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Issue 5
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Suppliers' Information Note

For The BT Network

ENHANCED DIGITAL BT VALUELINK® ACCESS Service Description

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1. INTRODUCTION

This Service Information Note (SIN) describes the Enhanced Digital BT ValueLink Access service. It is intended to provide general information about the service for Service Providers and Customer Premises Equipment (CPE) manufacturers and developers.

2. SERVICE AVAILABILITY

The availability of the service to customers is subject to operational availability and customer requirements.

3. SERVICE DESCRIPTION

3.1 General Description

The Enhanced Digital BT ValueLink Access service uses an ISDN I.421 primary rate access and complements the existing BT ISDN 30 (I.421) Service as defined in SIN 261 [1]. The Enhanced Digital BT ValueLink Access service is available to customers (who will typically be Service Providers) employing direct trunk level connection to the BT network for high traffic, multiple line call delivery. The introduction of the ISDN option for this type of delivery provides a number of improvements over earlier signalling systems employed, particularly fast call set-up and CLI presentation.

The Enhanced Digital BT ValueLink Access service provides the same basic call service features (i.e. bearer services and teleservices services) as defined in SIN 261 with the exception that the service is an incoming only service i.e. outgoing call barring is permanently activated on all calls. In addition, it should be noted that first party call clearing is applied to all call types (i.e. to speech as well as 64 kbit/s data calls, to calls inter-working with the PSTN, etc).

The Enhanced Digital BT ValueLink Access service will support the following supplementary services which, unless stated otherwise, will be implemented as defined in SIN 261:

- Calling Line Identification Presentation (CLIP);
- Calling Line Identification Restriction (CLIR) - applicable to out-going call via EMCD;
- Connected Line Identification Presentation (COLP);
- Connected Line Identification Restriction (COLR)
- Presentation Number (PN) - applicable to out-going call via EMCD
- Direct Dialling In (DDI) - a restricted implementation compared with that described in SIN 261 is provided; see Annex A for details;
- MCId (Malicious Call Identification) is supported using the same signalling mechanisms as defined in SIN 261. Details of the implementation of this supplementary service as it applies to Enhanced Digital ValueLink Access are given in Annex A;
- Subaddressing is supported but is limited to 6 octets of subaddress information – see Annex A for details;
- Customer controlled channel blocking supplementary service (this service is not defined in SIN 261 - see Annex A for details);

- Call Deflection (CD);
- Enhanced Mid Call Diversion (EMCD) supplementary services (this service is not defined in SIN 261 - see Annex A for details).
EMCD allows the customer controlled diversion of an incoming call to a third party, in a manner analogous to call transfer facility on a PABX. Following the diversion, the B-channel to the CPE is freed to be used for further calls.

3.2 The Customer Interface

The customer interface is as specified in SIN 261 with the following enhancement (details are given in Annex A):

- As a network controlled option, the Status Enquiry procedure (ref. ETS 300 403-1 [5], clause 5.8.10) is implemented to monitor the status of a call; the default for this option is ON.
- Establishment of bearer connection prior to call acceptance (ref. ETS 300 403-1, Annex K) is supported. This permits the provision of in-band tones and announcements from the CPE (see Section 3.3 below).

The service will be provided as a fully populated primary rate access, i.e. in increments of 30 channels.

3.3 In-band Tones and Announcements

One important difference to note between the Enhanced Digital BT ValueLink Access service and the BT ISDN 30 (I.421) Service defined in SIN 261 is that the network will establish the backward audio path on receipt of the ALERTING message from the ISDN CPE (see Annex A for details). This procedure is only applicable to the speech and 3.1 kHz audio bearer service. The backward audio path will remain open for 3 minutes or until the CPE returns a CONNECT message, whichever is the sooner. During this period the network does not provide any Awaiting Answer Indication signal (e.g. ringing tone) and the CPE can use the backward audio path facilities to deliver tones¹ or relevant in-band announcements.

Other in-band progress tones and announcements will be provided by the network.

4. FUTURE DEVELOPMENTS

Enhancement to this service is subject to commercial justification and customer demand. Implementation details relating to any enhancements will be documented in future issues of this SIN.

5. CONTACT POINTS

Contact points for further information is as follows:

¹ Note: It is recommended that to avoid possible customer confusion, where the Awaiting Answer Indication signal is applied by the ISDN CPE, it is the same as that used in the BT network. The absence of any form of comfort indication during the period that the backward audio path is open may cause the calling party to terminate the call. The BT Awaiting Answer Indication signal is defined in SIN 350 [8].

- Your company's BT Account Manager.
- BT Sales 0800 800152 for product and service information, sales and rental enquiries.

If you have questions relating to this document then please email us at: help@sinet.bt.com

6. REFERENCES

- [1] Suppliers' Information Note 261 - '*BT ISDN 30 (I.421) using full ETSI Call Control. Service Description*'
- [2] ETS 300 130-1 (1992) '*ISDN: Malicious Call Identification (MCID) Supplementary Service - DSSI Protocol*'
- [3] ETS 300 122-1 (1992) '*ISDN: Generic keypad protocol for the support of supplementary services*'
- [4] ETS 300 061 (1991) '*ISDN: Subaddressing (SUB) supplementary service DSSI Protocol*'
- [5] ETS 300 403-1 (1995) '*ISDN: DSSI Protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification*'
- [6] ETS 300 102-1 (1990) '*ISDN: User-network interface layer 3; Specifications for basic call control*'
- [7] ETS 300 738 (1997) – '*Minimum Man-Machine Interface to public network based supplementary services*'
- [8] Suppliers' Information Note 350 – '*BT Public Switched Telephone Network (PSTN): Network Tones And Announcements*'

For further information or copies of referenced sources, please see document sources at <http://www.sinet.bt.com/usenum.htm#docsources>

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7. ABBREVIATIONS

CD	Call Deflection
CLI	Calling Line Identity
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Restriction
CPE	Customer Premises Equipment
DDI	Direct Dial In
EMCD	Enhanced Mid Call Diversion
ETS	European Telecommunication Standard
ETSI	European Telecommunication Standards Institute
I.421	ITU-T ISDN primary rate interface
IE	Information Element
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunications Union - Telecommunications Standardisation Sector
MCId	Malicious Call Identification

PN Presentation Number
PSTN Public Switched Telephone Network
SIN Suppliers Information Note

