



SIN 232

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Suppliers' Information Note

For The BT Network

BT ISDN 30 (I.421) - Service Service Description and WITHDRAWAL NOTIFICATION

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1. GENERAL

1.1 This Suppliers Information Note (SIN) describes the BT ISDN 30 (I.421) Service supported on the *limited ETSI call control* platform, (CCITT Recommendation I.421 User-Network Interface). It is intended to provide general information about the service for Customer Premises Equipment (CPE) manufacturers and developers.

1.2 An overview of all of the ISDN services provided by BT is given in SIN 312.

2. ABBREVIATIONS

CCITT	- The International Telegraph and Telephone Consultative Committee (now called ITU-T - International Telecommunications Union - Telecommunications Standardisation Sector)
CPE	- Customer Premises Equipment
CTR	- Common Technical Regulation
ETS	- European Telecommunication Standard
ETSI	- European Telecommunication Standards Institute
ISDN	- Integrated Services Digital Network
ITEC	- ISDN Terminal Equipment Compatibility Laboratory
NT1	- Network Termination Type 1
NTTA	- Network Terminating and Testing Apparatus
PRA	- Primary Rate Access
PSTN	- Public Switched Telephone Network
SIN	- Suppliers Information Note
UTP	- Unscreened Twisted Pair

3. SERVICE AVAILABILITY

3.1 The issue of this SIN details the BT ISDN 30 (I.421) Service, (supported on the *limited ETSI call control* platform). It is an updated version of SIN 232, Issue 5.0 which announced the withdrawal of the service.

3.2 The BT ISDN 30 (I.421) Service, (supported on the *limited call control* platform) uses a call control platform across the network which was designed and implemented prior to the completion of the European ISDN Standards published by the European Telecommunications Standards Institute (ETSI). BT now support new provision of their ISDN 30e Service on a *full ETSI call control* platform which is described in SIN 261.

Following the complete introduction of the full ETSI call control platform, all new provision of ISDN 30 (I.421) services is on the full ETSI call control network platform.

BT withdrew the ISDN 30 (I.421) service provided on the *limited ETSI call control* network platform during 2008.

Both the *limited ETSI call control* network platform and the *full ETSI call control* network platform support the ISDN user-network interface to the ETSI international standards and hence network platforms will support the same approved ISDN CPE albeit with some restrictions, see SIN 261 Section 2.2.

4. SERVICE DESCRIPTION

4.1 The BT ISDN 30 (I.421) Service has been designed to support CPE complying with NET 5 (which was superseded by CTR 4) and is as described in the following ETSI standards as qualified by Annexes A to C of this SIN:

ETS 300 011 Edition 2
ETS 300 125
ETS 300 102-1
ETS 300 061
ETS 300 064
ETS 300 092
ETS 300 093

The full title and dated references of the above documents are given in Clause 6.

Further documentation on Services and Digital Calling Features to be provided is given in Annex A.

NOTE: From 1st September 1999, all supplementary services provided on BT's ISDN Services were re-branded as "Digital Select Services". Following a subsequent re-branding exercise these services are now called Digital Calling Features.

4.2 The customer interface is presented to the user via an NTTA (Network Terminating and Test Apparatus) offering a socket in accordance with ISO/IEC 10173¹ for connection of CPE to the service.

Note: the NTTA performs the NT1 function specified in the ETSI standards.

4.3 The NTTA is locally powered and will require a local mains supply. The power consumption is approximately 20 Watts.

4.4 The requirements for the cabling between the CPE and the NTTA are specified in prEN 50098-2. As an example, these requirements will be met using unshielded twisted pair (UTP) Class 5 cable of up to 200m in length.

5. INTERWORKING WITH OTHER SERVICES

For ISDN interworking with other services see SIN 261.

Further information specific to international interworking between the BT ISDN service and overseas ISDNs is available in SIN 243.

6. REFERENCES

Standard	Title	Remarks
CCITT Rec.V.110 (ECMA 102) 1988 Blue Book	Support of data terminal equipment (DTEs) with V-series type interfaces by an ISDN.	
EN 28887 (September 1993)	Interface connector and contact assignments for ISDN basic access interface located at reference points S and T	

¹ ETS 300 011 specifies that the connector for ISDN primary rate access is ISO/IEC 10173. However, it has been acknowledged in the international standards committee that there are manufacturing problems with the design of this connector. The connector specified in ISO/IEC 10173 has the same basic dimensions as the connector specified in EN 28877 but contains additional keying features to prevent inadvertent connection to services using that connector. The socket on the NTTA will permit the insertion of a plug to EN 28877. This is a permitted option in ISO/IEC 10173. **NB. The contact assignment shall be as specified in ISO/IEC 10173 even when a plug to EN 28877 is used.** This change to the connector is included in Edition 2 of ETS 300 011.

