-up of the bearer is desired and also contains the Codec list. The codec list is obtained from the BCF through information flow 2. The ISN(A) awaits the response indicating the address of the destination BIWF and its associated BNC-ID value.

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3 IAM **ISN(A) to ISN(B)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-N(ISN-B),	CCA-ID = 5, Action Indication = Connect Forwards + Codec	Bearer Service Characteristics BNC Characteristics Codec List

Processing upon receipt: The selected ISN validates the request, evaluates the codec information in the Codec List, selects a Codec, generates the supported codec list by removing unsupported codecs list from the codec list, and determines the Bearer Interworking Function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 4 towards ISDN B. It then communicates with the selected Bearer Interworking Function indicating a forward set-up request, along with a local call reference, and codec list in order to determine the BNC-ID to be associated with this new connection. The BIWF's BCF-N chooses a BNC-ID value of 710, selects the response mode to be associated with the Action ID (Forward Response or Forward Notify) based on the bearer service characteristics, reviews the codec list, slects a codec to be used, and creates a supported codec list and proceeds to notify its associated CSF-N of these information objects (information flow 6). The CSF-N proceeds to notify ISN(A) that it will need to begin to establish the backbone network connection between its selected BIWF and the selected BIWF within the scope of ISN(B) and indicates if a notification is necessary. This is accomplished by issuing information flow 7. ISN(B) awaits the completion of the backbone network connection.

NOTE – Setting the Action ID to "Forward response" will result in:

1) an IAM or COT being forwarded as shown in information flow 15;

2) cut-through occurring after information flow 16;

3) no APM message being sent as in information flow 23.

Setting the Action ID to "Forward Notify" will result in:

1) an IAM or COT being forwarded in information flow 25;

2) cut-through occurring before information flow 24;

3) an APM message being sent as in information flow 23, indicating continuity.

4a IAM (CC on Prev) **ISN(B) to ISDN(B)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 3.

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

4b No ISUP Message is Forwarded at this Time

7	APM		ISN(B) to ISN(A)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	CCA-ID = 5, Action Indication = Forward response + Codec or Forward Notify + Codec	BNC-ID: = 710, Selected Codec Supported codecs list

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(x) to begin bearer establishment between BIWF(x) and BIWF(y) via information flow 8. The selected codec is included in information flow 8. The Bearer Interworking Function issues information flow 9 which begins the forward direction backbone network connection establishment. The CSF-N records the Supported Codec for possible future use.

9	Bearer-Setup.Req		BIWF(X) to SWN(1)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y	BCS-ID = "65",	BNC-ID: = 710, BNCL-ID = 1000, {BNCL characteristics},

Initiation of information flow: Processing of information flow 7

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and SWN(2). The switching node issues information flow 10 towards SWN(2). Information flow (10)'s link information was determined from the link information received in information flow 7. Switching Node 1 awaits the commitment information from SWN(2).

10	Bearer-Setup.Req		SWN(1) to SWN(2)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = "25",	BNC-ID: = 710, BNCL-ID = 1001, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and SWN(3). The switching node issues information flow 11 towards SWN(3). Information flow (11)'s link information was determined from the link information received in information flow 10. Switching Node 2 awaits the commitment information from SWN(3).

11	Bearer-Setup.Req		SWN(2) to SWN(3)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = "18",	BNC-ID: = 710,, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(3) and SWN(4). The switching node issues information flow 12 towards SWN(4). Information flow (12)'s link information was determined from the link information received in information flow 11. Switching Node 3 awaits the commitment information from SWN(4).

12 Bearer-Setup.Req **SWN(3) to SWN(4)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	BCS-ID = "27",	BNC-ID: = 501, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(4) and BIWF(y). The switching node issues information flow 13 towards BIWF(y). Information flow (13)'s link information was determined from the link information received in information flow 12. Switching Node 4 awaits the commitment information from BIWF(y).

13 Bearer-Setup.Req **SWN(4) to BIWF(y)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	BCS-ID = "15",	BNC-ID: = 710, BNCL-ID = 1004, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and ISN-B. This is done via information flow 14. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 16 towards the selected BIWF indicating that the bearer is to be connected. If the Action ID conveyed in information flow 7 was a Forward Response indication, the BIWF cuts through the incoming bearer link from ISN(A) to the designated outgoing port of the BIWF and issues information flow 17 towards Switching Node 4. In addition, the call service function issues information flow 15 towards the terminating ISDN(B). If the Action ID conveyed in information flow 7 was a Forward Notify indication, the BIWF will not cut through the incoming bearer link to the designated outgoing port of the BIWF but will issue information flow 17 towards Switching node 4. In addition, information flow 15 will not be generated.

15a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 13 (conditional upon an Action ID = Forward Response in information flow 7) and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

15b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 13 (conditional upon an Action ID = Forward Response in information flow 7) and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside of the scope of these signalling requirements.

17	Bearer-Setup.Connect		BIWF(y) to SWN(4)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "15"	BNCL-ID = 1004,

Initiation of information flow: Processing of information flow 13

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 18 towards Switching Node 3.

18	Bearer-Setup.Connect		SWN(4) to SWN(3)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1003,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 19 towards Switching Node 2.

19	Bearer-Setup.Connect		SWN(3) to SWN(2)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "18"	BNCL-ID = 1002,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 20 towards Switching Node 1.

20	Bearer-Setup.Connect		SWN(2) to SWN(1)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "25"	BNCL-ID = 1001,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 21 towards Interface Serving Node -A.

21	Bearer-Setup.Connect		SWN(1) to BIWF(X)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "65"	BNCL-ID = 1000,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, performs cut-through of the incoming trunk to the BNC Link established between the two BIWFs, and issues information flow 22 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action, and if the Action ID conveyed in information 7 was a Forward Notify indication, the CSF issues information flow 23. In either case it awaits further action responses from the selected ISN.

23	APM		ISN(A) to ISN(B)
	Address information	**Control information**	**Bearer information**
	O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 21

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(y) to cut through via information flow 25, and issues information flow 24 towards the terminating ISDN.

25a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 23 (conditional upon Action ID = Forward Notify in information flow 7) and IAM (with CC on previous) being sent in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

25b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 23 (conditional upon Action ID = Forward Notify in information flow 7) and no IAM being forwarded in information flow 4.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

26 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 27, and records the alerting condition within its own database.

27 ACM **ISN(B) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 28, and records the alerting condition within its own database.

28 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

29	ANM		ISDN(B) to ISN(B)
	Address information	**Control information** CIC-ID = 6000	**Bearer information**

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 30, and records the answer condition within its own database.

30	ANM		ISN(B) to ISN(A)
	Address information	**Control information** CCA-ID = 5,	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 31, and records the answer condition within its own database.

31	ANM		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.5 Establishment of a Backbone Network Connection with Codec Negotiation and Transit Serving Node

8.1.5.1 Backward Connection Set-up with Codec Negotiation and Transit Serving Node

The information flows and functional entity actions illustrated in Figure 8-10 are described in the following numbered paragraphs. The cut-through points illustrated in the figure are the latest point at which cut-through has occurred. Depending on the bearer control protocol, cut-through may occur at an earlier point in time.

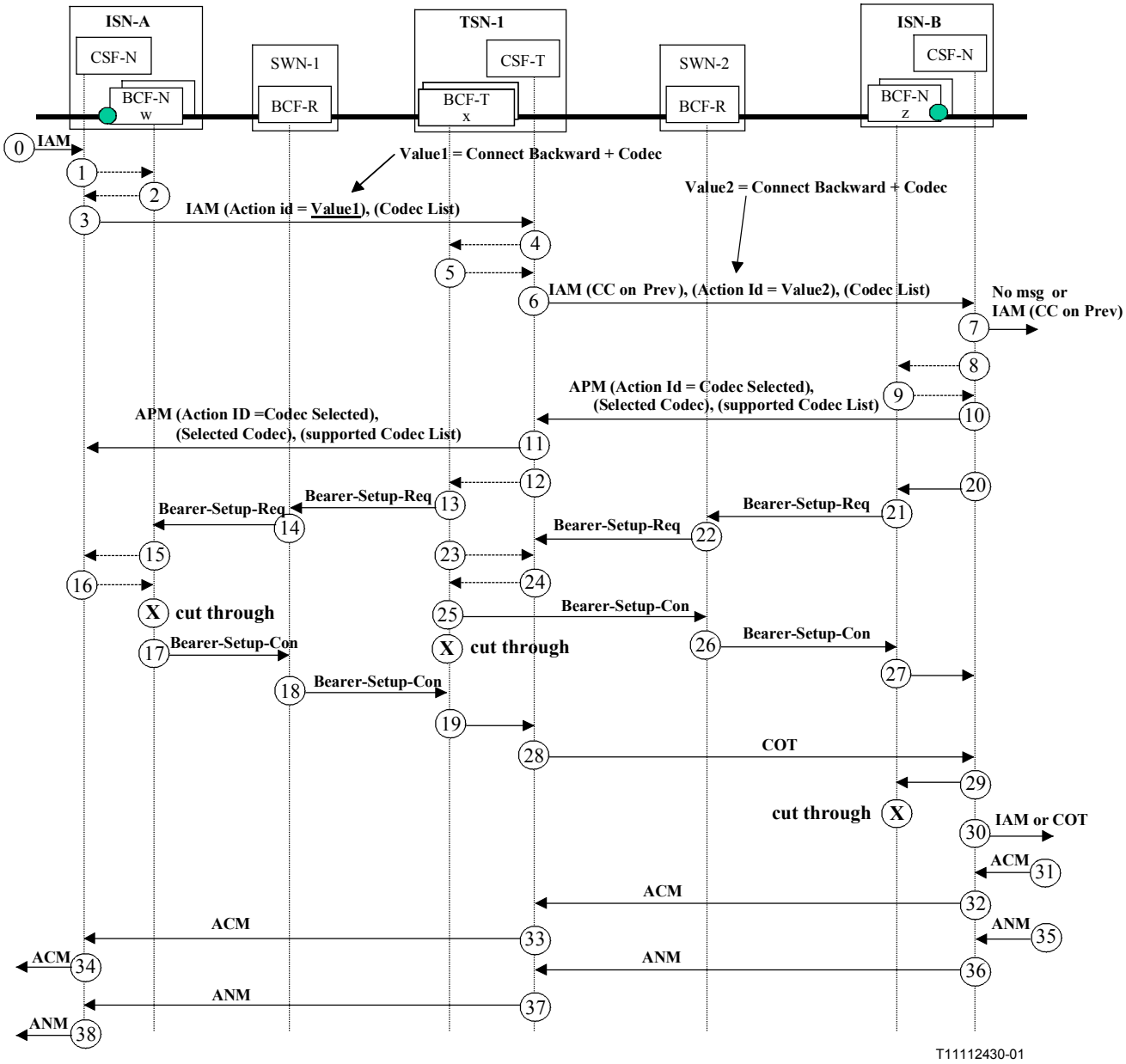

Figure 8-10 – Backward Connection Set-up with Transit Serving Node and Codec Negotiation

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0 IAM **ISDN(A) to ISN(A)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the bearer interworking function (BIWF = w) that will be used to interface with the requesting ISDN associated with the calling party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N chooses a BNC-ID value of 501 and associates this BNC-ID value with the local call reference value. The BCF-N passes the indication of backward set-up request, the chosen BNC-ID value, and the codec list to the CSF-N. (Note: This interaction between the CSF and BCF are represented by the information flows 1 and 2.)

The CSF-N determines the ISDN network associated with the called party. It then determines the signalling route to that ISDN and issues information flow 3 towards a ISN associated with the designated ISDN network. Information flow 3 indicates that a backward set-up of the bearer is desired and contains the list of codecs allowed for use. The ISN(A) awaits the establishment of the backbone connection across the backbone network.