8. HISTORY

Issue	Date	Comments
Issue 1	July 1998	First Issue
Issue 2	November 1998	Announced enhancements
Issue 2.1	January 1999	Second Issue
Issue 3	June 1999	Third Issue (see annex C)
Issue 4	October 1999	Correction of Call Progress Codes used in Table A.1
Issue 4.1	June 2000	Details added to Re-presentation
Issue 4.2	April 2001	Editorial changes
Issue 4.3	July 2002	Editorial changes
Issue 5	September 2003	Further details on the Call re-presentation and Home Group Divert features added

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ANNEX A

APPLICATION OF EUROPEAN STANDARDS

A.1 INTRODUCTION

This Annex gives guidance to Customer Premises Equipment (CPE) manufacturers wishing to develop equipment for connection to the Enhanced Digital BT ValueLink Access service. The options and variations from ETSI Primary Rate Access (PRA) standards that are applicable to the Enhanced Digital BT ValueLink Access service are the same as those which apply to the BT ISDN 30 (I.421) Service as defined in SIN 261 [1] (and particularly Annex A of SIN 261) for those services provide on the Enhanced Digital BT ValueLink Access service with the following exceptions.

A.2 ISDN 30 (I.421) LAYER 3 CONFORMANCE

The Enhanced Digital BT ValueLink Access service conforms to the ETSI Layer 3 standard ETS 300 403-1 [5] qualified by the following notes:

A.2.1 ETS 300 403-1 sub clause 5.8.7.1 and 5.8.7.2 – Non-mandatory Information Element Errors

When the network detects an error in a non-mandatory information element in a received message, the call state included by the network in the resulting STATUS message sent to the user will be the call state in which the network detected the error (as per ETS 300 102-1 [6] prior to Amendment 1) and not the call state of the network after taking action on the message (as per ETS 300 403-1).

A.2.2 ETS 300 403-1 sub clause 5.8.10 - Status Enquiry Procedure

The network will respond to STATUS ENQUIRY messages from the ISDN CPE with a Status message containing the current call state and cause #30.

As a network controlled option, during the active phase of a call, the network will issue STATUS ENQUIRY messages every 3 minutes (the default value for this option is for this polling procedure to be switched ON). The response from the ISDN CPE allows the network to detect 'Call Widows'. Responses from the ISDN CPE shall be one of the following:

- Status message indicating compatible call state
- Status message indicating incompatible call state
- RELEASE message (Invalid Call Reference)
- RELEASE COMPLETE message (Invalid Call Reference).

The first of these indicates that the call is still active at the ISDN CPE. The other three messages indicate that the call is no longer in the same state, allowing the network to detect 'Call Widows' and clear the call down. Should the call need clearing, one of these three clearing mechanisms will be used, as appropriate:

- If the ISDN CPE returns a STATUS message indicating an Incompatible Call State, then the network will initiate clearing with a DISCONNECT message.

- If the ISDN CPE returns a RELEASE message to the STATUS ENQUIRY message, then the network will respond with a RELEASE COMPLETE
- If the ISDN CPE returns a RELEASE COMPLETE message, then the network will return layer 3 to the corresponding state.

A.2.3 ETS 300 403-1 sub clause 5.9 - User Notification Procedure

NOTIFY messages will be discarded.

A.2.4 ETS 300 403-1 sub clause 9.1 - Timers in the Network Side

Network timer T301 will be 400 seconds (ETS 300 403-1 states that the value of this timer will be a minimum of 3 minutes).

Network timer T309 will be set to 10 seconds (ETS 300 403-1 states that the value of this timer will be in the range 6 to 12 seconds).

Network timer T310 will be set to 40 seconds (ETS 300 403-1 states that the value of this timer will be in the range 30-40 seconds).

A.2.5 ETS 300 403-1 ANNEX K - Procedures for Establishment of Bearer connection Prior to Call Acceptance.

The Enhanced Digital BT ValueLink Access service will support the procedures of this annex.

In line with ETS 300 403-1, these procedures are only applicable to the speech and 3.1 kHz audio bearer service.

Option (b) is implemented i.e. the network will establish the backward audio path on receipt of the ALERTING message from the ISDN CPE. If the ALERTING message contains the Channel identification information element containing an unacceptable B-channel indication, the network will clear the call. If the ALERTING message contains Progress indicator information element, this information element is ignored and discarded.

The ISDN CPE may send a CALL PROCEEDING message during call set-up, but no action will be taken by the network on receipt of this message.

There is a 3 minute network timer monitoring the network transition from the Call received state to the Active state. Expiry of this network timer (e.g. caused by failure of the ISDN CPE to transmit a CONNECT message) will result in the call being cleared. (In addition, in accordance with ETS 300 403-1, network timer T301 (see also A.2.4) is implemented to guard against the network not receiving a CONNECT message from the ISDN CPE. However, failure to receive a CONNECT message from the ISDN CPE will result in the 3 minute network timer expiring before T301 expires.)

A.3 SUPPLEMENTARY SERVICES

The implementation of the supplementary services on the Enhanced Mid-call Diversion service align with the equivalent service implemented on the BT ISDN 30 (I.421) Service as specified in SIN 261, Annex A with the following differences:

A.3.1 Direct Dial In (DDI)

This supplementary service enables the user to call directly via the public ISDN a user on a private ISDN (e.g. ISPBX) by use of the public ISDN numbering plan. For DDI, more than one public network number is assigned to a single access or group of accesses.

Only one user option of the options listed in SIN 261 is supported at the called side for the delivery of the called party number to the user. This option is the delivery of the full national number. In this case the “type of number” field of the Called party number information element is coded “national number”. No prefix digits (e.g. the initial 0) will be included.

A.3.2 Malicious Call Identification (MCId) Service

This supplementary service uses the same signalling mechanisms as defined in SIN 261. This supplementary service enables an incoming call to be identified and registered in the network and used for call tracing purposes.

The MCId service is provided on a temporary basis after prior arrangement with BT. The Enhanced Mid-call Diversion service provides MCId on individual accesses (or groups of accesses), rather than on a number basis.