Standard	Title	Remarks
EN 50098-2	Customer Premises Cabling for Information Technology. Part 2: The Design and Configuration for ISDN Primary Rate interface	
ETS 300 011 Edition 2	ISDN: Primary Rate user-network interface Layer 1 specification and principles	
ETS 300 059 (October 1991)	ISDN: Subaddressing (SUB) supplementary service	Service Description
ETS 300 060 (November 1991)	ISDN: Subaddressing (SUB) supplementary service	Information Flows
ETS 300 061 (November 1991)	ISDN: Subaddressing (SUB) supplementary service	DSS1 Protocol
ETS 300 062 (October 1991)	ISDN: Direct Dialling In (DDI) supplementary service	Service Description
ETS 300 063 (November 1991)	ISDN: Direct Dialling In (DDI) supplementary service	Information Flows
ETS 300 064-1 (September 1996)	ISDN: Direct Dialling In (DDI) supplementary service	DSS1 Protocol
ETS 300 089 (January 1992)	ISDN: Calling Line Identification Presentation (CLIP) supplementary service	Service Description
ETS 300 090 (January 1992)	ISDN: Calling Line Identification Restriction (CLIR) supplementary service	Service Description
ETS 300 091 (April 1992)	ISDN: Calling Line Identification Presentation (CLIP) supplementary service and Calling Line Identification Restriction (CLIR) supplementary service	Information Flows
ETS 300 092-1 (April 1992) + Amendment 2 (11/94)	ISDN: Calling Line Identification Presentation (CLIP) supplementary service	DSS1 Protocol
ETS 300 093-1 (April 1992)	ISDN: Calling Line Identification Restriction (CLIR) supplementary service	DSS1 Protocol
ETS 300 102-1 (December 1990) + Amendment 2 (10/93)	ISDN: User-Network Interface layer 3 Specification for Basic Call Control	DSS1 Protocol
ETS 300 108 (August 1992)	ISDN: Circuit-mode 64 kbit/s unrestricted 8 kHz structured bearer service category	Service Description
ETS 300 110 (August 1992)	ISDN: Circuit-mode 64 kbit/s 8 kHz structured bearer service category usable for 3.1 kHz audio information transfer	Service Description
ETS 300 122-1	ISDN: Generic Keypad Protocol for the support of supplementary services.	
ETS 300 125 (September 1991)	ISDN: User-network interface data link layer specification; Application of CCITT Recommendations Q.920/I.440 and Q.921/I.441	
ETS 300 156 (September 1992) + Amendment 1 (3/95) Standard being withdrawn and is replaced by TBR 4	ISDN: Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access (Formerly NET 5)	
I-ETS 300 245-1 (February 1996)	ISDN; Technical characteristics of telephony terminals Part 1: General	
ISO/IEC 10173 (April 1990)	ISDN Connector up to 8 pins and up to 2.048 Mbit/s	
CTR 4 (6/97)	CPE Attachment Approval Standards - ISDN Primary rate access; 6/6/97	Ref: EC Official Journal - L148
ITU-T Rec. G.114 (3/93)	One-Way Transmission Delay	

For further information or copies of referenced sources, please see document sources at <http://www.btplc.com/sinet/>

Suppliers' Information Notes (SINs)

SIN 243	ISDN International interworking	
SIN 261	BT ISDN 2e and ISDN 30e Service using full ETSI call control.	Service Description

SINs are available at: <http://www.btplc.com/sinet/>

7. HISTORY

Issue No.	Date	Reason for change
Issue 1	February 1993	Initial issue
Issue 2	January 1995	Revisions to take account of the launch of the Service.
Issue 3	November 1995	Updated to provide additional information, principally on directory numbering and access utilisation
Issue 4	July 1998	Revisions to take account of the impending full introduction of the BT ISDN 30 (I.421) Service using <i>full ETSI call control</i> platform.
Issue 4.1	April 1999	Editorial revisions only, see table D.1.
Issue 4.2	December 1999	Editorial revisions only, see table D.1.
Issue 4.3	May 2002	Editorial changes
Issue 4.4	April 2003	Approval Requirements statement removed, information available via SINet Useful Contacts page.
Issue 5.0	September 2006	Announce withdrawal of service.
Issue 5.1	June 2008	Updated in line with the planned date of withdrawal and the re-branding of Digital Select Services as Digital Calling Features.
Issue 5.2	January 2014	Changes to reflect the completion of BT's withdrawal from service
Issue 5.3	January 2015	Change SINet site references from http://www.sinet.bt.com to http://www.btplc.com/sinet/

ANNEX A

BT ISDN 30 (I.421) SERVICE - SERVICE FACILITIES

A.1 INTRODUCTION

This document is the means by which BT will formally announce the facilities available during the various stages of development and deployment of the BT ISDN 30 (I.421) Service; updates will be provided when appropriate. The status of the services offered in the Service is shown in this issue.

NOTE: Annex C provides without prejudice, non-regulatory, information of general interest to manufacturers.

A.2 FACILITY AVAILABILITY

The information supplied in Table A.1 states the facilities available on this service.

Service
Bearer Services:
Circuit mode speech bearer
Circuit mode 64 kbit/s unrestricted bearer
3.1 kHz audio bearer
Teleservices:
Telephony
Teletex
Group 4 facsimile
Group 2/3 facsimile
Digital Calling Features:
Direct Dial In (DDI)
Sub-addressing
Calling Line Identification Restriction (CLIR)
Calling Line Identification Presentation (CLIP)
Outgoing Call Barring (Administration Controlled)
Incoming Call Barring (Administration Controlled)
Call Diversion (Administration Controlled)
Malicious Call Identification (MCID)
Presentation Number (PN)
Service Care
TotalCare (PromptCare is the default level of Service Care)

Table A.1 - Facility Availability.

A.3 BEARER SERVICES

A.3.1 64 kbit/s unrestricted bearer service, see ETS 300 108.

A.3.2 Speech mode bearer service, see ETS 300 109.

A.3.3 3.1 kHz audio bearer service, see ETS 300 110.

A.4 TELESERVICES

Telephony, Teletex, Group 4 fax and Group 2/3 facsimile teleservices may be indicated on an end to end basis. All other teleservice indications will be discarded and call establishment will continue on the basis of the information within the Bearer Capability (BC) information element.

A.5 DIRECTORY NUMBER ALLOCATION

Note: the allocation of a directory number to a specific B-channel or group of B-channels is not a standardised service and is not compatible with the standardised service. Hence this feature is not offered.

The following table states the numbering options available on an ISDN 30 (I.421) access or group of accesses:

Up to 4 Single Directory Numbers or Up to 5 DDI ranges or 1 Single Directory Number and a Maximum of up to 4 DDI ranges or 2 Single Directory Numbers and a Maximum of up to 3 DDI ranges or 3 Single Directory Numbers and a Maximum of up to 2 DDI ranges or 4 Single Directory Numbers and a Maximum of up to 1 DDI range
--

Table: A.2 - ISDN 30 (I421) Numbering options

NOTE: The Single Directory Numbers are presented technically in the same way as DDI.

Hunting across all channels in the access or group of accesses is provided (see Annex B Clause B.3).

Direct Dialling In (DDI) is also available, see Clause A.6.1.

A.6 DIGITAL CALLING FEATURES

These services are available to customers. A charge (rental and/or connection charge) for these Digital Calling Features may be made.

A.6.1 Direct Dialling In

Reference ETS 300 062, ETS 300 063 and ETS 300 064.

Enables more than one number to be assigned to a single access or group of accesses. The DDI digits (up to a maximum of 6 digits) are delivered from the network to the user in the "number digits" field of the Called party number information element according to the procedures of ETS 300 102-1, sub clause 5.2. The "type of number" field of the Called party number information element is coded "unknown".