3	**IAM**		**ISN(A) to TSN(1)**
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-TSN Addr = TSN-1, T-BIWF-Addr = w,	CCA-ID = 5, Action Indication = Connect Backward + Codec "COT on Previous"	BNC-ID: = 501, Bearer Service Characteristics BNC Characteristics Codec List

Processing upon receipt: The selected TSN(1) CSF-N validates the request, validates the suitability of the Codec information contained in the Codec list and determines the Bearer Interworking Function (BIWF = x) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N issues information flow 4 towards the selected bearer interworking function in order to obtain the BNC-ID to be associated with the BNC between TSN(1) and ISN(B) and the backward set-up request indication. The BIWF chooses a BNC-ID of 701 to be used to associate the backbone bearer connection between TSN-1 and ISN(B). The BCF-N conveys the BNC-ID value, the BNC Characteristics, and backward set-up request indication to its associated CSF-N. The CSF-N then issues information flow 6 towards ISN (B) containing the BNC-ID value of 701, indicates backward set-up connection with codec and an indication whether a connection response is requested (Connected backward + codec). The TSN(1) awaits the commitment information flow from the selected ISN. Information flows 4 and 5 are not described in this example since they are outside the scope of capability set 1.

6	**IAM**		**TSN(1) to ISN(B)**
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-T(TSN-1), D-ISN Addr = ISN-B, T-BIWF-Addr = x,	CCA-ID = 35, Action Indication = Connect Backward "COT on Previous"	BNC-ID: = 701, Bearer Service Characteristics BNC Characteristics Codec List

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The selected ISN's CSF-N validates the request and determines the Bearer Interworking Function (BIWF = z) to be used to carry the new backbone connection between TSN(1) and ISN(B). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 7 towards the selected ISDN exchange (ISDN B), and issues information flow 8 towards the selected Bearer Interworking Function in order to determine if a pre-established idle backbone network connection exists between it and the Bearer Interworking Function selected by TSN(1) along with the Backward set-up option and the codec list. The BCF-N also reviews the codec list and selects a codec to be used. in addition, the BCF-N creates a list of supported codecs. The BIWF's BCF-N determines that no existing idle backbone connection meets the requirements. These lists and the indication that a new connection must be established between TSN(1) and ISN(B) are conveyed to its associated CSF-N. The CSF-N issues information flow 10 towards the TSN indicating the selected codec value and the list of supported codec. In addition, the CSF-N issues information flow 22 to the BIWF indicating that it is to establish this new connection. The Bearer Interworking Function determines the backbone network facility to be used and issues information flow 23 towards the selected SWN. The CSF-N awaits the commitment information flow from the selected bearer interworking function. Information flows 8, 9 and 22 are not described in this example since they are outside the scope of capability set 1.

7a IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 6.

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

7b No ISUP Message Forwarded at this Time

10 APM **ISN(B) to TSN(1)**

Address information	Control information	Bearer information
O-BIWF Addr = y,	CCA-ID = 5, Action Indication = Codec Selected	BNC-ID: = 710, Codec Selected Supported Codecs list

Initiation of information flow: Processing of information flow 6

Processing upon receipt: When TSN(A) receives this information flow, it notes that a codec has been selected. The CSF-N records the supported codec list and directs the BIWF to establish the new connection between TSN(1) and ISN(A) via information flow 12. The selected codec is passed to the BIWF in order that the BCF-N can establish the appropriate BNC for this selected codec type. The BCF-N initiates bearer set-up by issuing information flow 13. The CSF issues information flow 11 towards ISN(A) notifying it of the selected codec and the supported codecs. The TSN(!) awaits the completion of the requested backbone network connection.

11 APM **TSN(1) to ISN(A)**

Address information	Control information	Bearer information
O-BIWF Addr = y,	CCA-ID = 5, Action Indication = Codec Selected	BNC-ID: = 710, Codec Selected Supported Codecs list

Initiation of information flow: Processing of information flow 10

Processing upon receipt: When ISN(A) receives this information flow, it notes that a codec has been selected. The CSF-N records the supported codec list and the selected codec to be used when the connection is completed. The CSF-N awaits the completion of the backbone bearer connection.

13 Bearer-Setup.Req **BIWF(x) to SWN(1)**

Address information	Control information	Bearer information
T-BIWF Addr = w,	BCS-ID = "15",	BNC-ID: = 501, BNCL-ID = 1004, {BNCL characteristics},

Initiation of information flow: Processing of information flow 10

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and BIWF(w). The switching node issues information flow 14 towards BIWF(w). Information flow (14)'s link information was determined from the link information received information flow 13. Switching Node 1 connects the backbone network connection link between SWN(1) and BIWF(x) and the backbone network connection link between SWN(1) and BIWF(w), and awaits the commitment information from BIWF(w).

14	Bearer-Setup.Req		SWN(1) to BIWF(w)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = w,	BCS-ID = "27",	BNC-ID: = 501, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and TSN-1. This is done via information flow 15. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 16 containing the codec to be used towards the selected BIWF indicating that the bearer is to be connected. Because the Action ID contained in information flow 3 was Connect Backward, the BIWF cuts through the incoming bearer link from ISDN(A) to the designated outgoing port of the BIWF and issues information flow 17 towards Switching Node 1.

17	Bearer-Setup.Connect		BIWF(w) to SWN(1)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1003

Initiation of information flow: Processing of information flow 14

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 18 towards BIWF(x).

18	Bearer-Setup.Connect		SWN(1) to BIWF(x)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "15"	BNCL-ID = 1004,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, and issues information flow 19 notifying its associated call service function that the requested bearer action has been completed. Because the Action ID contained in information flow 6 was a Connect Backward, and if information flow 24 has been received, the BCF will cut through the incoming BNC to the Outgoing BNC. The call service function records the completion of the bearer action and awaits further action responses from ISN(B).

21	Bearer-Setup.Req		BIWF(z) to SWN(2)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = "15",	BNC-ID: = 402, BNCL-ID = 1001, {BNCL characteristics},

Initiation of information flow: Processing of information flow 6

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and BIWF(x). The switching node issues information flow 22 towards BIWF(x). Information flow (22)'s link information was determined from the link information received information flow 21. Switching Node 1 awaits the commitment information from BIWF(x).

22	Bearer-Setup.Req		SWN(2) to BIWF(x)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = "27",	BNC-ID: = 402, BNCL-ID = 1002, {BNCL characterisics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-B and TSN-1. This is done via information flow 23. The Call Service Function correlates the incoming

bearer request with the incoming call request and issues information flow 24 containing the codec to be used towards the selected BIWF indicating that the bearer is to be connected. Because the Action ID contained in information flow 6 was Connect Backward, the BIWF cuts through the incoming bearer link from ISN(A) to the designated outgoing port of the BIWF and issues information flow 25 towards Switching Node 2.

25	**Bearer-Setup.Connect**		**BIWF(x) to SWN(2)**
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1002

Initiation of information flow: Processing of information flow 22

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 26 towards BIWF(z).

26	**Bearer-Setup.Connect**		**SWN(2) to BIWF(z)**
	Address information	**Control information**	**Bearer information**
		BCS-ID = "15"	BNCL-ID = 1001,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, and issues information flow 27 notifying its associated call service function that the requested bearer action has been completed.

28	**COT**		**TSN(1) to ISN(B)**
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5	

Initiation of information flow: Reception of information flow 18 and an IAM (with CC on previous) being sent in information flow 6.

Processing upon receipt: When ISN(B) receives these information flows, it issues a COT or IAM information flow 30 to ISDN(B), and notifies its associated BIWF, via information flow 33, that the connection is available, and awaits further responses from ISDN(B). The BCF performs cut-through of the incoming BNC and the outgoing trunk.

30a	**COT**		**ISN(B) to ISDN(B)**
	Address information	**Control information**	**Bearer information**
		CIC-ID = 6000	

Initiation of information flow: Processing of information flow 28 and IAM (with CC on previous) being sent in information flow 7.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

30b	**IAM**		**ISN(B) to ISDN(B)**
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 28 and no IAM being forwarded in information flow 7.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

31 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 32, and records the alerting condition within its own database.

32 ACM **ISN(B) to TSN(1)**

Address information	Control information	Bearer information
	CCA-ID = 25,	

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 33, and records the alerting condition within its own database.

33 ACM **TSN(1) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 34, and records the alerting condition within its own database.

34 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

35 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 36, and records the answer condition within its own database.

36 ANM **ISN(B) to TSN(1)**

Address information	Control information	Bearer information
	CCA-ID = 25	

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 37, and records the answer condition within its own database.

37	ANM		TSN(1) to ISN(A)
	Address information	**Control information** CCA-ID = 5,	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 38, and records the answer condition within its own database.

38	ANM		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.5.2 Forward Connection Set-up with Codec Negotiation and Transit Serving Node

The information flows and functional entity actions illustrated in Figure 8-11 are described in the following numbered paragraphs. The cut-through points illustrated in the figure are the latest point at which cut-through has occurred. Depending on the bearer control protocol, cut-through may occur at an earlier point in time. The information elements BNC-ID and O-BIWF-Addr contained in the APM message with an Action ID of "connected," are here for information and do not need to be supported by protocols in CS-1.

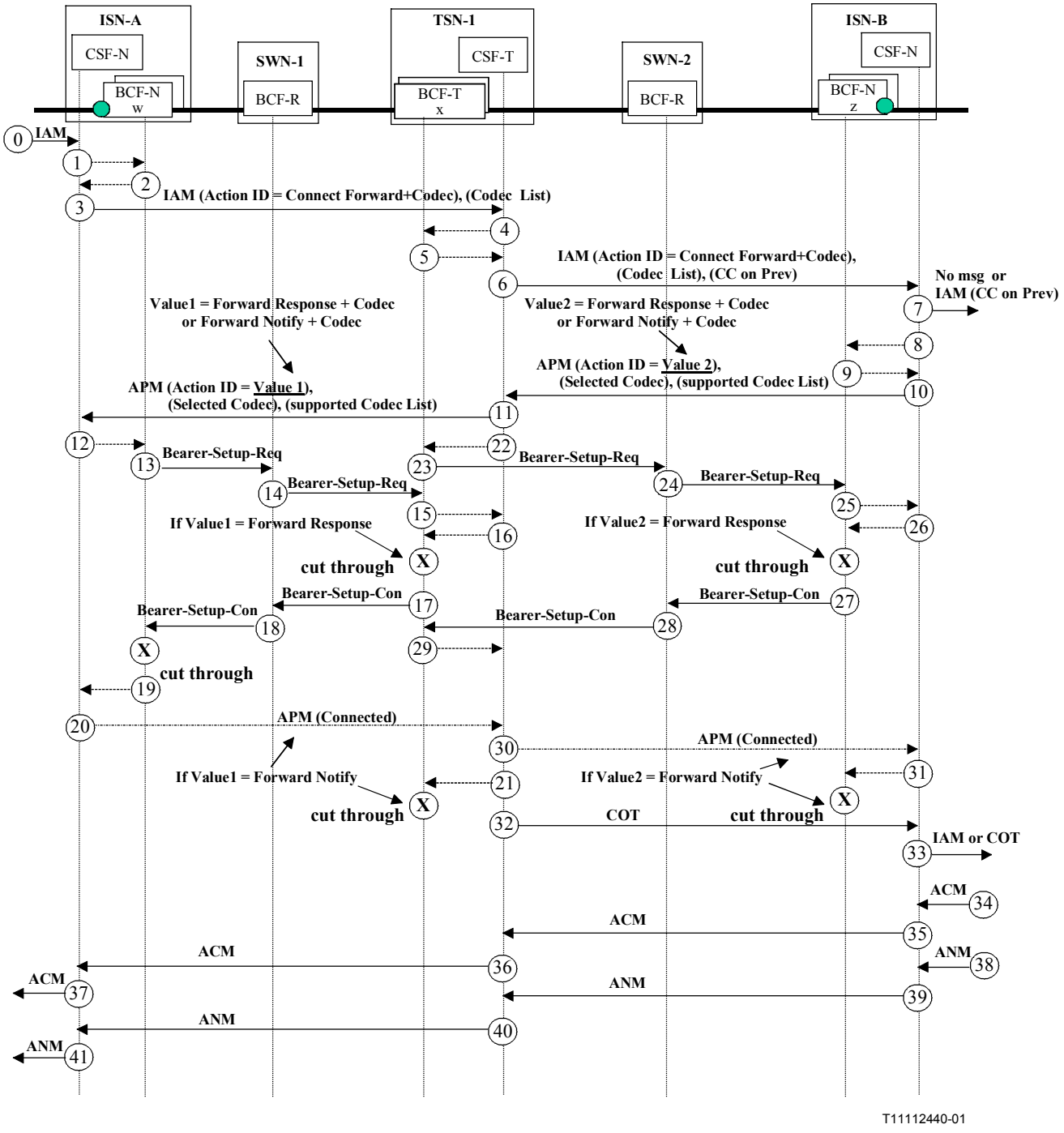

Figure 8-11 – Forward Connection Set-up with Transit Serving Node and Codec Negotiation