The MCId service offered has the following features:

- i) With MCId enabled if the calling party initiates clearing, confirmation of the network release towards the calling party is immediate, the CPE is expected to delay the confirmation of clearing towards the called party (using a short timer, typically 4 seconds). If the called party clears first then an immediate backward release will be sent to the network.
- ii) On expiry of the CPE timer or backward clear by the called party the CPE is expected to resume the normal call clearing process, and call details will be discarded.
- iii) MCId may be invoked during the established phase of the call or after the calling party has initiated clearing, before confirmation of clearing by the CPE, i.e. before the CPE timer expires.
- iv) Invocation may be by means of standard MCId facility information element as defined in ETS 300 130 [2]. MCId may also be invoked using the Keypad protocol (as specified in ETS 300 122-1 [3]), by sending the IA5 character string *39#.
(With reference to Annex B, for MCId the
<Service Prefix> ::= *
<Service Code> ::= 39
<Supplementary Information> ::= null i.e. there is no Supplementary Information which make the contents of the Keypad facility information element *39#).
The IA5 string is sent in a single Keypad facility information element in an INFORMATION message. This INFORMATION message uses the same call reference as used for call control messages associated with that particular call.
- v) **MCId invoked during established call:** the call details are permanently recorded and the call continues in the established phase. The calling party will receive no indication that the call details have been recorded.
- vi) **MCId invoked after the calling party has initiated clearing (before CPE timer expires):** the call details and the time of clearing being initiated are permanently recorded. The CPE is expected to resume the normal call clearing process.
- vii) Call details shall consist of: calling line identity (‘billing’ CLI); destination address (DDI digits); and either the time the call was received by the network or the time the call was answered by the called party.

- viii) MCId procedures will not apply to ISDN Category 1 (data) calls where normal call clearing procedures will always apply.
- ix) The network option to enable automatic invocation of the MCId supplementary service on calls to the served user that are not answered is **not** provided.

Note: It is particularly important that CPE using the Keypad protocol to support this service does not generate in band MF4 signalling as well as the D-channel Keypad protocol as the MF4 signalling could notify the far end user that MCId is being invoked.

A.3.3 Subaddressing (SUB) Service

Reference ETS 300 061 [4].

Enables the expansion of the customer's addressing capacity beyond the ISDN number. The maximum length of the subaddress information in the Called party subaddress information element supported by the network is 6 octets. If the calling user exceeds this maximum length then the network will discard the additional octets of subaddress information.

Only the "user specified" type of subaddress (octet 3 bits 5 to 7) is supported. All other codings of this field received from the calling user will be treated as "user specified". The network will not support the odd/even indicator (octet 3, bit 4) when set to "odd" and will discard any Called party subaddress information element received from the user with the odd/even indicator set to "odd". The coding of the type of subaddress and odd/even indicator in a Called party subaddress information element sent from the network to the called user will be set to "user specified" and "even" respectively.

A.3.4 B-channel Blocking Service

This service allows the blocking of incoming calls to individual B-channels or all B-channels in the primary rate access associated with the signalling D-channel. This supplementary service is equivalent to the 'back busy' feature available on Valuecall Digital Access product using channel associated A1/B1 signalling. This supplementary service allows the user to close off incoming calls in a controlled manner e.g. prior to maintenance activities on the CPE.

A.3.4.1 Keypad facility information content

This supplementary service uses the Generic Keypad Protocol defined in ETS 300 122-1 [3]. The format of the Keypad facility information IA5 character string is as described in Annex B with the service specific entities defined as follows:

<Service Prefix> ::= <Block> | <Unblock>

<Block> ::= *

<Unblock> ::= #

<Service Code> ::= 93

<Supplementary Information> ::= <B-channel>

<B-channel> ::= <Digit> [<Digit>]

<Digit> ::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

Note:

1. Where the optional B-channel parameter is not included then all B-channels associated with the signalling D-channel shall be blocked/unblocked.
2. B-channel is in the range 1 to 30 inclusive
3. Insertion of a leading zero for B-channel numbers less than 10 is optional i.e. both B-channel number '02' and '2' will be a valid number for B-channel number 2.

A.3.4.2 B-channel blocking procedures

This supplementary service is invoked by the user sending a Keypad facility information element (with contents as coded in section A.3.3.1) to the network. The Keypad facility information element is sent in a single INFORMATION message using the global call reference.

The network will make no acknowledgement to the request. Invalid coding of the Keypad facility information will result in the INFORMATION message being ignored (this includes requests to block/unblock B-channels outside the range 1 to 30).

If the network receives a valid request to block a B-channel (or all B-channels) whilst that B-channel is in use, the call in progress on that B-channel will be unaffected but no new incoming calls will be offered on that B-channel once it becomes free. There is no interrogation procedure.

This supplementary service cannot be used to unblock B-channels (or the whole primary rate access) that the network has taken out of service e.g. for maintenance reasons. B-channels blocked by the user as a result of invoking this supplementary service can be unblocked by the network.

A.3.5 Enhanced Mid-Call Diversion (EMCD)

EMCD allows CPE on an Enhanced Digital BT ValueLink Access to divert a call to any destination during the active phase of a call. The call set-up process will use signalling in the ISDN D channel to allow this to happen without affecting service to the calling customer, giving a seamless call transfer without interruption. The CPE performing the diversion will receive call progress information concerning the call set-up in the D channel, allowing the CPE to respond to engaged, number unobtainable and other call progress conditions.

A.3.5.1 Enhanced Mid Call Diversion Overview

EMCD call control is achieved using the generic keypad stimulus protocol (see Annex B). The keypad protocol allows control strings of characters to be transmitted both from the CPE to the network and from the network to the CPE. This takes place in the ISDN D channel and is inaudible to either party of the call.

As normal ISDN call set-up is not used the 2nd leg call is set up by the network, under the indirect control of the CPE. Therefore the ISDN call bearer capability and low and high level compatibility fields are copied from the established call's parameters.