The directory numbers in a DDI group are consecutive. Up to 5 separate DDI groups can be allocated to an access or group of accesses.

A single "service profile" applies to all of the numbers in a particular DDI group and at service launch, the same "service profiles" will apply to all DDI groups allocated to an access or group of accesses. A "service profile" specifies what services are applicable e.g. class of service and Digital Calling Features.

If a customer has more than one DDI group, the transmission of the full calling line identity applicable to each DDI number will be supported. This will require CPE to provide accurate Calling party Information to the network with outgoing calls. If the User provided information cannot be verified then the default calling line identity of the access (usually the main billing number) will be used as the CLI.

A.6.2 Subaddressing

Reference ETS 300 059, ETS 300 060 and ETS 300 061

Enables the expansion of the customer's addressing capacity beyond the ISDN number. When the calling and called user is connected to the BT ISDN (ISDN 30 (I.421) or ISDN 2) 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.

However, CPE manufacturers and users are advised to restrict the subaddress information to 4 octets in order to increase the probability of international interworking with other networks supporting the Subaddressing Digital Calling Feature.

For the ISDN 30 (I.421) Service the BT ISDN will only support the "user specified" type of subaddress (octet 3 bits 5 to 7). 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.

To ensure correct transport of the called party subaddress information when the called user is connected to the BT ISDN 30 (DASS 2) Service, the subaddress information should consist of IA5 alpha numeric characters excluding, "#" (IA5 code for # is Hex 23).

This Digital Calling Feature is provided to the called user and any charges for this service are applicable to the called user.

A.6.3 Calling Line Identification Restriction (CLIR)

Reference ETS 300 090, ETS 300 091 and ETS 300 093.

Customers can request that their line identities (telephone number) are not released to the customers they are calling. This service is available free of charge when ordered at the same time as the line(s).

Customers without CLIR activated can implement CLI restriction on a per call basis by dialling 141 as a prefix before the directory number of their outgoing call.

Customers that have CLIR activated can release their CLI on a per call basis by dialling 1470 as a prefix before the directory number of their outgoing call.

A.6.4 Calling Line Identification Presentation (CLIP)

Reference ETS 300 089, ETS 300 091 and ETS 300 092

Enables the called party to receive the call identity of the calling party. The delivery of calling line identities is available as a Digital Calling Feature. The destination end rents the service from BT.

Currently, the capability to provide the calling party subaddress from calling to called party is not supported. This service is very similar to the Calling Line Identification service provided on the BT ISDN 30 (DASS 2) Service. As with the BT ISDN 30 (DASS 2) Service, the calling user can insert the calling line identity at call request (e.g. to provide the DDI number). However, when the calling user provides a partial number (i.e. just the DDI digits), the calling line number presented to the called user gives no indication of which part of the number was provided by the calling user and which was provided by the public network (unlike the ISDN 30 (DASS 2) Service where an "X" is placed between the 2 parts of the number). This is in accordance with the international standards.

When the call originates on an ISDN access with DDI and the calling CPE does not provide the DDI digits, then the originating local exchange will insert an appropriate directory number i.e. one of the directory numbers in the DDI group, usually the main billing number.

Note: - In the Calling party number information element the type of number field is coded "unknown".

A.6.5 Outgoing Call Barring

This facility, under Administration control, allows the user to restrict the destinations to which outgoing calls may be placed. The facility is available on a permanent or pre-arranged basis. The categories of outgoing call barring include:

- i. all calls (except emergency and fault repair)
- ii. all national calls and international
- iii. all international calls
- iv. operator controlled calls
- v. calls to premium rate services (see SIN 212 for further information).

Combinations of the above categories are supported.

A.6.6 Incoming Call Barring

The facility, under Administration control, allows the user to restrict the receipt of incoming calls. The facility is available on a permanent or pre-arranged basis.

A.6.7 Call Diversion

This facility, under Administration control, enables the called customer to have incoming calls diverted to another number. This facility applies only to incoming calls having a Bearer capability information element coded "speech" or "3.1 kHz audio". Incoming calls with the bearer capability information element coded other

than "speech" or "3.1 kHz audio" will not be diverted and will be offered to the user identified by the Called party number.

For calls which are diverted, no Digital Calling Features (e.g. CLIP) will be carried forward on the diverted leg of the call.

The following types of diversion are available:

- i unconditional (i.e. all speech or 3.1 kHz calls)
- ii on busy
- iii on no reply

Types (ii) and (iii) can be combined.

A.6.8 Malicious Call Identification (MCID)

This service applies to both basic access and primary rate access and to both T and S/T-reference point configurations. The service is only provided on a temporary basis after prior arrangement with BT.

The service enables an incoming call to be identified and registered in the network and used for call tracing purposes. The network option to enable automatic invocation of MCID Digital Calling Feature on calls to the served user which are not answered is not provided.

If the served user also has the DDI Digital Calling Feature, then the MCID service will be provided for a specific ISDN number(s) forming part of the DDI Digital Calling Feature.

To invoke the MCID Digital Calling Feature, the network supports the use of the Keypad protocol (as specified in ETS 300 122-1) to invoke this service.

To invoke the MCID Digital Calling Feature using the Keypad protocol, the called user shall send the IA5 character string "*39#" in a single Keypad facility information element in an INFORMATION message (i.e. enbloc procedures only shall be used). This INFORMATION message uses the call reference used for the other call control messages associated to that call. There will be no response from the network to indicate success or failure of the invocation.

Note: It is particularly important in the MCID Digital Calling Feature that CPE using the Keypad protocol to support this service does not generate inband 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.6.9 Presentation Number (PN)

Presentation Number is implemented as described in clause A.7.17 of SIN 261.

- End of Annex A -

ANNEX B

BT ISDN 30 (I.421) SERVICE - NON-REGULATORY INFORMATION

B.1 Introduction

This Annex provides information of a general nature which it is hoped will be useful to manufacturers of CPE.

B.2 Cause Definitions

Where call clearing is initiated by the network it is recommended that the terminal should make available the clearing cause and cause value received from the network which should be distinguishable from any cause generated by the CPE.

This recommendation is made to allow network provided ISDN call progress information to be correctly interpreted by CPE users and maintenance engineers.