0 IAM **ISDN(A) to ISN(A)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the Bearer Interworking Function (BIWF = w) that will be used to interface with the requesting ISDN associated with the calling party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWF's BCF-N. The BCF-N indicates a forward set-up request, specifies the information to be carried by the BNC Characteristics and passes the BNC Characteristics, and the Codec List to the CSF-N. (Note: This interaction between the CSF and BCF are represented by the information flows 1 and 2.) The CSF-N determines the ISDN network associated with the called party. It then determines the signalling route to that ISDN and issues information flow 3 towards an ISN associated with the designated ISDN network. Information flow 3 indicates that a forward set-up of the bearer is desired and contains the list of codecs allowed for use. The ISN(A) awaits the response indicating the address of the destination BIWF and its associated BNC-ID value.

3 IAM **ISN(A) to TSN(1)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-TSN Addr = TSN-1, T-BIWF-Addr = w,	CCA-ID = 5, Action Indication = Connect Forward	Bearer Service Characteristics BNC Characteristics Codec List

Processing upon receipt: The selected TSN(1) CSF-N validates the request, validates the suitability of the Codec information contained in the Codec list and determines the Bearer Interworking Function (BIWF = x) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N issues information flow 4 towards the selected Bearer Interworking Function in order to choose a BNC-ID. The BIWF chooses a BNC-ID of 701 to be used to associate the backbone bearer connection between TSN-1 and ISN(A). This value, an indication of forward set-up request, and the information to be placed into the BNC Characteristics associated with the BNC between TSN(1) and ISN(B) are conveyed to the CSF-N via information flow 5. The CSF-N then issues information flow 6 towards ISN (B) containing the BNC-ID value of 701, indicates forward set-up connection with codec. Information flows 4 and 5 are not described in this example since they are outside the scope of capability set 1.

6 IAM **TSN(1) to ISN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-T(TSN-2), D-CSF Addr = CSF-T(ISN-B), T-BIWF-Addr = x,	CCA-ID = 35, Action Indication = Connect Forward + Codec "COT on Previous"	Bearer Service Characteristics BNC Characteristics Codec List

Initiation of information flow: Processing of information flow 3

Processing upon receipt: The selected ISN's CSF-N validates the request and determines the Bearer Interworking Function (BIWF = z) to be used to carry the new backbone connection between TSN(1) and ISN(B). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 7 towards the selected ISDN exchange (ISDN B), and issues information flow 8 towards the selected Bearer Interworking Function in order to obtain the BNC-ID used to reference the BNC connection between TSN(1) and the ISN(B). The BCF-N selects a value of 402 for the BNC-ID, specifies the notify option and passes this information to its associated CSF-N. In addition,

the BCF-N reviews the codec list and selects the codec to be used and creates a list of supported codecs. This information is also conveyed to the CSF-N in information flow 9. The interface serving node issues information flow 10 towards TSN(1). This information flow contains the BNC-ID, the BIWF address, the notify option, the selected codec and supported codec list. The ISN(B) awaits the commitment information flow from the selected interworking function. Information flows 8 and 9 are not described in this example since they are outside the scope of capability set 1.

7a	**IAM**		**ISN(B) to ISDN(B)**
	Address information	**Control information**	**Bearer information**
	(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 6

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

7b No ISUP Message Forwarded at this Time

10	**APM**		**ISN(B) to TSN(1)**
	Address information	**Control information**	**Bearer information**
	O-BIWF Addr = z,	CCA-ID = 5, Action Indication = Forward Response + Codec or Forward Notify + Codec	BNC-ID: = 402, Codec Selected Supported codecs list

Initiation of information flow: Processing of information flow 6

Processing upon receipt: When TSN(1) receives this flow, it forwards the selected codec to ISN(A) via information flow 11, records the notification option, records the supported codec list for future possible use, communicates with the selected BIWF within its scope requesting that the backbone connection between TSN(1) and ISN(B) be established (information flow 22). The information flow 22 contains the selected codec, the BIWF address of the BIWF within the scope of ISN(B), and the BNC-ID to be associated with the BNC to be established. The BIWF initiates BNC establishment by issuing information flow 23 and awaits BNC establishment completion. The CSF-N awaits the confirmation of the backbone connection from its associated BIWF.

11	**APM**		**TSN(1) to ISN(A)**
	Address information	**Control information**	**Bearer information**
	O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Forward Response + Codec or Forward Notify + Codec	BNC-ID: = 701, Codec Selected Supported codecs list

Initiation of information flow: Processing of information flow 10

Processing upon receipt: When ISN(A) receives this information flow, it records the supported codec list for possible future use, conveys the BNC-ID and the selected codec, the destination BIWF address within the scope of TSN(1) to the BIWF within the scope of ISN(A) via information flow 12. Information flow 12 requests the establishment of the backbone network connection between ISN(A) and TSN(1). The BIWF initiates BNC establishment by issuing information flow 13 and awaits BNC establishment completion. The CSF-N awaits the confirmation of the backbone network connection from its associated BIWF.

13	Bearer-Setup.Req		BIWF(w) to SWN(1)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = "15",	BNC-ID: = 701, BNCL-ID = 1004, {BNCL characteristics},

Initiation of information flow: Processing of information flow 11

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and BIWF(x). The switching node issues information flow 14 towards BIWF(x). Information flow (14)'s link information was determined from the link information received information flow 13. Switching Node 1 awaits the commitment information from BIWF(x).

14	Bearer-Setup.Req		SWN(1) to BIWF(x)
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = x,	BCS-ID = "27",	BNC-ID: = 701, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and TSN-1. This is done via information flow 15. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 16 towards the selected BIWF indicating that the bearer is to be connected. If the Action ID contained in information flow 11 indicated Forward Response, the BIWF cuts through the incoming bearer link from ISDN(A) to the designated outgoing port of the BIWF and issues information flow 17 towards Switching Node 1. If the Action ID contained in information flow 11 indicated Forward Notify, the BIWF only issues information flow 17.

17	Bearer-Setup.Connect		BIWF(x) to SWN(1)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "27"	BNCL-ID = 1003

Initiation of information flow: Processing of information flow 14

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 18 towards BIWF(w).

18	Bearer-Setup.Connect		SWN(1) to BIWF(w)
	Address information	**Control information**	**Bearer information**
		BCS-ID = "15"	BNCL-ID = 1004,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, establishes cut-through, and issues information flow 19 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action and issues information flow 20 towards TSN(1) if information flow 11 contained an action indicator value of Forward Notify. ISN(A) awaits further action responses from TSN(1).

20 APM **ISN(B) to TSN(2)**

Address information	Control information	Bearer information
O-BIWF Addr = w,	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 701,

Initiation of information flow: Processing of information flow 18 and conditional upon information flow 11 containing an Action ID equal to "Forward Notify".

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(x) to cut through via information flow 21. The BIWF cuts through the incoming BNC to the BNC between TSN(1) and ISN(B) after receiving information flow 28.

23 Bearer-Setup.Req **BIWF(x) to SWN(2)**

Address information	Control information	Bearer information
T-BIWF Addr = z,	BCS-ID = "15",	BNC-ID: = 402, BNCL-ID = 1001, {BNCL characteristics},

Initiation of information flow: Processing of information flow 10

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and BIWF(z). The switching node issues information flow 24 towards BIWF(z). Information flow (24)'s link information was determined from the link information received information flow 23. Switching Node 2 awaits the commitment information from BIWF(z).

24 Bearer-Setup.Req **SWN(2) to BIWF(x)**

Address information	Control information	Bearer information
T-BIWF Addr = x,	BCS-ID = "27",	BNC-ID: = 402, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-B and TSN-1. This is done via information flow 25. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 26 towards the selected BIWF indicating that the bearer is to be connected. If the Action ID contained in information flow 10 indicated Forward Response, the BIWF cuts through the incoming bearer link from ISDN(A) to the designated outgoing port of the BIWF and issues information flow 27 towards Switching Node 2. If the Action ID contained in information flow 10 indicated Forward Notify, the BIWF only issues information flow 27.

27 Bearer-Setup.Connect **BIWF(z) to SWN(2)**

Address information	Control information	Bearer information
	BCS-ID = "27"	BNCL-ID = 1002

Initiation of information flow: Processing of information flow 24

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 28 towards BIWF(x).

28 Bearer-Setup.Connect **SWN(2) to BIWF(x)**

Address information	Control information	Bearer information
	BCS-ID = "15"	BNCL-ID = 1001,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, and issues information flow 29 notifying its associated call service function that the requested bearer action has been completed. The CSF-N issues information flow 32 towards ISN(B) indicating connection available. In addition, TSN(1) issues information flow 30 towards ISN(B), if the Action ID in information flow 10 was Forward Notify.

30 APM **ISN(B) to TSN(1)**

Address information	Control information	Bearer information
O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Connected	BNC-ID: = 701,

Initiation of information flow: Processing of information flow 28 and conditional upon information flow 10 containing an Action ID equal to "Forward Notify."

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(y) to cut through via information flow 31. The BIWF cuts through the incoming trunk to the established BNC.

32 COT **TSN(1) to ISN(B)**

Address information	Control information	Bearer information
	CCA-ID = 5	

Initiation of information flow: Reception of information flow 28 and an IAM (with CC on previous) being sent in information flow 6.

Processing upon receipt: When ISN(B) receives these information flows, it issues a COT or IAM information flow 33 to ISDN(B) and awaits further responses from ISN(B).

33a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 32 and IAM (with CC on previous) being sent in information flow 7.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

33b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 32 and no IAM being forwarded in information flow 7.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

34 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 35, and records the alerting condition within its own database.

35 ACM **ISN(B) to TSN(1)**

Address information	Control information	Bearer information
	CCA-ID = 25,	

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 36, and records the alerting condition within its own database.

36 ACM **TSN(1) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 37, and records the alerting condition within its own database.

37 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

38 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 39, and records the answer condition within its own database.

39 ANM **ISN(B) to TSN(1)**

Address information	Control information	Bearer information
	CCA-ID = 25	

Processing upon receipt: When the TSN(1) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 40, and records the answer condition within its own database.

40	ANM		TSN(1) to ISN(A)
	Address information	**Control information** CCA-ID = 5,	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 41, and records the answer condition within its own database.

41	ANM		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.6 Forward Connection Set-up with Call Mediation Node

The signalling requirements for Capability Set 1 state that the Call Mediation Node shall not be excluded by the protocol implementation, a signalling flow is incorporated in these signalling flows which illustrate its actions upon establishment of a new call and backbone network connection. Since the CMN procedures are outside the scope of Capability Set 1, only one flow will be illustrated in this subclause.