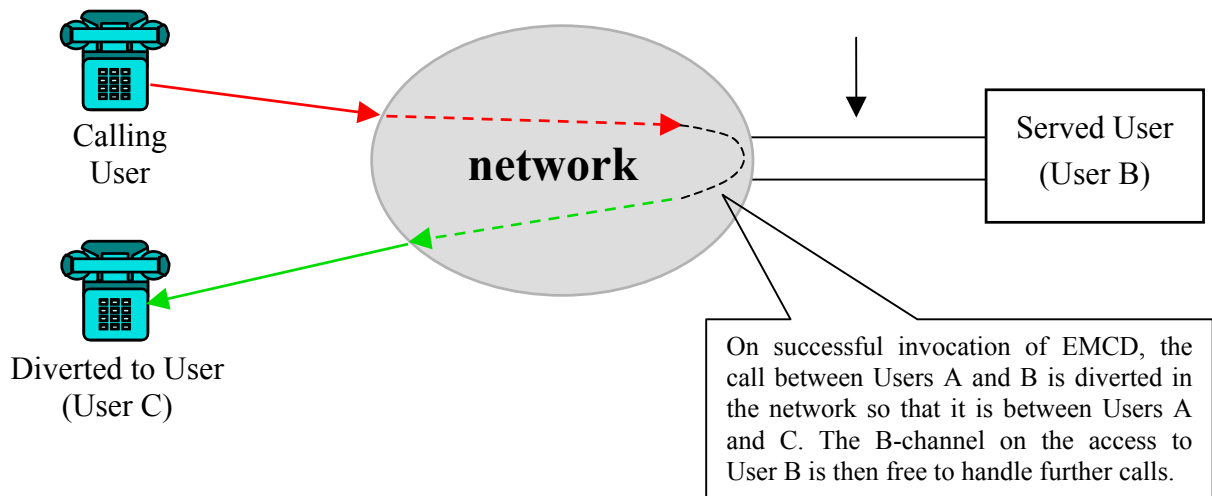


Figure A.1 – Example of EMCD Scenario

A typical EMCD call sequence will be as follows (with reference to Figure A.1):

- i) A normal call is established (between users A and B). The served user (B) engages in a dialogue with the calling user (A) until the need to invoke the EMCD occurs.
- ii) The served user (B) uses the ‘Keypad Protocol’ (abbreviated to a ‘keypad message’ in this text) to send a message requesting EMCD and containing the number of the diverted to user (User C).
Note: a free B-channel on the Enhanced Digital BT ValueLink Access is not required for this potential connection to the diverted party. All call progress information relating to this connection is provided as messages in the D-channel (see point iv below).
- iii) The Network receives and interprets the message and sets up a 2nd leg route using the diverted to number obtained from the received keypad message. The calling party (A) still has a two way voice path to the served user (B) during this process, so a courtesy announcement or ‘music-on-hold’ can be provided by the served user (B) to User A.
- iv) Call progress messages received on the 2nd leg route are forwarded back to the served user (B) in keypad messages. The served user (B) can use this information to give meaningful call progress indication (over the B-channel) to the calling user (A) in the event that the diverted to number (User C) is engaged or otherwise unobtainable.
- v) On answer by User C of the 2nd leg route, the network clears the call and B-channel connection to the served user (B), leaving the calling (A) and called (C) users connected together until either one clears. This frees the B- channel to User B for reuse. (NB: User B will continue to pay for the call between Users A and C following EMCD and has no control over that connection i.e. only User A or User C can clear the connection).

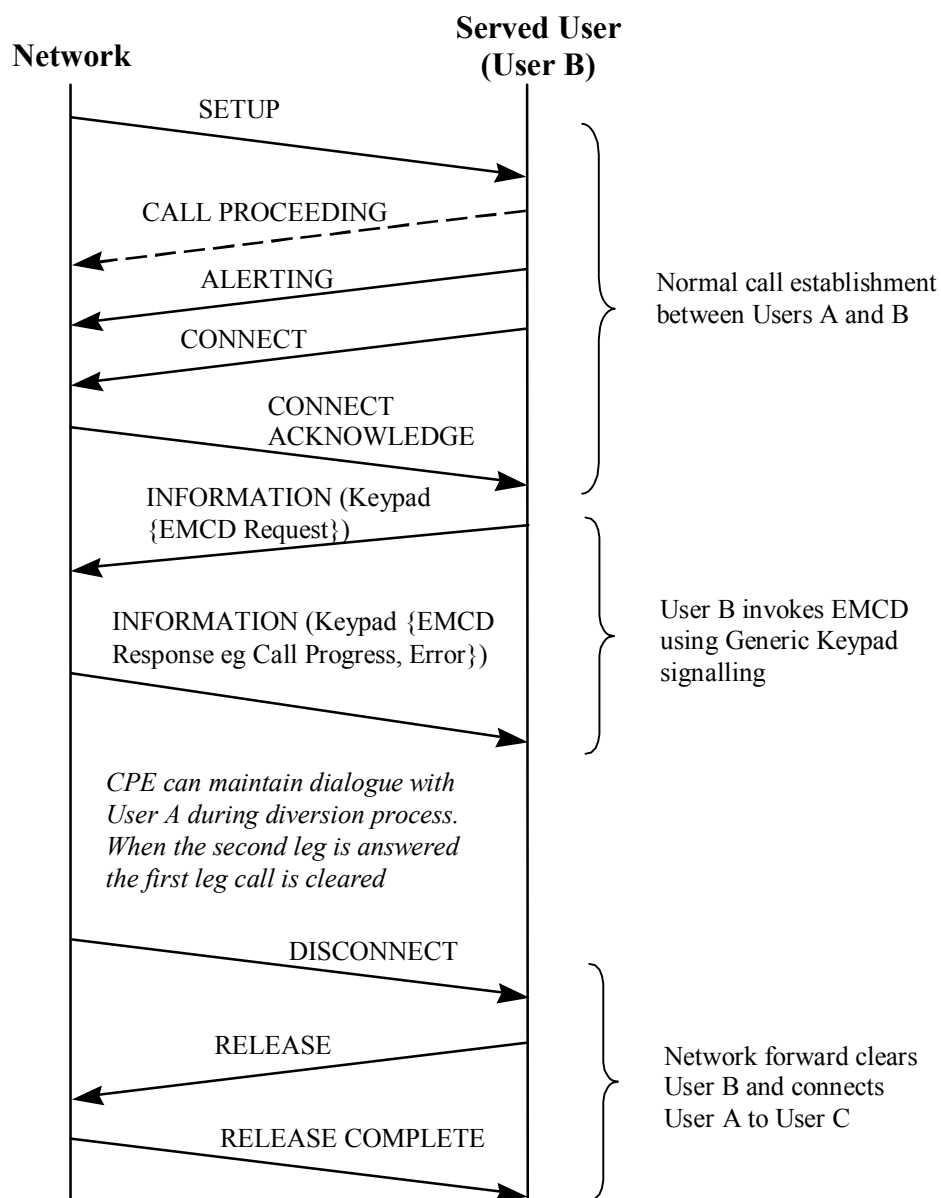


Figure A.2 - Typical DSS1 Call Message Sequence for Basic EMCD

A.3.5.2 EMCD Call Control Message Syntax

All messages concerning the EMCD service will be contained in INFORMATION messages. These include both messages from the CPE to the network and from the network to the CPE. The data in INFORMATION messages will be carried by Keypad facility information elements containing IA5 strings as described in Annex B.