When terminal equipments are clearing calls, the only valid 'Locations' to be used in the 'Cause' Information element are USER or Public network serving the local user.

B.3 Hunting Facility

B.3.1 I.421 incorporates hunting over channels as an inherent part of the service; in addition line hunting will be provided so that an incoming call may hunt over a number of I.421 accesses (Note - hunting cannot be carried out over a mixture of ISDN 30 (I.421) and ISDN 30 (DASS) accesses or over a mixture of ISDN 30(I.421) accesses provided on *limited* and ISDN 30e accesses on *full ETSI call control* platforms). The hunt group is allocated one directory number and calls will be offered in a sequential manner, i.e. incoming calls will be offered to the first free channel and hunting will start at the same channel on every occasion.

B.3.2 Exchange line facilities will be provided against the I.421 access or group of accesses rather than individual ISDN 30 (I.421) channels.

B.4 Bypass Numbers

The concept of "bypass" numbers to be connected to an access whose directory numbers are on call forward (divert) to another number does not exist in the international standards. A "bypass" capability can be achieved, however with a single directory number or DDI by using a separate access with its own number(s) connected to the customers CPE.

Note: limitations to the full functionality of DDI at the time of service launch (see Clause A.6.1) may prevent the use of the above mechanisms to provide "bypass" capability.

B.5 Access To Intelligent Network (IN) Services

An increasing number of services are being provided on the BT PSTN using the Intelligent Network architecture. These services are also available on the ISDN. Some of these services require additional signalling using DTMF (Dual Tone Multi-frequency) signalling. In order for ISDN CPEs to have access to these services, it is recommended that CPE manufacturers provide DTMF capability in their terminal equipment in accordance with I-ETS 300 245-1 Section 5.4.

Note: some Digital Calling Features are supported using the Keypad protocol specified in EN 300 122-1 (e.g. MCID which is supported using the functional signalling as well as the Keypad protocol signalling - see Clause A.6.8). The Keypad protocol requires the transfer of keypad operations (i.e. a sequence of numeric digits including * and #) via the D-channel in Keypad facility information element. For the support of all services, it is therefore necessary for the terminal equipment to be switchable between sending either DTMF or Keypad facility information elements. It is not recommended that terminal equipment generate both DTMF and Keypad facility information elements at the same time as a result of a single man machine interface interaction.

B.6 Traffic/Channel Management

Accesses may be set-up to be wholly for bothway working, wholly for incoming working or wholly for outgoing working. Specific B-channels in an access can not be so set (the international standards do not specifically support the concept of B-channels which are exclusively for incoming or outgoing use only. However, customer's CPE by using the appropriate B-channel selection procedures when initiating calls and receiving

calls (see ETS 300 102-1, sub-clause 5.1.2 and sub-clause 5.2.3.1 respectively) can achieve a similar degree of control. Suppliers are reminded that their equipment must implement the B-channel selection procedures referenced above in order to provide the capability, where required, of using specific B-channels for exclusive outgoing only or incoming only working. In addition, the CPE can limit the number of incoming calls to be handled at any one time, by rejecting (in accordance with ETS 300 401-2) all incoming call requests which would exceed a pre-set limit.

B.7 Multiple Simultaneous Call establishment/Automatic Call Generation

It is recommended that for ISDN CPE which needs to establish multiple B-channel connections (e.g. channel aggregator equipment, Routers, etc), a 100 ms gap is placed between successive call establishment requests. This will ensure optimal processing within the network. If no gap is placed between successive call requests, congestion can occur in the network resulting in call establishment failure.

B.8 ISDN Connections Using Satellite Links

CPE designers need to take account that satellite links are used, particularly on international calls, in providing ISDN connections and should take account of the increased delay introduced by the satellite link. Whilst the preferred call routing will try and limit the use of satellite links to one, there are some destinations in the world and under some conditions (e.g. network congestion, fault recovery) where 2 satellite links will be used to provide the ISDN connection. Each satellite link can introduce a one-way transmission delay of 260ms (ref. Recommendation G.114 and hence applications in ISDN CPE need to be able to tolerate an additional round trip delay of $4 \times 260 = 1.04s$.

B.9 ISDN 30 (I.421) - Setting Of Sa Bits In Layer 1

CPE designers need to take account of the following clarification to the ETSI layer 1 standard ETS 300 011. It has been identified that there could be a conflict concerning the use of the S_a bits as defined in the "Digital Section Specification (ETS 300 233)" and the "User-Network Interface Specification (ETS 300 011)". In particular it has been identified that if a terminal manufacturer sets S_{a5} bit to zero (0), and the network termination equipment (NT1) is transparent to the S_a bits, a condition will be detected by the exchange termination function that an unintentional loopback has been set. This could result in the exchange removing the primary rate access from service. This is to prevent traffic being offered to a looped back access.

On close examination of the respective ETSS it can be found that:-

- In ETS 300 233 table 2 it is defined that in normal operation the ET sends S_{a5} bit set to zero (0), and that in normal operation the DS sends S_{a5} bit set to one(1).
 - An unintentional loopback condition is S_{a5} bit set to zero(0) detected by the ET.
 - In ETS 300 011 Table 3 the allocation of bits numbers 1 to 8 of the frame are normative as described in ITU Recommendation G.704.
 - In ITU Recommendation G.704 Table 4a/g.704 - Note 4 iii states "Bits S_{a5} to S_{a7} are for national usage where there is no demand on them for specific point-to-point applications."
 - "Bits S_{a4} to S_{a8} (where they are not used) should be set to 1 on links crossing an international border."
- To overcome the above anomaly ETSI have included the following clarification in Edition 2 of ETS 300 011.

A note has been added to table 3 (Allocation of bits 1 to 8 of the frame) of para 5.5.3 Assignment of bits in timeslot 0.

NOTE 4: Bits S_{a4} to S_{a8} shall be set to 1 by TEs. S_{a4} and S_{a8} are reserved for international standardisation, S_{a5} to S_{a7} are reserved for national use. TEs shall ignore any received pattern.

B.10 CPE Configuration Affecting Call Charges

The configuration of CPE, particularly those using automatic call generation, can significantly impact on customer's bills. It is important that the configuration is optimised for the customer's application and that the users are made aware of the importance of maintaining the configuration for optimal performance and costs. If equipment is incorrectly configured the customer may receive unnecessary call charges. This incorrect configuration has shown itself in the following forms:

B.10.1 Long Duration Calls

It has been identified that some calls may not be cleared correctly by the user or may not be cleared due to mis-configuration of the terminal equipment. This results in long duration calls and higher than expected call charges.