The information flows and functional entity actions illustrated in Figure 8-12 are described in the following numbered paragraphs. The cut-through points illustrated in the figure are the latest point at which cut-through has occurred. Depending on the bearer control protocol, cut-through may occur at an earlier point in time. The information elements BNC-ID and O-BIWF-Addr contained in the APM message with an Action ID of "connected", are here for information and do not need to be supported by protocol in CS-1.

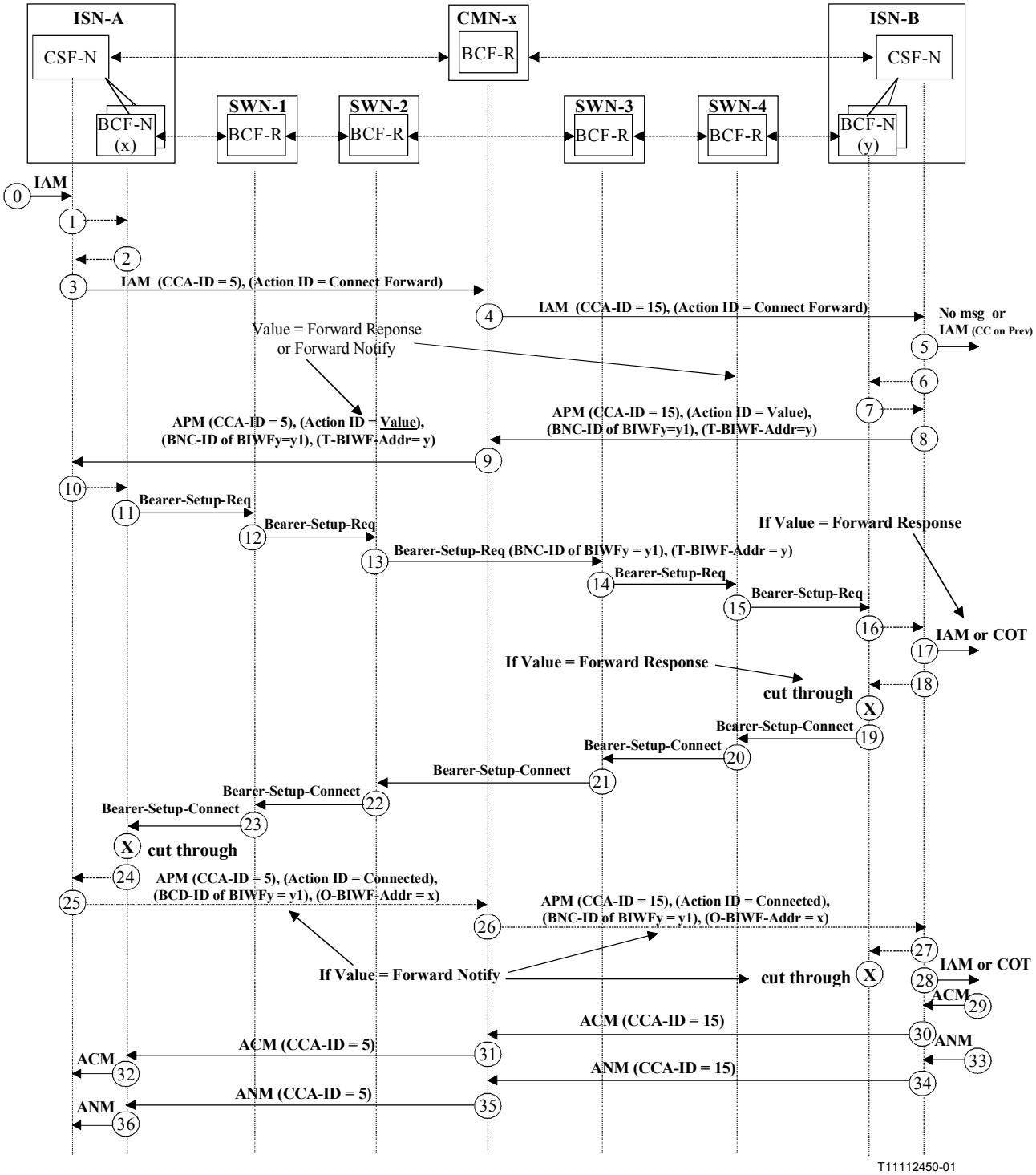

Figure 8-12 – Forward Connection Set-up with Call Mediation Node

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0 IAM **ISDN(A) to ISN(A)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC = 5000	Bearer Service Characteristics

Initiation of information flow: A user associated with the ISDN(A) has requested an N-ISDN service.

Processing upon receipt: When the ISN's CSF-N receives this information flow, it validates the request, determines the Bearer Interworking Function (BIWF = x) that will be used to interface with the requesting ISDN associated with the calling party, and the ISN determines the ISDN network associated with the called party. The CSF-N chooses a local call reference value and passes this value to the chosen BIWFs BCF-N. The BCF-N indicates a forward set-up request, specifies the information to be carried by the BNC Characteristics parameter and passes this information to the CSF-N. (Note: This interaction between the CSF and BCF is represented by information flows 1 and 2.) CSF-N then determines the signalling route to that ISDN and issues information flow 3 towards a CSF-C associated with the designated ISDN network. Information flow 3 indicates that a forward set-up of the bearer is desired. The ISN(A) awaits the response indicating the address of the destination BIWF and its associated BNC-ID value.

---

3 IAM **ISN(A) to CMN(X)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-N(ISN-A), D-CSF Addr = CSF-C(CMN-X),	CCA-ID = 5, Action Indication = Connect Forwards	Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected CMN(X) validates the request and forwards the IAM, changing the CCA-ID.

---

4 IAM **CMN(X) to ISN(B)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A, O-CSF Addr = CSF-C(CMN-X), D-CSF Addr = CSF-N(ISN-B),	CCA-ID = 15, Action Indication = Connect Forwards	Bearer Service Characteristics BNC Characteristics

Processing upon receipt: The selected ISN validates the request and determines the Bearer Interworking Function (BIWF = y) to be used to carry the new backbone connection between ISN(B) and ISN(A). The CSF-N selects the outgoing trunk group and trunk member and issues information flow 5 towards ISDN B. It then communicates with the selected Bearer Interworking Function indicating a forward set-up request, along with a local call reference in order to determine the BNC-ID to be associated with this new connection. The BIWF's BCF-N chooses a BNC-ID value of 710, selects the response mode to be associated with the Action ID (Forward Response or Forward Notify) based on the bearer control characteristics, and proceeds to notify its associated CSF-N of these information objects (information flow 7). In addition to the BNC-ID, the BCF-N notifies its associated CSF-N if a BNC notification should be requested. The CSF-N proceeds to notify ISN(A) via CMN(X) that it will need to begin to establish the backbone network connection between its selected BIWF and the selected BIWF within the scope of ISN(B) and indicates if a notification is necessary. This is accomplished by issuing information flow 8. ISN(B) awaits the completion of the backbone network connection

---

5a IAM (CC on Prev) **ISN(B) to ISDN(B)**

Address information	**Control information**	**Bearer information**
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000 "COT on Previous"	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 4

Processing upon receipt: When the ISDN(B) receives this information flow, it notes that ISN-B indicates that a COT action is being performed and awaits the information flow indicating the completion of the continuity test before it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

OR

5b No ISUP Message is Forwarded at this Time

8	**APM**		**ISN(B) to CMX(X)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	CCA-ID = 15, Action Indication = Forward response or Forward Notify	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 4

Processing upon receipt: The Call Mediation Node forwards the information to ISN(A) by issuing information flow 9.

9	**APM**		**ISN(B) to ISN(A)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	CCA-ID = 15, Action Indication = Forward response or Forward Notify	BNC-ID: = 710,

Processing upon receipt: The Interface Serving node notifies its bearer interworking unit BIWF(x) to begin bearer establishment between BIWF(x) and BIWF(y) via information flow 10. The Bearer Interworking Function issues information flow 11 which begins the forward direction backbone network connection establishment.

11	**Bearer-Setup.Req**		**BIWF(X) to SWN(1)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y	BCS-ID = “65”,	BNC-ID: = 710, BNCL-ID = 1000, {BNCL characteristics},

Initiation of information flow: Processing of information flow 9

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(1) and SWN(2). The switching node issues information flow 12 towards SWN(2). Information flow (12)'s link information was determined from the link information received in information flow 0. Switching Node 1 awaits the commitment information from SWN(2).

12	**Bearer-Setup.Req**		**SWN(1) to SWN(2)**
	Address information	**Control information**	**Bearer information**
	T-BIWF Addr = y,	BCS-ID = “25”,	BNC-ID: = 710, BNCL-ID = 1001, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(2) and SWN(3). The switching node issues information flow 13 towards SWN(3). Information flow (13)'s link information was determined from the link information received in information flow 12. Switching Node 2 awaits the commitment information from SWN(3).

13 Bearer-Setup.Req **SWN(2) to SWN(3)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	BCS-ID = "18",	BNC-ID: = 710,, BNCL-ID = 1002, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(3) and SWN(4). The switching node issues information flow 14 towards SWN(4). Information flow (14)'s link information was determined from the link information received in information flow 13. Switching Node 3 awaits the commitment information from SWN(4).

14 Bearer-Setup.Req **SWN(3) to SWN(4)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	BCS-ID = "27",	BNC-ID: = 501, BNCL-ID = 1003, {BNCL characteristics},

Processing upon receipt: The selected switching node validates the request and determines the route and backbone transport facility used to carry the new backbone connection between SWN(4) and BIWF(y). The switching node issues information flow 15 towards BIWF(y). Information flow (15)'s link information was determined from the link information received in information flow 14. Switching Node 4 awaits the commitment information from BIWF(y).

15 Bearer-Setup.Req **SWN(4) to BIWF(y)**

Address information	Control information	Bearer information
T-BIWF Addr = y,	BCS-ID = "15",	BNC-ID: = 710, BNCL-ID = 1004, {BNCL characteristics},

Processing upon receipt: The selected Bearer Interworking Function validates the request and notifies its associated Call Service function that a bearer has been requested between ISN-A and ISN-B. This is done via information flow 16. The Call Service Function correlates the incoming bearer request with the incoming call request and issues information flow 18 towards the selected BIWF indicating that the bearer is to be connected. If the Action ID conveyed in information flow 8 was a Forward Response indication, the BIWF cuts through the incoming bearer link from ISN(A) to the designated outgoing port of the BIWF and issues information flow 19 towards Switching Node 4. In addition, the call service function issues information flow 17 towards the terminating ISDN(B). If the Action ID conveyed in information flow 8 was a Forward Notify indication, the BIWF will not cut through the incoming bearer link to the designated outgoing port of the BIWF but will issue information flow 19 towards Switching node 4. In addition, information flow 15 will not be generated.

17a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 15 (conditional upon an Action ID = Forward Response in information flow 8) and IAM (with CC on previous) being sent in information flow 5.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

17b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 15 (conditional upon an Action ID = Forward Response in information flow 8) and no ISUP being forwarded in information flow 5.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

---

19 Bearer-Setup.Connect **BIWF(y) to SWN(4)**

Address information	Control information	Bearer information
	BCS-ID = "15"	BNCL-ID = 1004,

Initiation of information flow: Processing of information flow 15.

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 20 towards Switching Node 3.

---

20 Bearer-Setup.Connect **SWN(4) to SWN(3)**

Address information	Control information	Bearer information
	BCS-ID = "27"	BNCL-ID = 1003,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 21 towards Switching Node 2.

---

21 Bearer-Setup.Connect **SWN(3) to SWN(2)**

Address information	Control information	Bearer information
	BCS-ID = "18"	BNCL-ID = 1002,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 22 towards Switching Node 1.