A.3.5.2.1 CPE to Network Messages

The network will be able to accept Keypad facility information elements of up to 34 octets in length (see [5], §4.5.18).

The format of the Keypad facility information IA5 character string is as described in Annex B with the service specific entities defined as follows:

<Service Prefix> ::= *

<Service Code> ::= 96

<Supplementary Information> ::= <Diverted to Address> |
<Clear Request> |
<Enquiry Call Request> |
<Home Group Divert Request> |
<Information Forwarding Request> |
[<Call Re-presentation Request>]
[<Call Type Override Request>]
[<EMCD Subaddress Request>]
[<Second Leg Duration Limit>]
[<Voice Path Control Request>]

<Diverted to Address> ::= <Digit> {<Digit>}

<Clear Request> ::= C

<Call Re-presentation Request> ::= R <Route Number> <Called Number>

<Call Type Override Request> ::= T <Call Type>

<EMCD Sub-address Request> ::= S <Sub-address>

<Second Leg Duration Limit> ::= Z <Tone Type> <Duration Limit>

<Enquiry Call Request> ::= D <Called Number>

<Home Group Divert Request> ::= F <Route Number> <Called Number>

<Information Forwarding Request> ::= I <Escaped IA5>

<Intrusion Tone> ::= Z <Tone Type><Total Duration of 2nd Leg Call (in seconds)>

<Voice Path Control Request> ::= P <Path Number>

<Called Number> ::= {<Digit>}

<Route Number> ::= <Digit>

<Path Number> ::= <Digit>

<Call Type> ::= <Digit>

<Tone Type> ::= 0|1, i.e. 0 for no tone, 1 for tone cadence 30 seconds prior to expiry of call duration timer

<Duration Limit> ::= <Digit> {<Digit>}, i.e. call timer duration in seconds

<Escaped IA5> ::= Standard IA5 character set, with \ escape character, i.e.

\ <IA5 Character> is forwarded as <IA5 Character>, hence

* is forwarded as * – the * character is not interpreted as the terminator

\\ is forwarded as \

<Digit> ::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

If any part of a single Keypad facility information element received by the network does not comply with the requirements above then the network will ignore the entire information element and return the <Format Error> message defined below. The network will ignore any field(s) that are not valid in the current phase of EMCD call set-up.

A.3.5.2.2 Network to CPE Messages

The format of the Keypad facility information IA5 character string is as described in Annex B with the service specific entities defined as follows:

<Service Prefix> ::= *

<Service Code> ::= 96

<Supplementary Information> ::=

<Service Reject> |

<Format Error> |

<Call Progress Information > |

<Forwarded Information>

<Service Reject> ::= R <Request Code>

<Format Error> ::= E

<Request Code> ::= C | D | F | I | P | R | S | T

<Call Progress Information> ::= P <Digit> <Digit> <Digit>

<Forwarded Information> ::= F <Escaped IA5 String>

<Digit> ::= 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9

The meaning of the three digit call progress information code is given in the table A.1

Call Progress Information Code	Description
000–127	Second leg network call cause code as passed in the Cause value field of a Cause information element Note: padding with leading zeros to give fixed length string
200–327	Second leg network call progress code (as passed in the Progress Description field of a Progress indicator information element) + 200
400–527	Enquiry Call user facing call (2 nd CPE channel) cause code as passed in the Cause value field of a Cause information element + 400
600–727	Enquiry Call user facing call (2 nd CPE channel) progress code (as passed in the Progress Description field of a Progress indicator information element) + 600
900	Second leg route call proceeding.
901	Second leg route call alerting.
909	Second leg route call connected.
910	Enquiry Call user facing call proceeding.
911	Enquiry Call user facing call alerting.
919	Enquiry Call user facing call connected.

All other Progress Information Codes are reserved for future use.

Table A.1 Call Progress Information Codes

A.3.5.3 Basic EMCD Procedures

The service may be invoked during the active phase of a call. The service is requested by the sending of an INFORMATION message to the network containing a Keypad facility information element formatted as described in A.3.4.2.1 and containing the number of the diverted to user.

On receipt of a valid EMCD request, the network will attempt to establish a connection to the diverted to user with the same Bearer capability, High and Low layer compatibility information element coding as the active call. If the EMCD request is:

- successful, the network shall send an INFORMATION message to the served user containing a Keypad facility information element formatted as described in A.3.4.2.2 and containing the appropriate call progress information code.
- unsuccessful (e.g. the diverted to address is invalid, the diverted to user is busy), then the EMCD request will be rejected by the network sending an INFORMATION message to the served user containing a Keypad facility information element formatted as described in A.3.4.2.2 and containing the appropriate call progress information code.

When the diverted to user (User C) answers, the network will complete the transfer and forward clear the served user (User B), thus the served user has no further control over the call and the control is passed to the calling (User A) and diverted to (User C) users.

Note: if the served user clears the call after initiating an EMCD request and before the final destination has answered the diversion continues, with any appropriate in-band tones audible to the calling user (User A).

The served user (User B) can cancel an EMCD request at any time prior to either:

- a) the network rejecting the EMCD request, or
- b) the network clearing the call to the served user (User B) as a result of successful invocation of EMCD,

by the served user sending an INFORMATION message to the network containing a Keypad facility information element formatted as described in A.3.4.2.1 and containing a Clear Request. (Note: in case (b) there is a possibility that a DISCONNECT message sent from the network as a result of successful EMCD crosses over with a EMCD Clear Request from the served user. In this case, the EMCD Clear Request will be ignored by the network and the successful EMCD will be completed.)

A.3.5.4 Modifications to Basic EMCD Procedures

A number of additional supplementary services are provided which allow the CPE to modify the basic EMCD procedures.

Call Re-presentation: this function allows the CPE to request that it (or another CPE of any chosen destination) be reconnected to the caller if the 2nd leg of the call clears. **Note: This Supplementary Service requires first party release on the second leg and as such it is limited to use on non-geographic destination numbers (e.g. 0800, 0345 etc) and certain mobile and ISDN destinations.**

Call Type Override: this function allows the served user (User B) to select the outgoing call type (normally copied from the incoming call) from a limited range of options. For example, it could request an ISDN only call, even if the incoming call originated from the PSTN.