For example:

- Connections may be maintained during idle periods for Remote LAN access
- ISDN used as a private circuit back up has routers that fail to release the call when the private circuit is restored.
- Customer may end a Video Conferencing call by turning off the monitor but actually, unintentionally leave the call connected.

It is recommended that CPE customers should be made aware of the importance of ensuring that their CPE, particularly some Videoconferencing equipment, Bridges and Routers etc have been configured to clear down correctly at the end of a call.

B.10.2 Short Duration calls (Automatic call generation)

It has been identified that some terminal equipment automatically makes calls using the B channels without the user's knowledge. Correct configuration of the terminal equipment can minimise the amount of automatic call generation. Some terminal equipment can be configured to make calls on a transactional basis instead of utilising the full minimum charging period. This may not be the most efficient way to configure the application and the customer could be better off by keeping the call "open" (toll saving) for the duration of the minimum call fee making better use of the time paid for.

For example:

- Calls made for each individual e-mail sent, instead of batching a number of e-mails together and making one call.
- Routers sending protocol "watchdog" packets in the background.
- Maximum call length timers incorrectly set too short. It is recommended that terminal equipment customers are advised on the optimum configuration of their equipment and the correct call clearing method so as to minimise call charges.

B.11 ANONYMOUS CALL REJECTION (ACR)

The Telecommunication Data Protection Directive (Directive 97/66/EC) highlights the need for users to be able to reject incoming calls where the calling user has withheld their calling line identity (anonymous call rejection). International standards defining the anonymous call rejection function are being developed and the ETSI service description for ACR contains two options for ISDN:-

- i) a network based solution and
- ii) a customer / CPE based solution.

BT ISDN 30 (I.421) Service does not offer network based ACR.

B.12 SUB-EQUIPPED CIRCUITS

Where a sub-equipped circuit is provided, only specific channels will be available for use. This will typically be channels 1 to n, where n is the number of channels provided.

In accordance with international standards, it is therefore recommended that CPE leaves B channel selection to the network to perform.

- End of Annex B -

ANNEX C

BT APPLICATION OF EUROPEAN STANDARDS

C.1 Introduction

This Annex gives guidance to Customer Premises Equipment (CPE) manufacturers wishing to develop equipment for connection to the BT ISDN 30 (I.421) Service. The options and variations from ETSI Primary Rate Access (PRA) standards which are applicable to the BT ISDN 30 (I.421) Service at the date of service opening are documented in the following notes.

It should be noted that BT intend to evolve the ISDN 30 (I.421) Service to eliminate variations from the ETSI standards and to support additional services as stated in SIN 261.

C.2 ISDN 30 (I.421) Layer 1 Conformance

The BT ISDN 30 (I.421) Service conforms to the ETSI Layer 1 Primary Rate Access standard (ETS 300 011) as qualified by the following notes:

C.2.1 ETS 300 011 sub clause 5.1 - Summary of Functions.

The BT implementation does not support H0 or H1 bearer calls (384 or 1920 kbit/s).

C.3 ISDN 30 (I.421) Layer 2 Conformance

The BT ISDN 30 (I.421) Service conforms to ETSI Layer 2 Primary Rate Access standard (ETS 300 125) as qualified by the following notes:

C.3.1 ETS 300 125 Part 1, clauses 1-5 - General, concepts etc.

This background information should be read in context with the following notes which refer to Part 2 of ETS 300 125.

C.3.2 ETS 300 125 Part 2, sub clause 2.3 - Address Field

LAPB datalink connections in the D channel will not be supported by the network and any frame received with a LAPB address will be treated as an invalid frame (See ETS 300 125 sub clause 2.9).

C.3.3 ETS 300 125 Part 2, sub clause 3.3.3 - Service Access Point Identifier (SAPI)

Only a SAPI value of 0 is supported (See ETS 300 125, Table 2/Q.921).

C.3.4 ETS 300 125 Part 2, sub clause 3.3.4.2 - TEI (Terminal Endpoint Identifier) for Point to point data link connection

The only non-automatic TEI recognised by the network will be TEI value = 0. The network will not support automatic TEI values. Any frame received by the network with TEI value not equal to 0 will be treated as an invalid frame (See ETS 300 125 sub clause 2.9).

C.3.5 ETS 300 125 Part 2, sub clause 5.3.1/5.3.2 - TEI assignment procedure

The network will not support automatic TEI assignment procedures. Any "TEI ID" request received by the network will be ignored and discarded without notification to the sender.

C.3.6 ETS 300 125 Part 2, sub clause 5.3.1/5.3.5 - TEI identity verify procedures

The network will not support TEI identity verify procedures. Any user initiated "TEI ID verify" request received by the network will be ignored and discarded without notification to the sender. The network will not generate any message associated with the management of TEIs.

C.4 ISDN 30 (I.421) LAYER 3 CONFORMANCE

The BT ISDN 30 (I.421) Service conforms to the ETSI Layer 3 standard (ETS 300 102-1) qualified by the following notes:

C.4.1 ETS 300 102-1 clause 1 - General

This application document specifies the interface for Primary Rate Access only.

C.4.2 ETS 300 102-1 sub clause 3.1 - Messages for Circuit Mode Connection Control

Call Information Phase Messages - none of the messages in this class are supported since the SUSPEND and RESUME family of messages relate to the Terminal Portability supplementary service which is not applicable to the primary rate access and the USER INFORMATION message is associated with the User-to-User signalling supplementary service which is not supported.

SEGMENT message - none of the services supported require the use of the segmentation procedures and hence this message is not supported (see also Clause C.4.26).

CONGESTION message - the CONGESTION message is associated with the User-to-User signalling supplementary service which is not supported. Hence this message is not supported.

FACILITY message - no Digital Calling Features are supported which require the use of this message and hence this message is not supported.

STATUS ENQUIRY message - this message is not supported (see also Clause C.4.22).

Note: "not supported" means that the network will not recognise the message if received from the user and will never generate the message.