---

22 Bearer-Setup.Connect **SWN(2) to SWN(1)**

Address information	Control information	Bearer information
	BCS-ID = "25"	BNCL-ID = 1001,

Processing upon receipt: The switching node notes the confirmation of the establishment request and issues information flow 23 towards Interface Serving Node -A.

---

23 Bearer-Setup.Connect **SWN(1) to BIWF(X)**

Address information	Control information	Bearer information
	BCS-ID = "65"	BNCL-ID = 1000,

Processing upon receipt: The Bearer Interworking Function records the establishment of the backbone connection, performs cut-through of the incoming trunk to the BNC Link established between the two BIWFs, and issues information flow 24 notifying its associated call service function that the requested bearer action has been completed. The call service function records the completion of the bearer action, and if the Action ID conveyed in information 9 was a Forward Notify indication, the CSF issues information flow 25. In either case it awaits further action responses from the selected ISN.

25 APM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
O-BIWF Addr = x,	CCA-ID = 5, Action Indication = Forward Notify	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 23 and conditional upon the action indicator in information flow 9 being set to Forward Notify.

Processing upon receipt: The CMN(X) validates the message and issues information flow 26 towards the terminating ISDN.

26 APM **ISN(A) to ISN(B)**

Address information	Control information	Bearer information
O-BIWF Addr = x,	CCA-ID = 15, Action Indication = Forward Notify	BNC-ID: = 710,

Initiation of information flow: Processing of information flow 25 and conditional upon the action indicator in information flow 8 being set to Forward Notify.

Processing upon receipt: The ISN informs the BCF via information flow 27 and if the action indicator in information flow 8 was set to Forward Notify, then cut-through occurs and information flow 28 is sent to the ISDN (B).

28a COT **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: Processing of information flow 26 (conditional upon Action ID = Forward Notify in information flow 8) and IAM (with CC on previous) being sent in information flow 5.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and waits for the notification of the connection availability.

OR

28b IAM **ISN(B) to ISDN(B)**

Address information	Control information	Bearer information
(Called-Party-Addr) = User B, (Calling-Party-Addr) = User A,	CIC-ID: = 6000	Bearer Service Characteristics

Initiation of information flow: Processing of information flow 26 (conditional upon Action ID = Forward Notify in information flow 8) and no IAM being forwarded in information flow 5.

Processing upon receipt: When the ISDN(B) receives this information flow, it determines the selected end user and offers the call and bearer to the selected TE. Further actions associated with the TE is outside the scope of these signalling requirements.

29 ACM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user alerting has begun.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 30, and records the alerting condition within its own database.

30 ACM **ISN(B) to CMN(X)**

Address information	Control information	Bearer information
	CCA-ID = 15,	

Processing upon receipt: When the CMN(X) receives this information flow, it forwards this call progress information towards ISN(B) by issuing information flow 31, and records the alerting condition within its own database.

31 ACM **CMN(X) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 5,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 32, and records the alerting condition within its own database.

32 ACM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the alerting condition within its own database.

33 ANM **ISDN(B) to ISN(B)**

Address information	Control information	Bearer information
	CIC-ID = 6000	

Initiation of information flow: ISDN indicates that the user has answered.

Processing upon receipt: When the ISN(B) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 34, and records the answer condition within its own database.

34 ANM **ISN(B) to CMN(X)**

Address information	Control information	Bearer information
	CCA-ID = 15,	

Processing upon receipt: When the CMN(X) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 35, and records the answer condition within its own database.

35 ANM **ISN(B) to CMN(X) to ISN(A)**

Address information	Control information	Bearer information
	CCA-ID = 15,	

Processing upon receipt: When the ISN(A) receives this information flow, it forwards this call progress information towards the requesting ISDN by issuing information flow 36, and records the answer condition within its own database.

36 ANM **ISN(A) to ISDN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Processing upon receipt: When the ISDN(A) receives this information flow, it forwards this call progress information towards the requesting user, and records the answer condition within its own database.

8.1.7 Codec Modification Signalling Requirement Flows

8.1.7.1 Codec Modification during stable Backbone Network Connection

The information flows and functional entity actions illustrated in Figure 8-13 are described in the following numbered paragraphs. The information element BNC-ID contained in the APM messages with an Action ID of "modified codec or codec modified", are here for information and do not need to be supported by protocol in CS-1.

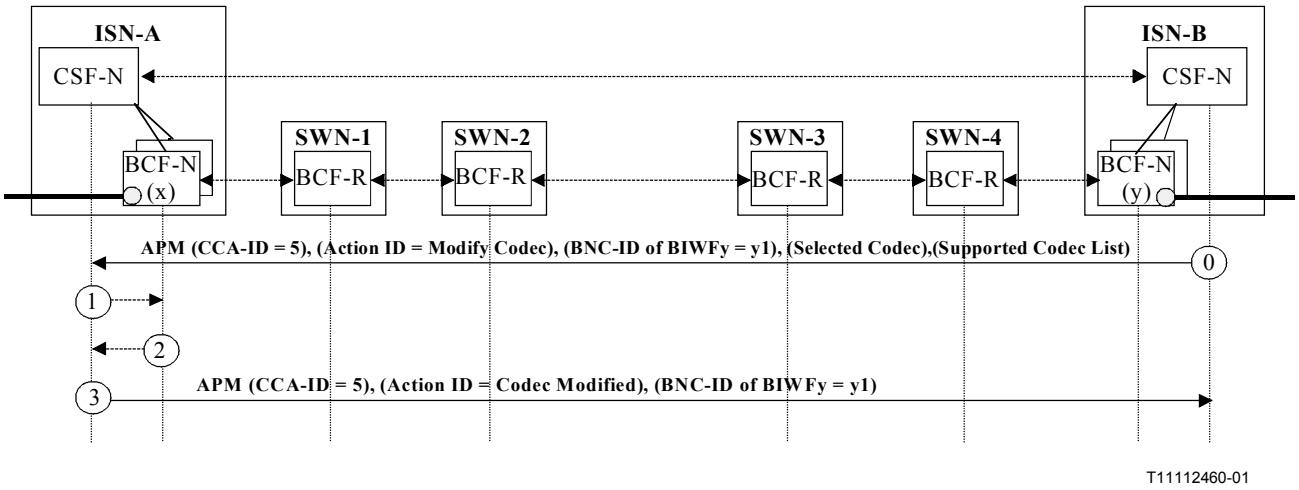

Figure 8-13 – Codec Modification during Stable Backbone Network Connection

0	**APM**		**ISN(B) to ISN(A)**
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5, Action ID = Modify Codec,	BNC-ID = 710 Selected Codec Supported Codec List

Initiation of information flow: Internal or external events to ISN(B) trigger the request to modify the codec.

Processing upon receipt: ISN(A) validates the request. Information flow 1 is issued towards BCF(x) to inform on the new Selected Codec and Supported Codec List. Information flow 3 is issued towards ISN(B) to confirm the codec modification.

1	**APM**		**ISN(A) to ISN(B)**
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5, Action ID = Codec Modified	BNC-ID = 710

Initiation of information flow: Processing of information flow 0

Processing upon receipt: ISN-B validates the confirmation.

8.1.7.2 Codec Modification during Stable Backbone Network Connection with Transit Serving Node

The information flows and functional entity actions illustrated in Figure 8-14 are described in the following numbered paragraphs. The information element BNC-ID contained in the APM messages with an Action ID of "modified codec or codec modified", are here for information and do not need to be supported by protocol in CS-1.

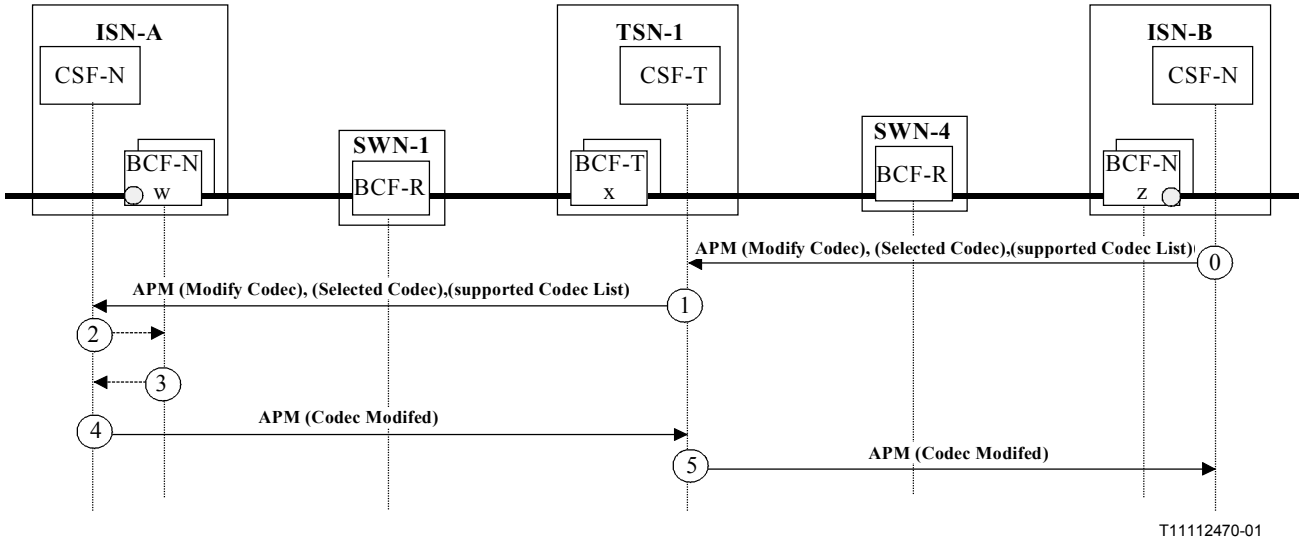

Figure 8-14 – Codec Modification during Stable Backbone Network Connection with Transit Serving Node

0	**APM**		**ISN(B) to TSN(1)**
	Address information	**Control information**	**Bearer information**
		CCA-ID = 25, Action ID = Modify Codec,	BNC-ID = 402 Selected Codec Supported Codec List

Initiation of information flow: Internal or external events to ISN(B) trigger the request to modify the codec.

Processing upon receipt: TSN(1) validates the request. Information flow 1 is issued towards ISN(A) to convey the codec modification request, Selected Codec and Supported Codec List.

1	**APM**		**TSN(1) to ISN(A)**
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5, Action ID = Modify Codec,	BNC-ID = 710 Selected Codec Supported Codec List

Initiation of information flow: Processing of information flow 0

Processing upon receipt: ISN(A) validates the request. Information flow 2 is issued towards BCF(w) to inform on the new Selected Codec and Supported Codec List. Information flow 4 is issued towards TSN(1) to confirm the codec modification.

4	**APM**		**ISN(A) to TSN(1)**
	Address information	**Control information**	**Bearer information**
		CCA-ID = 5, Action ID = Codec Modified	BNC-ID = 710

Initiation of information flow: Processing of information flow 1

Processing upon receipt: TSN(1) validates the request and issues information flow 5 to ISN(B).

5 APM		TSN(1) to ISN(B)
Address information	**Control information**	**Bearer information**
D-SN Addr = ISN-B	CCA-ID = 25, Action ID = Codec Modified	BNC-ID = 402

Initiation of information flow: Processing of information flow 4

Processing upon receipt: ISN(B) validates the confirmation.

8.2 Call Release

Subclause 8.2 describes the procedures to remove the call relationship between the call control and bearer control within a SN.

The backbone network connection is not released by this procedure. If the backbone network connection is also to be released, this procedure and the backbone network release procedure contained in 8.3 should be used.

8.2.1 Call Release

The information flows and functional entity actions illustrated in Figure 8-15 are described in the following numbered paragraphs.