Second Leg Time Duration Limit and Intrusion Tone: this function allows the CPE to define a time duration limit for the EMCD second leg. On answer of the second leg a timer is started, expiry of this timer causes the second leg to be cleared with clearing cause #16 (normal call clearing). This supplementary service also allows an optional in-band intrusion tone to be inserted 30 seconds before the timer expires.

EMCD Subaddressing: this function allows the served user (User B) to specify an ISDN sub-address, in addition to the diverted to call party number.

Enquiry Call Set-up: this function allows the CPE to set-up the 2nd leg call on a separate B-channel from the incoming call and then subsequently connect two calls together to complete the transfer.

Home Group Divert: this function allows the served user (User B) to divert the call to another CPE port on the same customer access group without diverting out to the network first.

Information Forwarding: this function allows the CPE to communicate with another CPE on the same customer access group using information in keypad facility information elements.

Voice Path Control: this function overrides the immediate completion of the call transfer following diverted to user (User C) answer, and then allows the CPE to switch transmission between calling user (User A) and User C and control completion of the transfer.

A.3.5.4.1 Call Re-presentation

This function allows the CPE to request that the calling user (User A) be reconnected to it (or another CPE) if the 2nd leg of the call clears.

The served user (User B) is able to select a call re-presentation function when setting up a diversion, at the same time specifying a destination route (from a pre-defined list of up to a maximum of 10 routes held by the network) and the called number to be delivered as part of the re-presentation call set-up. *It should be noted that this feature is only operational within a host platform. Therefore if a service is provided across multiple platforms this feature cannot be used to transfer calls between these platforms.*

If Call Re-presentation is selected then once a call that has been successfully diverted and is subsequently backward cleared User A is put on hold while a new call is set up to the CPE using the specified number. The CPE is then able to answer the new call and resume interaction with User A. As this is a new call it can fail if routes to User B are busy at the time. The phases in a Re-presented call are shown below:

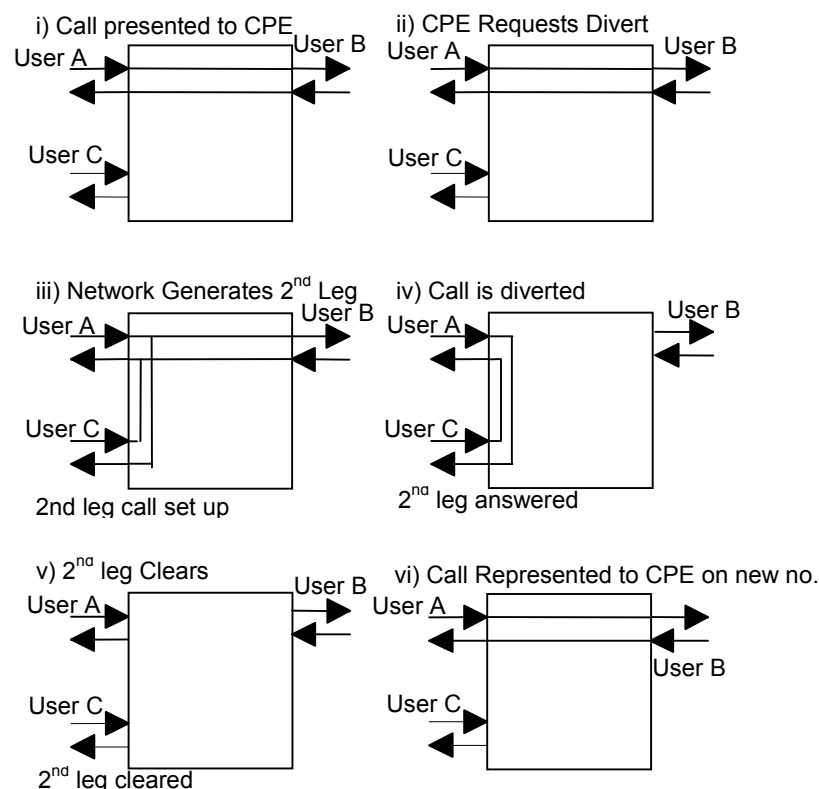


Figure A.3: Phases of Representation Divert Call Setup

A.3.5.4.2 Call Type Override

Normally the 2nd leg call type will be of the same as the 1st leg call type, however, this service allows a different call type to be selected from a pre-defined set.

The Bearer capability, Low level compatibility and High level compatibility fields of the outgoing call may be selected as follows:

Call Type	SETUP information elements
0	Reserved for future use
1	Data (64 kbit/s unrestricted)
2	Speech
3	3.1kHz Audio (default)
4	Telefax Group 4
5	Telefax Group 2/3
6-9	Reserved for future use

Table A.2 - Call Types

All other Call Type Codes are reserved for future use.

Note: When using this additional feature of the supplementary service, in the event that one of the reserved voice paths is selected, the 3.1.kHz Audio Call Type 3 is utilised.

A.3.5.4.3 Second Leg Duration Limit & Intrusion Tone

This supplementary service allows the CPE to define a time duration limit for the EMCD second leg. On answer of the second leg a timer is started, expiry of this timer causes the second leg to be cleared with a release reason of 16. If a representation request has been made then on expiry of the timeout the call will be re-presented to the CPE.

The CPE is also provided with the option of playing an intrusion tone on the voice path of the EMCD call, this intrusion tone may typically be used to indicate that the second leg call will terminate very soon. Currently available tones are detailed in Table A.3. By using a tone type of 0 (or no tone) the option is effectively disabled from the supplementary service.

The following points should be noted when using this additional feature of the supplementary service:

- The tone replaces the voice traffic and therefore during the tone period no voice traffic will be routed during this period
- When using a tone of type 1 and a second leg duration of 30 seconds or less then the tone will be heard for the entire duration of the second leg call.

Tone Type	Description
0	None
1	Tone cadenced into call 30 seconds prior to expiry of timeout
2	Reserved
3	Reserved
4	Reserved
5	Reserved
6	Reserved
7	Reserved
8	Reserved
9	Reserved

Table A.3. Intrusion Tone Types

A.3.5.4.4 EMCD Subaddressing

The served user (User B) is able to include sub-address information when setting up a diversion. The sub-address information consists of up to 20 IA5 characters, and will be presented as a ‘user defined format’ sub-address.