C.4.3 ETS 300 102-1 sub clause 3.4 - Messages used with the Global Call Reference
The RESTART message will not be generated by the network (see Clause C.4.21).

C.4.4 ETS 300 102-1 sub clause 4.2 - Protocol Discriminator
The only value of protocol discriminator used and supported is 00001000 "Q.931 user-network call control messages".

C.4.5 ETS 300 102-1 sub clause 4.5.1.1 - Table 4.3 Information Element Identifier Coding
Table C.1 indicates all the information elements supported.

Information element	Reference
Sending complete	
Bearer capability	(see Clause C.4.6)
Cause	
Call State	
Channel identification	
Progress indicator	
Notification indicator	
Display	
Keypad facility	
Calling party number	
Called party number	
Called party subaddress	
Low layer compatibility	(see Clause C.4.8)
High layer compatibility	(see Clause C.4.7)

Table C.1 Information elements supported

C.4.6 ETS 300 102-1 sub clause 4.5.5 - Table 4.6 Bearer capability information element

Information Transfer Capability (Octet 3) - For the BT ISDN 30 (I.421) Service the values of 7 kHz audio and video codepoints of information transfer capability in octet 3 should be treated as reserved.

Structure, Configuration, Establishment and Symmetry - If Octets 4a and/or 4b are sent in the Bearer Capability Information Element the BT ISDN 30 (I.421) Service will behave as though the octets were omitted i.e. the default values for these fields will be assumed. Octets 4a and 4b will not be generated by the network.

User Information Layer 1 Protocol (Octet 5) - The BT ISDN 30 (I.421) Service will not support the following values of the user information layer 1 protocol field and will treat them as reserved values.

- 00100 Recommendation G.721 32 kbit/s ADPCM and Recommendation I.460.
- 00101 Recommendation G.722 and G.725 7 kHz audio
- 00110 Recommendation G.7xx 384 kbit/s video
- 01001 CCITT standardised rate adaptation X.31 HDLC flag stuffing.

Negotiation (Octet 5a) - The BT ISDN 30 (I.421) Service will treat Bit 6 of Octet 5a as a spare bit , i.e., It will accept codings "0" and "1" in the user to network direction but will generate coding "0" in the network to user direction.

Note: The network will accept any coding of a “spare bit” and no specific meaning will be attached to the “spare bit”.

User Rate (Octet 5a) - The BT ISDN 30 (I.421) Service will not support the values given in Tables C.2 in the user rate field. If received by the network the call will default to the corresponding simple bearer service (64 kbit/s unrestricted or 3.1 kHz audio). See Annex H of ETS 300 102-1, clauses H.1.2 and H.1.3 Type 1.

Octet 5a bits 5 to 1	User rate	Recommendation
10000	64 kbit/s	Recommendation X.1
10101	0.1345 kbit/s	Recommendation X.1
10110	0.100 kbit/s	Recommendation X.1

Table C.2 User Rate (Octet 5a) codings not supported

For the BT ISDN 30 (I.421) Service if octet 5a bit 7 indicates "synchronous" the codings specified in Table C.3 of the user rate field will not be supported.

Octet 5a bits 5 to 1	User rate	Recommendation
10111	0.075/1.2 kbit/s	Recommendation V.6 and X.1
11000	1.2/0.075 kbit/s	Recommendation V.6 and X.1
11001	0.050 kbit/s	Recommendation V.6 and X.1
11010	0.075 kbit/s	Recommendation V.6 and X.1
11011	0.110 kbit/s	Recommendation V.6 and X.1
11100	0.150 kbit/s	Recommendation V.6 and X.1
11101	0.200 kbit/s	Recommendation V.6 and X.1
11110	0.300 kbit/s	Recommendation V.6 and X.1

Table C.3 User Rate (Octet 5a) codings not supported when synchronous

Octet 5b for V.110/X.30 rate adaptation - Intermediate rate (octet 5b) Bits 7 and 6 - The BT ISDN 30 (I.421) Service will treat these bits as spare bits, i.e. it will accept codings "0 0", "0 1", "1 0" and "1 1" in the user to network direction but will only generate coding "0 0" in the network to user direction.

Network Independent Clock (NIC) (octet 5b) - For the BT ISDN 30 (I.421) Service the coding of bits 5 and 4 in octet 5b will not be independent. The BT ISDN will only support codings "0 0" and "1 1". Other coding combinations will be treated as reserved.

Flow control on transmission (Tx) (octet 5b) - The BT ISDN 30 (I.421) Service will treat bit 3 as a spare bit, i.e. it will accept codings "0" and "1" in the user to network direction but will generate coding "0" in the network to user direction

Flow control on reception (Rx) (octet 5b) - The BT ISDN 30 (I.421) Service will treat bit 2 as a spare bit, i.e. it will accept codings "0" and "1" in the user to network direction but will generate coding "0" in the network to user direction.

Number of stop bits (octet 5c) - The BT ISDN 30 (I.421) Service will restrict the use of "0 0" coding to the case where it is necessary to include octet 5c for the sole purpose of allowing a subsequent octet 5d. If this coding is received, by the BT ISDN 30 (I.421) Service in inappropriate circumstances, then it will be treated as reserved.

Number of data bits excluding parity bit if present (octet 5c) Bits 5 and 4 - The BT ISDN 30 (I.421) Service will not support the values of the parity information field (bits 3 to 1 of octet 5c). Consequently, if the user's data includes parity information, the number of data bits field should include the parity bit.

For the BT ISDN 30 (I.421) Service the "00" code will be used to indicate "unspecified number of data bits".

Parity information (octet 5c) - Bits 3, 2 and 1 - The BT ISDN 30 (I.421) Service will not support the use of the parity information field. All codings will be accepted if received in the user to network direction but coding "0 1 1" "none" will be generated in the network to user direction.

Duplex mode (octet 5d) - Bit 7 and Modem type (octet 5d) - Bits 6, 5, 4, 3, 2 and 1 - The treatment of octet 5d by the BT ISDN 30 (I.421) Service will depend on the coding of the information transfer capability field in octet 3. If 3.1 kHz audio is indicated then, for a call that does not leave the ISDN, octet 5d will be conveyed to the called user. In all other cases octet 5d will be discarded.