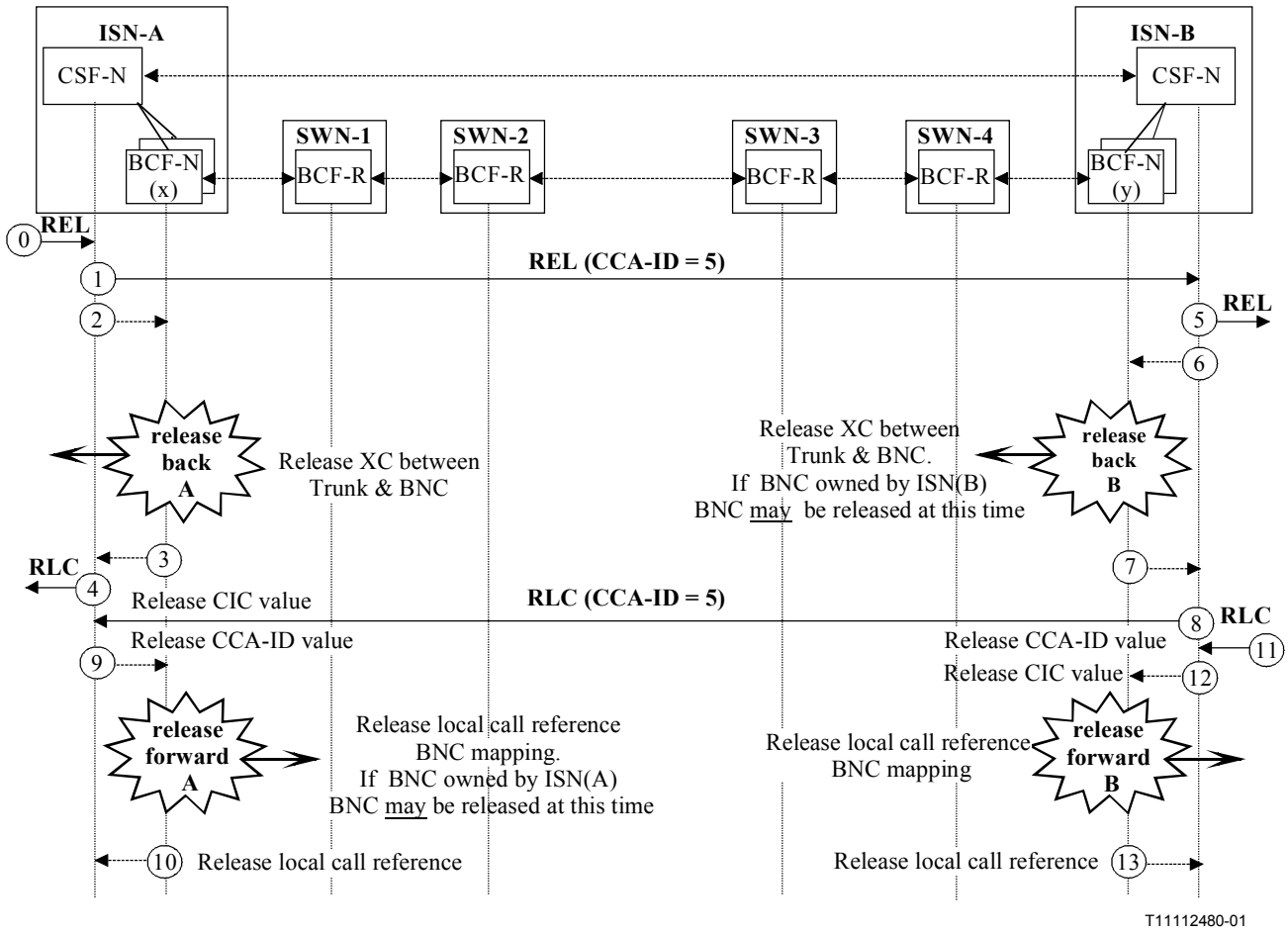

Figure 8-15 – Call release

0	REL		ISDN(A) to ISN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Initiation of information flow: A user associated with the ISDN(A) has requested that the N-ISDN service be cleared.

Processing upon receipt: When the ISN receives this information flow, it validates the request, and initiates clearing the call and Narrowband bearer service. The Backbone Network Connection (BNC) will not be removed by this set of information flows. [If the ISN(A) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows]. The CSF-N issues information flow 1 towards its peer CSF-N indicating that the Call shall be released, and issues information flow 2 to the interworking function requesting that the incoming trunk should be disconnected from the backbone network connection. The CSF-N then issues information flow 4 towards ISDN(A) confirming the clearing of the call and the narrowband bearer service. The ISN(A) awaits the confirmation from ISN(B) to the REL information flow.

1	REL		ISN(A) to ISN(B)
	Address information	**Control information** CCA-ID = 5	**Bearer information**

Processing upon receipt: When the ISN(B) receives this information flow, it validates the request, and initiates call and narrowband bearer clearing. The Backbone Network Connection (BNC) will not be removed by this set of information flows. [If the ISN(B) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows]. The CSF-N issues information flow 6 to the Bearer Interworking Function requesting that the outgoing trunk be disconnected, and issues information flow 8 towards ISN(A) confirming that the Call and Narrowband Bearer have been released. It then issues information flow 5 towards ISDN(B) requesting call and bearer clearing. The BIWF will disconnect the outgoing trunk from the backbone network connection and immediately respond to its associated CSF-N. (Note: If the backbone network connection is to be dropped by the BIWF, it will be started after information flow 7.)

4	RLC		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Initiation of information flow: Processing of information flow 0

Processing upon receipt: When the ISDN(A) receives this information flow, it recognizes that the call and bearer have been released between the ISDN(A) and the ISN(A).

5	REL		ISN(B) to ISDN(B)
	Address information	**Control information** CIC-ID = 6000	**Bearer information**

Initiation of information flow: Processing of information flow 1.

Processing upon receipt: When the ISDN(B) receives this information flow, it validates the request, it being clearing procedures which will result in the issuing of information flow 11.

8	RLC		ISN(B) to ISN(A)
	Address information	**Control information** CCA-ID = 5	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it notes that the call has been released. The CSF-N communicates with the associated BIWF (information flow 9) which will remove the mapping of the local call reference to the BNC-ID. The BIWF immediately responses. (Note: If the backbone network connection is to be dropped by the BIWF, it will be started after information flow 10.)

11	RLC		ISDN(B) to ISN(B)
	Address information	**Control information** CIC-ID = 6000	**Bearer information**

Initiation of information flow: ISDN(B) has cleared the Call and Bearer Service to the end user.

Processing upon receipt: When the ISN(B) receives this information flow, it clears the call and bearer associations with ISDN(B). In addition, it communicates with its BIWF in order to remove the mapping between the BNC-ID and the local call reference value.

8.2.2 Call Release with Mediation Node

The information flows and functional entity actions illustrated in Figure 8-16 are described in the following numbered paragraphs.

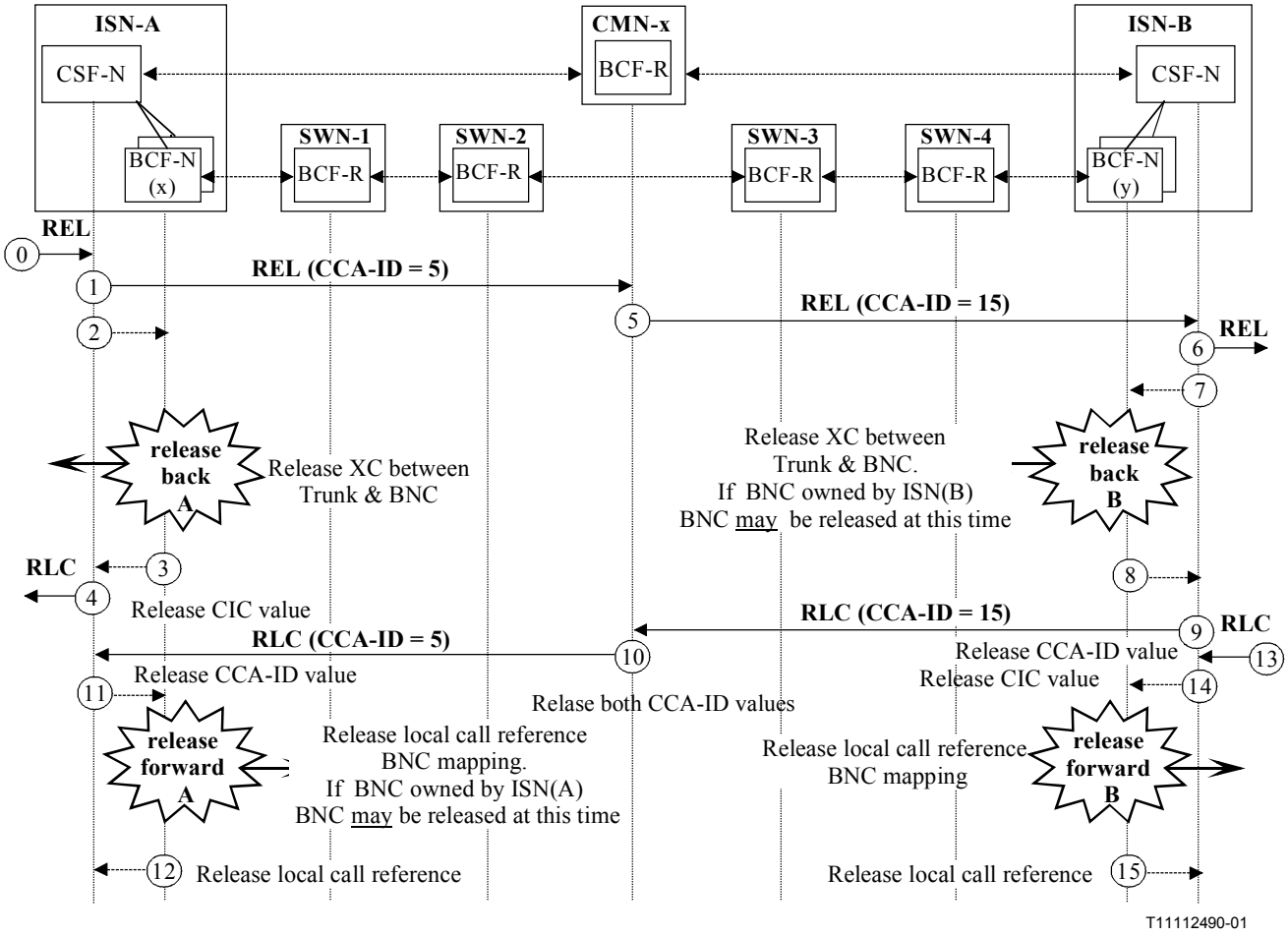

Figure 8-16 – Call Release with Mediation Node

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0 REL **ISDN(A) to ISN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Initiation of information flow: A user associated with the ISDN(A) has requested that the N-ISDN service be cleared.

Processing upon receipt: When the ISN receives this information flow, it validates the request, and initiates clearing the call and Narrowband bearer service. The Backbone Network Connection (BNC) will not be removed by this set of information flows. [If the ISN(A) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows]. The CSF-N issues information flow 1 towards its peer CSF-N indicating that the Call shall be released, and issues information flow 2 to the interworking function requesting that the incoming trunk be disconnected from the backbone network connection. The CSF-N then issues information flow 4 towards ISDN(A) confirming the clearing of the call and the narrowband bearer service. The ISN(A) awaits the confirmation from ISN(B) to the REL information flow.

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1 REL **ISN(A) to CMN (X)**

Address information	Control information	Bearer information
	CCA-ID = 5	

Processing upon receipt: When the CMN(X) receives this information flow, it validates the request, forwards the information flow towards ISN(B) via information flow 5.

4	RLC		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Initiation of information flow: Processing of information flow 0

Processing upon receipt: When the ISDN(A) receives this information flow, it recognizes that the call and bearer have been released between the ISDN(A) and the ISN(A).