A.3.5.4.5 Enquiry Call Set-up

The enquiry call set-up service allows the served user (User B) to use a second CPE B channel to set up the 2nd leg of an MCD call completely independently from the 1st leg. User B may then engage in a dialogue with the 2nd leg without putting the calling user (User A) on ‘hold’.

If prior to specifying the destination address, the User B selects Enquiry Call set-up then the following sequence is used to set up the EMCD call:

- i) The network allocates a 2nd B channel on the same physical 2 Mbit/s bearer as the existing call (if this allocation fails then the EMCD call will fail with code 417 ‘enquiry call user busy’).
- ii) The network then sets-up a call into the 2nd CPE B channel using the Called Number specified in the Enquiry Call Request. Call progress information is relayed to the 1st CPE channel in Call Progress Information messages (see Table A.1).
- iii) On answer of the 2nd channel the network commence the set-up of the call to the 2nd leg destination. The answer on the 2nd CPE channel is also reported to the 1st CPE channel in a Call Progress Information message (see Table A.1).
- iv) While the 2nd leg call set-up proceeds the two CPE channels may exchange information using the Information Forwarding Request service.

- v) Call progress information on the 2nd leg call is relayed to both CPE channels in Call Progress Information messages (see Table A.1).
- vi) On 2nd leg call answer the diverted to user (User C) is connected to the 2nd CPE channel. The CPE may now engage in independent dialogues on both channels. If necessary it may still exchange Information Forwarding Requests with the 1st channel via the network.
- vii) To transfer the call the served user (User B) clears the 1st CPE call. The network then clears the 2nd CPE call and connects the calling user (User A) and diverted to user (User C) as for a normal EMCD call.
- viii) If user B invokes the call clear service on the 1st CPE channel, or forward clears the 2nd CPE channel then the 2nd leg call shall be cleared and the network revert to the normal active call state.

The phases in Enquiry Call set-up are shown below:

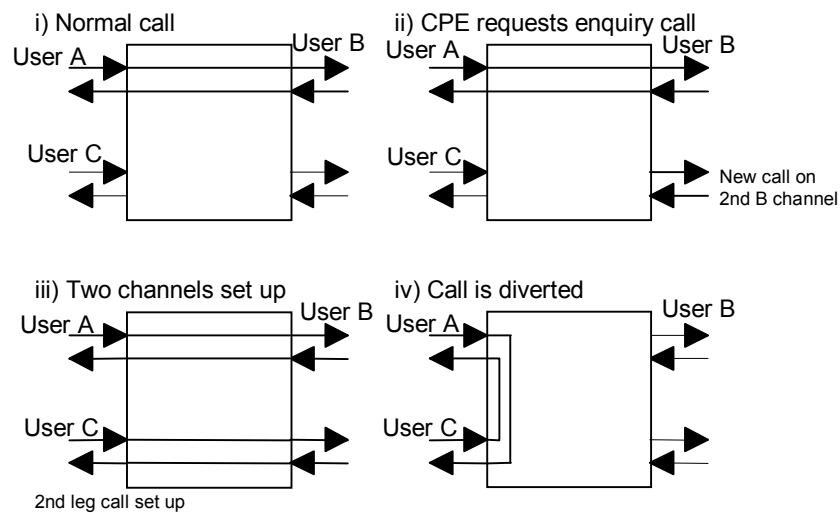


Figure A.4: Enquiry Call Set-up

Note: It is necessary for User B to be able to relate the calls on the two CPE B channels as part of the same Enquiry Call set-up, the method for doing this is an issue for the CPE application.

A.3.5.4.6 Home Group Divert

Home Group Divert operates in a similar manner to normal EMCD call set-up. However, rather than routing the call via the public network the call is immediately routed to another CPE on the same network 'Home Group'.

If the served user (User B) selects Home Group Divert then the network selects the appropriate route from a pre-defined set of a maximum of 10 based on the Route Number parameter supplied by the CPE, and sets up a call up to that destination. If no such route exists then the request will be rejected. The called number used is that contained in the Called Number parameter supplied by the CPE. This call and subsequent transfer then progresses as for any other EMCD call. *It should be noted that this feature is only operational within a host platform. Therefore if a service is provided across multiple platforms this feature cannot be used to transfer calls between these platforms,*

On receipt of a Home Group Divert request the process begins immediately. Any previous or following Call Re-presentation or Enquiry Call requests and any previously specified Destination Address fields are ignored, i.e. Home Group Divert requests override Call Re-presentation or Enquiry Call requests. The phases in Home Group Divert are shown below:

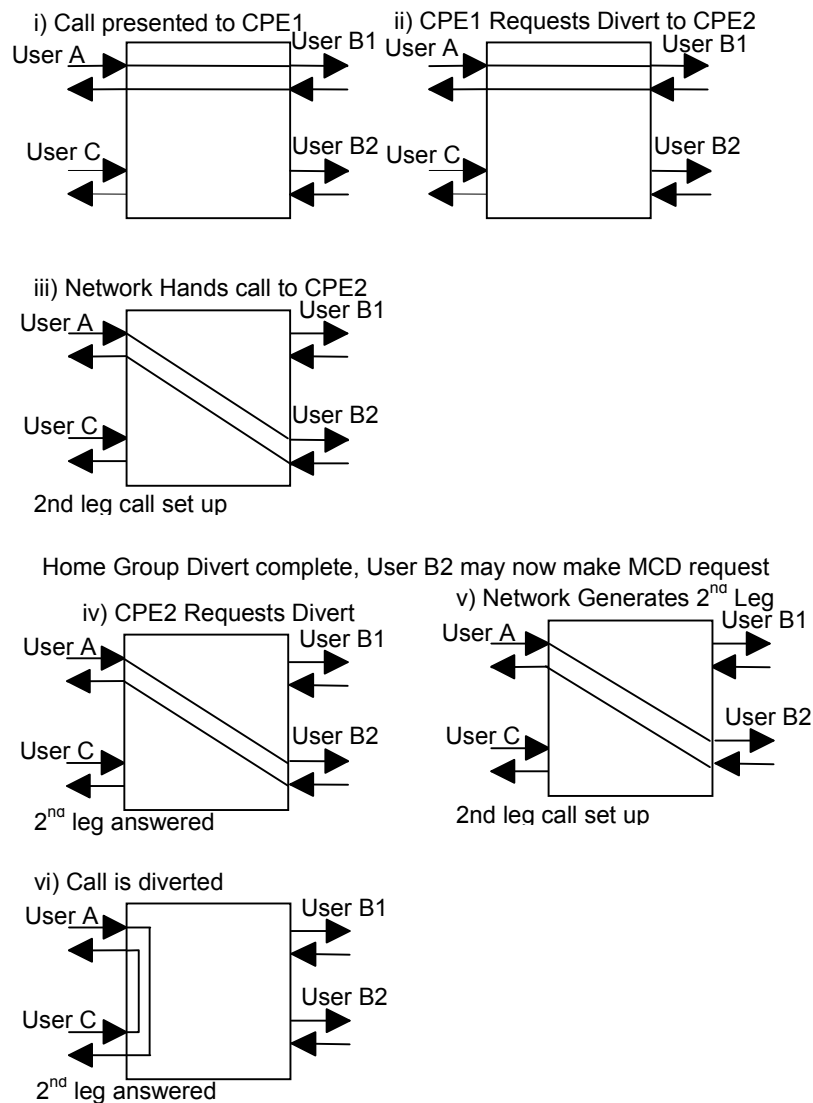


Figure A.5: Phases of Home Group Divert Call Setup

A.3.5.4.7 Information Forwarding

The <Escaped IA5> string supplied by the CPE is forwarded to either the second CPE channel in an Enquiry Call EMCD call set-up, or the destination CPE in a Home Group Transfer. If no 2nd CPE channel exists at the time the CPE issues the Information Forwarding request, then the request will be ignored.

It is possible for the 2nd CPE to send strings back to the 1st CPE using information forwarding requests without invoking other MCD services.

The forwarded information strings are terminated by the end of the Keypad Facility information element as only a single string is sent in a message.

A.3.5.4.8 Voice Path Control

The served user (User B) is able to specify the voice path configuration to be applied once the 2nd leg of the EMCD call has answered. It is also for user B to select further configurations following 2nd leg call answer. The voice path is selected from one of the following configurations:

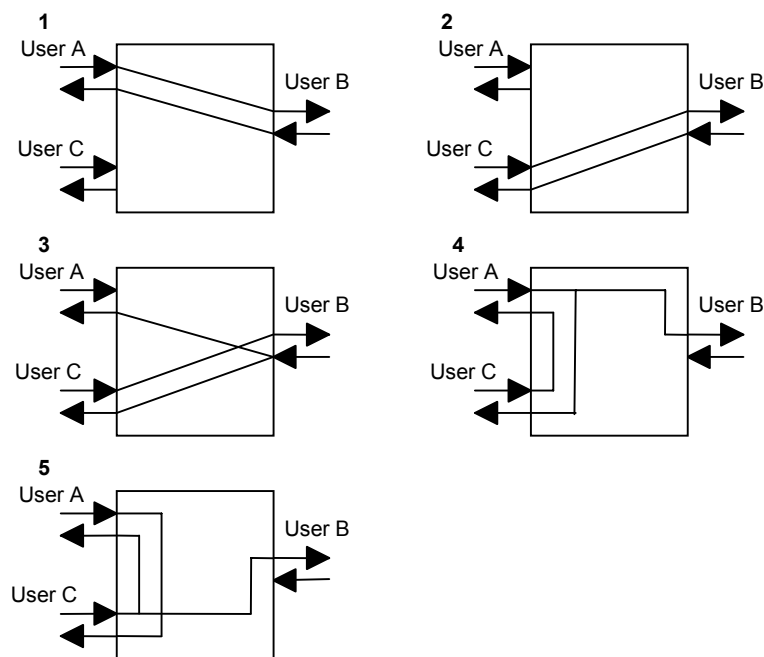


Figure A.6: Voice Path Configurations

The Path Number parameter supplied by the CPE select one of the voice path configurations, as numbered in Figure A.6. If a Path Number parameter of '0' is specified, then on 2nd leg answer the CPE call is cleared and the calling user (User A) and diverted to user (User C) are immediately connected. A Path Number parameter of '0' is the implicit default on all calls where no Voice Path Control request is used.

- End of Annex A -

ANNEX B

GENERIC KEYPAD PROTOCOL; CODING OF KEYPAD FACILITY INFORMATION

Some supplementary services use the Generic Keypad Protocol that is defined in ETS 300 122-1 [3]. The format of the Keypad facility information IA5 character string to be contained in the Keypad facility information element aligns with the format defined in ETS 300 738 [7]. This format is as follows (using Backus-Naur notation – see Note):

<Keypad facility information> ::= <Service Prefix> <Service Code> {<Service Separator> <Supplementary Information>} <Service Suffix>

<Service Separator> ::= *

<Service Suffix> ::= #

The definition of <Service Prefix>, <Service Code> and <Supplementary Information> are specific to each supplementary service and are defined in the section in this SIN describing the supplementary service.

Note: In the Backus-Naur notation:

- A sequence of characters enclosed in the brackets < > is a description of an entity e.g. <Keypad facility information>.
- Braces { } mean that the enclosed item can be repeated 0 (i.e. the item is absent) or more times.
- Square brackets [] indicate that enclosed item is optional (i.e. it may be absent).
- The character ::= means “is defined as”.
- The character | means “(exclusive) or”.
- Spaces are shown for clarity only, and
- Any other character not enclosed in the brackets < > represents itself and are to be IA5 encoded.

- End of Annex B -

ANNEX C

DIFFERENCES COMPARED WITH PREVIOUS ISSUE OF SIN 316

This annex provides a *brief* description of the *major* changes between this issue of Suppliers Information Note 316 and the previous issue 4.3. Please refer to the main body of the document for full descriptions of each topic, particularly as a number of editorial changes have also been made throughout this issue of the document.

Description	Ref. Section
Call Deflection supplementary service added	3.1
Limitation of user options for delivery of DDI digits at called user side.	A.3.1
Enhancement to the Call re-presentation feature	A.3.5.4.1
Further details on the Home Group Divert feature added	A.4.5.4.6
Correction to EMCD call failure code	A.3.5.4.5, bullet i)
Editorial changes including change to the service name to BT VALUELINK® (from Value Call)	general

- End of Annex C -