User information layer 2 protocol (octet 6) - Bits 5, 4, 3, 2 and 1 - The BT ISDN 30 (I.421) Service will not support coding "0 0 0 1 0" (Recommendation Q.921 (I.441)) of the user information layer 2 protocol field and will treat it as a reserved value.

User information layer 3 protocol (octet 7) - Bits 5, 4, 3, 2 and 1 - The BT ISDN 30 (I.421) Service will use octets 6 and 7 together. Octet 7 without octet 6 will be treated as a reserved coding.

User information layer 3 protocol (octet 7) - Bits 5, 4, 3, 2 and 1 - The BT ISDN 30 (I.421) Service will not support coding "0 0 0 1 0" (Recommendation Q.931 (I.451)) of the user information layer 1 protocol field and will treat it as a reserved value.

C.4.7 ETS 300 102-1 Table 4.17 High layer compatibility information element - High layer characteristics identification (octet 4)

The BT ISDN 30 (I.421) Service will only support the High layer compatibility elements as defined in Table C.4 . Any other codings received will be discarded. Furthermore the High layer compatibility elements will be restricted to 4 octets.

Bits 7 6 5 4 3 2 1	High layer characteristics identification
0 0 0 0 1 0 0	Facsimile Group 2/3 (Recommendation F.182)
0 1 0 0 0 0 1	Facsimile Group 4 Class 1 (Recommendation F.184)
0 1 1 0 0 0 1	Teletex service, basic mode of operation Recommendation F.200)
0 1 1 0 0 1 0	Syntax Based Videotex (Recommendations F.300 and T.102)

Table C.4 High layer compatibility elements

C.4.8 ETS 300 102-1 sub clause 4.5.18 - Low layer compatibility

Dependent on signalling capabilities encountered within the network, the BT ISDN 30 (I.421) Service will only support a limited capability to transfer Low layer compatibility information to the called terminal. This treatment cannot be regarded as a transparent transfer of information.

The network treatment of Low layer compatibility information depends on the information transfer capability requested in octet 3 of the Bearer capability information element as follows:

- 3.1 kHz audio: if octet 5d is not present in the Bearer capability information element in the user to network direction then its presence will be checked in the Low layer compatibility element. If present, octet 5d will be treated as though it had been received in the Bearer capability information element and will be conveyed to the destination network side. In the network to user direction, if a progress indicator information element is not included in the SETUP message, then a "copy" of the Bearer capability information element will be taken to form the Low layer compatibility information element.
- 64 kbit/s Unrestricted Digital Information: if any of octet 5 up to and including 5c is present in the Low layer compatibility information element but absent in the Bearer capability information element in the

user to network direction then it will be treated as though it had been included in the Bearer capability information element and will be conveyed to the destination network side. If octets 6 and 7 are both absent in the Bearer capability information element but both present in the Low layer information element indicating CCITT Recommendation X.25 Link level and CCITT Recommendation X.25 Packet level respectively in the user to network direction then they will be treated as though they had been included in the Bearer capability information element and will be conveyed to the destination network side. In the network to user direction a "copy" of the Bearer capability information element will be taken to form the Low layer compatibility information element.

In ETS 300 102-1 Table 4.18 shows the general coding of the Low layer compatibility information element, however dependent on signalling capabilities encountered within the network, the BT ISDN 30 (I.421) Service will only support those values specified for the Bearer capability information element (See clause C.4.6 on Bearer capability information element) when Low layer compatibility information element is used in the circumstances described above. Similarly, in the network User-to-User direction the BT ISDN will generate only values specified for the Bearer capability information element.

C.4.9 ETS 300 102-1 sub clause 5.1.1 - Call request and ETS 300 102-1 sub-clause 4.5.8 - Called Party Number

The BT ISDN 30 (I.421) Service requires the Type of Number (Octet 3, bits 5-7 of the Called Party Number information element) to be coded "unknown". All other codings of the Type of Number field will be treated as invalid and the call will be rejected.

The BT ISDN 30 (I.421) Service does not recognise "#" character within the Called party number information element as a sending complete indication.

C.4.10 ETS 300 102-1 sub clause 5.1.2 and 5.1.3

The BT ISDN 30 (I.421) Service does not provide progress indicator in association with the provision of tones/announcements.

C.4.11 ETS 300 102-1 sub clause 5.1.4 - Invalid call information

The BT ISDN 30 (I.421) Service will use non-standard cause #90 "destination address missing or incomplete" instead of cause #28. In addition, cause #3 will never be generated by the network.

C.4.12 ETS 300 102-1 sub clause 5.1.5.1 and 5.1.5.2 - Call Proceeding

The BT ISDN 30 (I.421) Service will not use causes #57 and #58 in the circumstances specified in these sub clauses of the standard.

C.4.13 ETS 300 102-1 sub clause 5.1.6 - Notification of interworking at originating interface

Notification of interworking via the sending of a progress indicator is not supported as indicated in C.4.10 . When the requested bearer capability is speech or 3.1 kHz audio and the call encounters analogue interworking within the BT network then the CONNECT message returned to the calling user will include a Display information element containing the IA5 character string *AA*NOT SUITABLE FOR DATA#.

C.4.14 ETS 300 102-1 sub clause 5.1.9 - Call rejection, sub clause 5.2.5.3 - Called user clearing during incoming call establishment and sub clause 5.2.5.4 - Call Failure

If the called user sends causes #1, #17, #21 or #88 then the BT ISDN 30 (I.421) Service will deliver these causes unchanged to the calling user. All other cause values sent by the calling user will be changed to #16 "normal call clearing" before delivery to the calling user.

If at the called interface timer T310 or T301 expires, the BT ISDN 30 (I.421) Service will send to the calling user cause #41 "temporary failure" instead of #18 "no user responding" or #19 "user alerting, no answer" respectively.

C.4.15 ETS 300 102-1 sub clause 5.2.1 - Incoming Call

The BT ISDN 30 (I.421) Service will always use en-bloc sending and will always include the Sending complete information element in the SETUP message.

C.4.16 ETS 300 102-1 sub clause 5.2.6 - Notification of interworking at the terminating interface

The BT ISDN 30 (I.421) Service will only provide notification of interworking to called user if the requested bearer service is 3.1 kHz audio.

If the called user sends a PROGRESS message this message and its contents are discarded (no supervisory timers are stopped). If any Progress indicator information element is received from the called user in any call control message, the information element will be discarded and not conveyed to the calling user.