5	REL		CMN(X) to ISN(B)
	Address information	**Control information** CCA-ID=15	**Bearer information**

Initiation of information flow: Processing of information flow 1

Processing upon receipt: When the ISN(B) receives this information flow, it validates the request, and initiates call and narrowband bearer clearing. The Backbone Network Connection (BNC) will not be removed by this set of information flows. [If the ISN(B) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows]. The CSF-N issues information flow 7 to the Bearer Interworking Function requesting that the outgoing trunk be disconnected, and issues information flow 9 towards ISN(A) confirming that the Call and Narrowband Bearer have been released. It then issues information flow 6 towards ISDN(B) requesting call and bearer clearing. The BIWF will disconnect the outgoing trunk from the backbone network connection and immediately respond to its associated CSF-N. (Note: If the backbone network connection is to be dropped by the BIWF, it will be started after information flow 7.)

6	REL		ISN(B) to ISDN(B)
	Address information	**Control information** CIC-ID = 6000	**Bearer information**

Initiation of information flow: Processing of information flow 1

Processing upon receipt: When the ISDN(B) receives this information flow, it validates the request, it being clearing procedures which will result in the issuing of information flow 13.

9	RLC		ISN(B) to CMN(X)
	Address information	**Control information** CCA-ID = 15	**Bearer information**

Processing upon receipt: When the CMN(X) receives this information flow, it notes that the call has been released. It forwards the release indication to ISN(A) via information flow 10.

10	RLC		CMN(X) to ISN(A)
	Address information	**Control information** CCA-ID = 5	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it notes that the call has been released. The CSF-N communicates with the associated BIWF (information flow 11) which will remove the mapping of the local call reference to the BNC-ID. The BIWF immediately responses. (Note: If the backbone network connection is to be dropped by the BIWF, it will be started after information flow 12.)

13	RLC		ISDN(B) to ISN(B)
	Address information	**Control information** CIC-ID = 6000	**Bearer information**

Initiation of information flow: ISDN(B) has cleared the Call and Bearer Service to the end user.

Processing upon receipt: When the ISN(B) receives this information flow, it clears the call and bearer associations with ISDN(B). In addition, it communicates with its BIWF in order to remove the mapping between the BNC-ID and the local call reference value.

8.2.3 Call Release with Transit Serving Node

The information flows and functional entity actions illustrated in Figure 8-17 are described in the following numbered paragraphs.

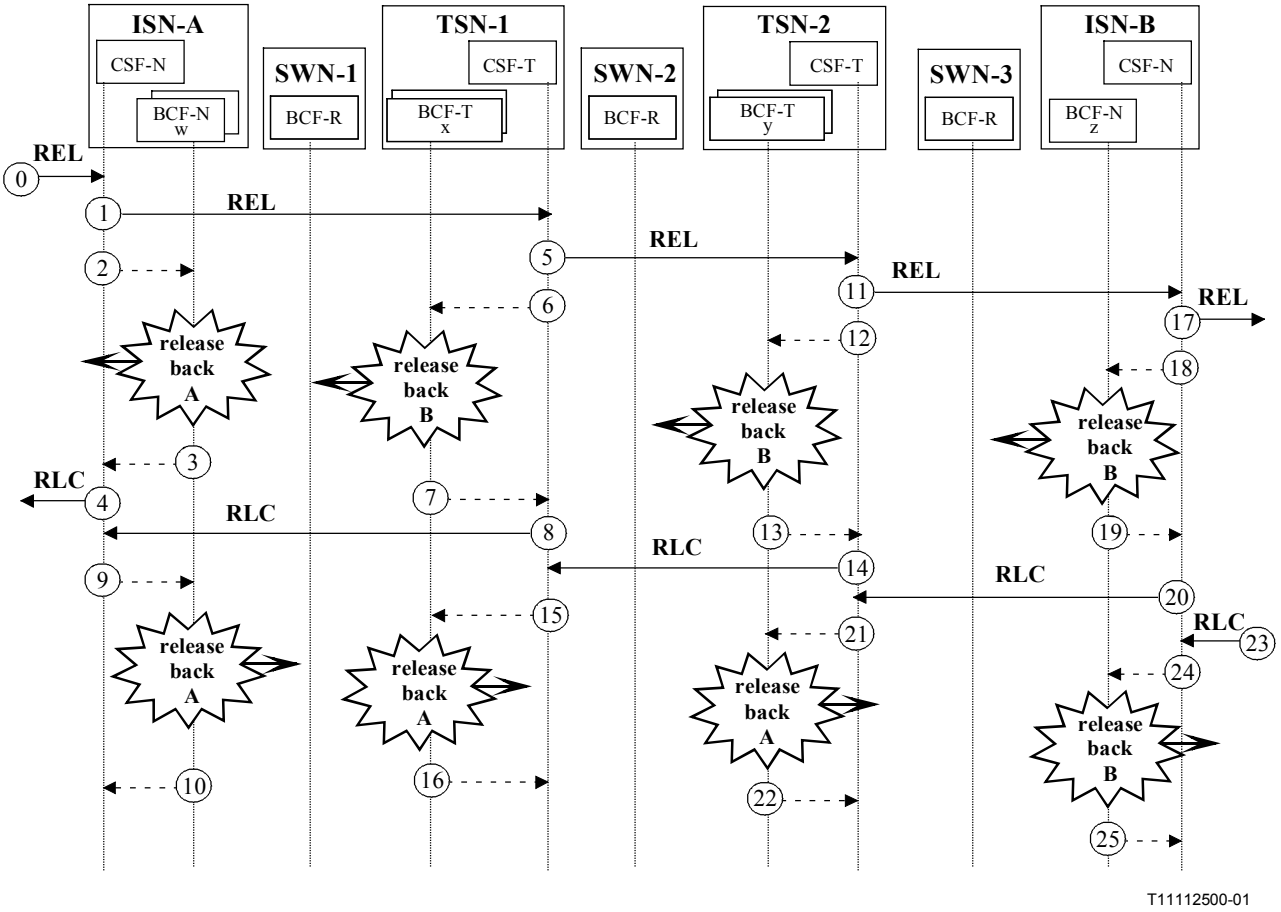

Figure 8-17 – Call Release with Transit Serving Node

0 REL **ISDN(A) to ISN(A)**

Address information	Control information	Bearer information
	CIC-ID = 5000	

Initiation of information flow: A user associated with the ISDN(A) has requested that the N-ISDN service be cleared.

Processing upon receipt: When the ISN receives this information flow, it validates the request, and initiates clearing the call and Narrowband bearer service. The Backbone Network Connection (BNC) will not be removed by this set of information flows. [If the ISN(A) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows]. The CSF-N issues information flow 1 towards its peer CSF-N indicating that the Call shall be released, and issues information flow 2 to the interworking function requesting that the incoming trunk be disconnected from the backbone network connection. The CSF-N then issues information flow 4

towards ISDN(A) confirming the clearing of the call and the narrowband bearer service. The ISN(A) awaits the confirmation from ISN(B) to the REL information flow.

1	REL		ISN(A) to TSN(1)
	Address information	**Control information** CCA-ID = 5	**Bearer information**

Processing upon receipt: When the TSN(1) receives this information flow, it validates the request, and initiates call and narrowband bearer clearing. The Backbone Network Connection (BNC) will not be removed by this set of information flows. (If the TSN(1) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows). The CSF-N issues information flow 6 to the bearer interworking function requesting that the outgoing trunk be disconnected, and issues information flow 8 towards ISN(A) confirming that the Call and Narrowband Bearer have been released. It then issues information flow 5 towards TSN(2) requesting call and bearer clearing. The BIWF will disconnect the outgoing trunk from the backbone network connection and immediately respond to its associated CSF-N.

4	RLC		ISN(A) to ISDN(A)
	Address information	**Control information** CIC-ID = 5000	**Bearer information**

Initiation of information flow: Processing of information flow 0

Processing upon receipt: When the ISDN(A) receives this information flow, it recognizes that the call and bearer have been released between the ISDN(A) and the ISN(A.

5	REL		TSN(1) to TSN(2)
	Address information	**Control information** CCA-ID = 15	**Bearer information**

Processing upon receipt: When the TSN(2) receives this information flow, it validates the request, and initiates call and narrowband bearer clearing. The Backbone Network Connection (BNC) will not be removed by this set of information flows. [If the TSN(2) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows]. The CSF-N issues information flow 12 to the bearer interworking function requesting that the outgoing trunk should be disconnected, and issues information flow 14 towards TSN(1)confirming that the Call and Narrowband Bearer have been released. It then issues information flow 11 towards ISN(B) requesting call and bearer clearing. The BIWF will disconnect the outgoing trunk from the backbone network connection and immediately respond to its associated CSF-N.

8	RLC		TSN (2) to TSN(1)
	Address information	**Control information** CCA-ID = 5	**Bearer information**

Processing upon receipt: When the ISN(A) receives this information flow, it notes that the call has been released. The CSF-N communicates with the associated BIWF (information flow 9) which will remove the mapping of the local call reference to the BNC-ID. The BIWF immediately responses. (Note: If the backbone network connection is to be dropped by the BIWF, it will be started after information flow 10.)

11	REL		TSN(2) to ISN(B)
	Address information	**Control information** CCA-ID = 25	**Bearer information**

Processing upon receipt: When the ISN(B) receives this information flow, it validates the request, and initiates call and narrowband bearer clearing. The Backbone Network Connection (BNC) will

not be removed by this set of information flows. [If the ISN(B) wishes to remove the BNC, it will invoke the BNC removal procedure shown in a separate set of information flows]. The CSF-N issues information flow 18 to the bearer interworking function requesting that the outgoing trunk be disconnected, and issues information flow 20 towards TSN(2) confirming that the Call and Narrowband Bearer have been released. It then issues information flow 17 towards ISDN(B) requesting call and bearer clearing. The BIWF will disconnect the outgoing trunk from the backbone network connection and immediately respond to its associated CSF-N.

14	**RLC**		**TSN(2) to TSN(1)**
	Address information	**Control information** CCA-ID = 15	**Bearer information**

Processing upon receipt: When the TSN(1) receives this information flow, it notes that the call has been released. The CSF-N communicates with the associated BIWF (information flow 15) which will remove the mapping of the local call reference to the BNC-ID. The BIWF immediately responses. (Note: If the backbone network connection is to be dropped by the BIWF, it will be started after information flow 16.)

17	**REL**		**ISN(B) to ISDN(B)**
	Address information	**Control information** CIC = 6000	**Bearer information**

Processing upon receipt: When the ISDN(B) receives this information flow, it validates the request, and initiates call and bearer release. The ISDN(B) issues information flow 23 after the call and bearer have been cleared.

20	**RLC**		**ISN(B) to TSN(2)**
	Address information	**Control information** CCA-ID = 25	**Bearer information**

Processing upon receipt: When the TSN(2) receives this information flow, it notes that the call has been released. The CSF-N communicates with the associated BIWF (information flow 21) which will remove the mapping of the local call reference to the BNC-ID. The BIWF immediately responses. (Note: If the backbone network connection is to be dropped by the BIWF, it will be started after information flow 22.)

23	**RLC**		**ISDN(B) to ISN(B)**
	Address information	**Control information** CIC-ID = 6000	**Bearer information**

Initiation of information flow: ISDN(B) has cleared the Call and Bearer Service to the end user.

Processing upon receipt: When the ISN(B) receives this information flow, it clears the call and bearer associations with ISDN(B). In addition, it communicates with its BIWF in order to remove the mapping between the BNC-ID and the local call reference value.

8.3 Backbone Network Connection Release

This procedure is used to release a backbone network connection. It may be used in conjunction with the call release procedure described in 8.2.

The information flows and functional entity actions illustrated in Figure 8-18 are described in the following numbered paragraphs.

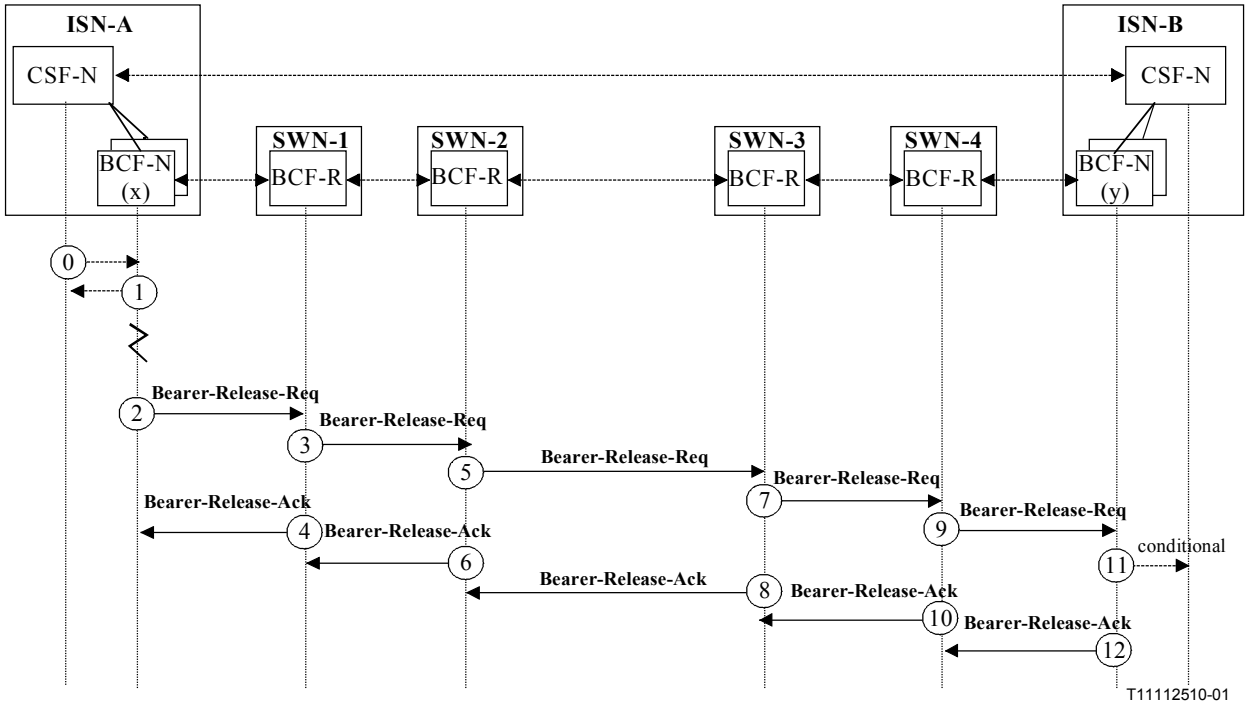

Figure 8-18 – Backbone Network Connection Release

2	**Bearer-Release-Req**		**BIWF(x) to SWN(1)**
	Address information	**Control information**	**Bearer information**
		BCS-ID = "65"	BNCL-ID = 1000,

Initiation of information flow: Call Service Function in ISN(A) indicates that the call has or is in the process of being cleared (information flow 0) and the BCF-N has made the determination that an idle Backbone Network Connection is to be released.

Processing upon receipt: When the SWN(1) receives this information flow, it disconnects the Backbone Network Connection Link between BIWF(X) and SWN(1), issues information 3 towards SWN(2) requesting BNC release, and information flow 4 towards the BIWF(x) indicating that the connection link has been released. The SWN then awaits the confirmation of the BNC from SWN(2).

3	**Bearer-Release-Req**		**SWN(1) to SWN(2)**
	Address information	**Control information**	**Bearer information**
		BCS-ID = "25"	BNCL-ID = 1001-,

Processing upon receipt: When the SWN(2) receives this information flow, it disconnects the Backbone Network Connection Link between SWN(1) and SWN(2), issues information 5 towards SWN(3) requesting BNC release, and information flow 6 towards the SWN(1) indicating that the connection link has been released. The SWN then awaits the confirmation of the BNC release from SWN(3).

4	**Bearer-Release-Ack**		**SWN(1) to BIWF(X)**
	Address information	**Control information**	**Bearer information**
		BCS-ID = "65"	BNCL-ID = 1000-,

Processing upon receipt: When the BIWF(x) receives this release confirmation information flow, it then clears all information associated with this BNC within its domains.

5	Bearer-Release-Req		SWN(2) to SWN(3)
	Address information	**Control information** BCS-ID = "18"	**Bearer information** BNCL-ID = 1002-,

Initiation of information flow: Processing of information flow 3

Processing upon receipt: When the SWN(3) receives this information flow, it disconnects the Backbone Network Connection Link between SWN(2) and SWN(3), issues information 6 towards SWN(4) requesting BNC release, and information flow 7 towards the SWN(2) indicating that the connection link has been released. The SWN then awaits the confirmation of the BNC release from SWN(4).

6	Bearer-Release-Ack		SWN(2) to SWN(1)
	Address information	**Control information** BCS-ID = "25"	**Bearer information** BNCL-ID = 1001-,

Initiation of information flow: Processing of information flow 3

Processing upon receipt: When the SWN(1) receives this release confirmation information flow, it then clears all information associated with this BNC within its domains.

7	Bearer-Release-Req		SWN(3) to SWN(4)
	Address information	**Control information** BCS-ID = "27"	**Bearer information** BNCL-ID = 1003-,

Initiation of information flow: Processing of information flow 5

Processing upon receipt: When the SWN(4) receives this information flow, it disconnects the Backbone Network Connection Link between SWN(3) and SWN(4), issues information 9 towards BIWF(y) requesting BNC release, and information flow 10 towards the SWN(3) indicating that the connection link has been released. The SWN then awaits the confirmation of the BNC release from BIWF(y).

8	Bearer-Release-Ack		SWN(3) to SWN(2)
	Address information	**Control information** BCS-ID = "18"	**Bearer information** BNCL-ID = 1002-,

Initiation of information flow: Processing of information flow 5

Processing upon receipt: When the SWN(2) receives this release confirmation information flow, it then clears all information associated with this BNC within its domains.

9	Bearer-Release-Req		SWN(4) to BIWF(y)
	Address information	**Control information** BCS-ID = "15"	**Bearer information** BNCL-ID = 1004-,

Initiation of information flow: Processing of information flow 7

Processing upon receipt: When the BIWF(y) receives this information flow, it disconnects the Backbone Network Connection Link between SWN(4) and BIWF(yY), may issue information 11 towards its associated CSF-N indicating that the BNC has been released, and information flow 12 towards the SWN(4) indicating that the connection link has been released. The BIWF(y) clears all information associated with this BNC within its domain. Information flow 11 is conditional in that this flow would only occur if the call within ISN(B) has not been previously cleared. Actions taken by the CSF-N are presently outside the scope of these requirements.

10	Bearer-Release-Ack		SWN(4) to SWN(3)
	Address information	**Control information** BCS-ID = "27"	**Bearer information** BNCL-ID = 1003-,

Initiation of information flow: Processing of information flow 7

Processing upon receipt: When the SWN(3) receives this release confirmation information flow, it then clears all information associated with this BNC within its domains.

12	Bearer-Release-Ack		BIWF(y) to SWN(4)
	Address information	**Control information** BCS-ID = "15"	**Bearer information** BNCL-ID = 1004-,

Initiation of information flow: Processing of information flow 9

Processing upon receipt: When the SWN(4) receives this release confirmation information flow, it then clears all information associated with this BNC within its domains.

ANNEX A

Capability Set 1 Services and Functions

Table A.1 – N-ISUP Services and Functions Supported in BICC Capability Set 1

ITU-T ISUP'2000 Function/service	Applicability to BICC
Basic call	
Speech/3.1 kHz audio	Required
64 kbit/s unrestricted	Required
Multirate connection types	Required
N × 64 kbit/s connection types	Required
En bloc address signalling	Required
Overlap address signalling	Required
Transit network selection	National Option
Continuity check	Not Required
Forward transfer	Required
Simple segmentation	Required
Tones and announcements	Required

Table A.1 – N-ISUP Services and Functions Supported in BICC Capability Set 1 *(continued)*

ITU-T ISUP'2000 Function/service	Applicability to BICC
Basic call	
Access delivery information	Required
Transportation of User teleservice information	Required
Suspend and resume	Required
Signalling procedures for connection type allowing fall-back capability	Required
Propagation delay determination procedure	Not Required
Enhanced echo control signalling procedures	Not Required
Simplified echo control signalling procedures	Required
Automatic repeat attempt	Required
Blocking and unblocking of circuits and circuit groups (in Q.BICC, circuits = CIC which is equal to the CCA-ID)	Required
CIC group query (in Q.BICC, CIC = CCA-ID)	National Option
Dual seizure (in Q.BICC, dual seizure applies to CIC = CCA-ID and does not refer to circuits)	Required
Transmission alarm handling for digital inter-exchange circuits	Not Required
Reset of circuits and circuit groups (in Q.BICC, circuits = CIC which is equal to the CCA-ID)	Required
Receipt of unreasonable signalling information	Required
Compatibility procedure	Required
Temporary trunk blocking	Not Required
ISDN User Part signalling congestion control	Required
Automatic congestion control	Required
Interaction between N-ISDN and INAP	Required
Unequipped circuit identification code (in Q.BICC, CIC = CCA-ID)	National Option
ISDN User Part availability control	Not Required
MTP pause and resume	Required
Overlength messages	Required
Temporary Alternative Routing (TAR)	Required
Hop counter procedure	Required
Collect call request procedure	Required
Hard-to-Reach	Required
Calling Geodetic location procedure	Required
Generic signalling procedures	
End-to-end signalling – Pass along method	Required
End-to-end signalling – SCCP Connection Orientated	Required
End-to-end signalling – SCCP Connectionless	Required
Generic number transfer	Required
Generic digit transfer	Required
Generic notification procedure	Required

Table A.1 – N-ISUP Services and Functions Supported in BICC Capability Set 1*(concluded)*

ITU-T ISUP'2000 Function/service	Applicability to BICC
Generic signalling procedures	
Service activation	Required
Remote Operations Service (ROSE) capability	Required
Network specific facilities	Required
Pre-release information transport	Required
Application Transport Mechanism (APM)	Required
Redirection	Required
Pivot Routing	Required
Supplementary services	
Direct-Dialling-In (DDI)	Required
Multiple Subscriber Number (MSN)	Required
Calling Line Identification Presentation (CLIP)	Required
Calling Line Identification Restriction (CLIR)	Required
Connected Line Identification Presentation (COLP)	Required
Connected Line Identification Restriction (COLR)	Required
Malicious Call Identification (MCID)	Required
Sub-addressing (SUB)	Required
Call Forwarding Busy (CFB)	Required
Call Forwarding No Reply (CFNR)	Required
Call Forwarding Unconditional (CFU)	Required
Call Deflection (CD)	Required
Explicit Call Transfer (ECT)	Required
Call Waiting (CW)	Required
Call HOLD (HOLD)	Required
Completion of Calls to Busy Subscriber (CCBS)	Required
Completion of Calls on No Reply (CCNR)	Required
Terminal Portability (TP)	Required
Conference calling (CONF)	Required
Three-Party Service (3PTY)	Required
Closed User Group (CUG)	Required
Multi-Level Precedence and Preemption (MLPP)	(Note)
Global Virtual Network Service (GVNS)	Required
International telecommunication charge card (ITCC)	Required
Reverse charging (REV)	Required
User-to-User Signalling (UUS)	Required
Additional functions/services	
Support of VPN applications with PSS1 Information Flows	Required
Support of Number Portability (NP)	Required
NOTE – MLPP functionality shall not be supported in CS 1, but the support for MLPP transparency is required.	

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Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
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