C.4.17 ETS 300 102-1 sub clause 5.3 2 (d)- Exception conditions

The BT ISDN 30 (I.421) Service will send non-standard cause #4 instead of cause #6 to indicate "channel unacceptable" as a result of unsuccessful termination of the B-channel selection procedures.

C.4.18 ETS 300 102-1 sub clause 5.3 3 - Clearing initiated by the user; and sub clause 5.3.4.2 - Clearing when tone/announcements not provided

The BT ISDN 30 (I.421) Service will not include a second Cause information element in the retransmitted RELEASE message (sent as a result of T308 expiration).

C.4.19 ETS 300 102-1 sub clause 5.3.4.1 - Clearing when tones/announcements provided

The BT ISDN 30 (I.421) Service will operate the following procedure instead of those specified in this clause:

When the requested bearer capability is speech or 3.1 kHz audio and the called user is unable to accept the call then:

- the network shall return to the calling user an ALERTING message containing a Display information with the IA5 string:
 *EC*nn# and *AA*descriptive sequence# (in any order i.e. *EC*nn# followed by
 *AA*descriptive sequence# or *AA*descriptive sequence# followed by *EC*nn#)
 where "nn" provides a code representing the reason for call failure (this is not the cause value) and
 "descriptive sequence" represents a plain language description of the reason for clearing (see
 Table C.5).
- the network shall then apply in-band tones/announcements and start a supervisory timer whose value is dependent on tone/announcement being applied).
- if the calling user initiates clearing prior to the supervisory timer expiring, the network shall stop the timer, remove the tone/announcement and complete the call clearing procedures.
- if the supervisory timer expires, the network shall initiate call clearing as specified in ETS 300 102-1 sub clause 5.3.4.2 using cause #41 "temporary failure".

"nn"	"description sequence"
00	NUMBER UNOBTAINABLE
01	NUMBER INCOMPLETE
02	CLEARED
03	NUMBER UNOBTAINABLE
04	NUMBER UNOBTAINABLE
05	USER HAS CHANGED NUMBER
06	NOT ALLOWED
07	NETWORK BUSY
08	NUMBER BUSY
09	LINE OUT OF SERVICE
0A	NUMBER UNOBTAINABLE
0B	ACCESS BARRED
12	REMOTE ERROR
13	INCOMPATIBLE TERMINAL
14	ACKNOWLEDGEMENT
15	ERROR (21)
17	SERVICE TEMPORARY FAILURE
18	FACILITY NOT REGISTERED
1A	ERROR (26)
1E	NUMBER UNOBTAINABLE
1F	NO REPLY
20	SERVICE TERMINATION
24	CLEARED
29	CUG ACCESS BARRED
2D	TERMINAL UNAVAILABLE
2E	TERMINAL UNAVAILABLE
30	CLEARED
32	RESTRICTED ACCESS
33	ERROR

Table C.5 Descriptive Sequence and Numeric Codes used in Display information strings for Call Clearing

C.4.20 ETS 300 102-1 sub clause 5.4 - In-band Tones and Announcements

The BT ISDN 30 (I.421) Service will not provide the progress indicator #8 in association with in-band tones and announcements. See also Clauses C.4.10 and C.4.19.

C.4.21 ETS 300 102-1 sub clause 5.5 - Restart Procedure

The BT ISDN 30 (I.421) Service will never initiate the restart procedure but will react as specified in ETS 300 102-1 when the restart procedure is initiated by the user.

C.4.22 ETS 300 102-1 sub clause 5.8.10 - Status enquiry procedure

The BT ISDN 30 (I.421) Service will not generate the STATUS ENQUIRY message. On receipt of a STATUS ENQUIRY message, the network will respond with a STATUS message containing the current call state and cause #98.

C.4.23 ETS 300 102-1 sub clause 5.9 - User Notification Procedure

The transfer of a NOTIFY message to the remote user will only occur if the remote user is connected to the BT ISDN 30 (I.421) Service. Otherwise the NOTIFY message will be discarded.

C.4.24 ETS 300 102-1 ANNEX I (Normative) - Use Of Progress Indicators

The BT ISDN 30 (I.421) Service will not implement Annex I - see also Clauses C.4.13 and C.4.16.

C.4.25 ETS 300 102-1 ANNEX J (Normative) - Examples Of Cause Value And Location For Busy Condition.

Dependent on the signalling capabilities of the network on interworking Annex J may not apply. As a minimum the following cause values and locations will be indicated:

- if the remote user or private network beyond the interface with the BT ISDN Service is busy then cause #17 "user busy" location "user" will be returned to the caller.
- if the BT ISDN Service is congested the cause #42 "switching equipment congestion" location "public network serving the local user" will be returned to the calling user.

When terminal equipments are clearing calls, the only valid 'Locations' to be used in the 'Cause' Information element are USER or Public network serving the local user.

C.4.26 ETS 300 102-1 ANNEX K (Normative) - Message Segmentation Procedures

The BT ISDN 30 (I.421) Service will not support the segmentation procedures. However, it is recommended for further evolution that the segmentation procedures are supported by Customer Premises equipment but are not used until they become necessary with the introduction of new services.

C.4.27 ETS 300 102-1 ANNEX L - Low Layer Information Coding Principles

The BT ISDN 30 (I.421) Service will provide only limited capability to convey low layer compatibility information across the network - see Clause C.4.8.

C.4.28 ETS 300 102-1 ANNEX M - Low Layer Compatibility Negotiation

The BT ISDN 30 (I.421) Service will not support the procedures of this annex.

C.4.29 ETS 300 102-1 ANNEX N - Procedures for Establishment of Bearer connection Prior to Call Acceptance.

The BT ISDN 30 (I.421) Service will not support the procedures of this annex.

- End of Annex C -

ANNEX D

DIFFERENCES COMPARED TO ISSUE 5.0 OF SIN 232

This document provides a *brief* description of the *major* changes between this issue (5.2) of Suppliers Information Note 232 and issue 5.0. 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
Changes to reflect the completion of BT's withdrawal from service	3.2
Change of 'Digital Select Services' to Digital Calling Features' following re-branding	Throughout document

Table D.1 - List of major changes from previous issue of SIN 232

- End of Annex D -