Chapter D19: ETSI ISUP Interface

D19.1 Functional Description

D19.1.1 Network Role

ETSI ISUP is a standard interface for interconnecting switches and networks that may differ in terms of services supported, network signalling system and access protocol. Although initially used primarily for international interconnections between national networks, it is equally suitable for interconnecting networks within a national regulatory regime, e.g. between a Europe NLO network and the national PSTN, and for use as an intra-network signalling system.

As an open interface, ETSI ISUP or a national ETSI ISUP variant is frequently used as the national CCS7 standard for connecting central office switches within national PSTNs and for interconnect between different network operators.

The ISDN User Part (ISUP) is the CCS7 user part that supports not only basic telephony, but also ISDN data calls, and a range of supplementary services based on the exchange of information using out-of-band messages.

ISUP performs the functions of OSI Layers 4 to 7, but in fact operates as a single layer, i.e. no information is added or removed for the intermediate layers, and ISUP information has exactly the same format at Level 7 as at Level 4. It uses the Message Transfer Part (MTP) to support message transfer, i.e. ISUP messages are conveyed between nodes in MTP Message Signal Units (MSUs).

See Chapter C3: Trunk Interface Support for general information about ISN04 (TDM) support for CCS7, including a summary of MTP functions.

Peer-to-peer ISUP messaging is illustrated in figure 109.

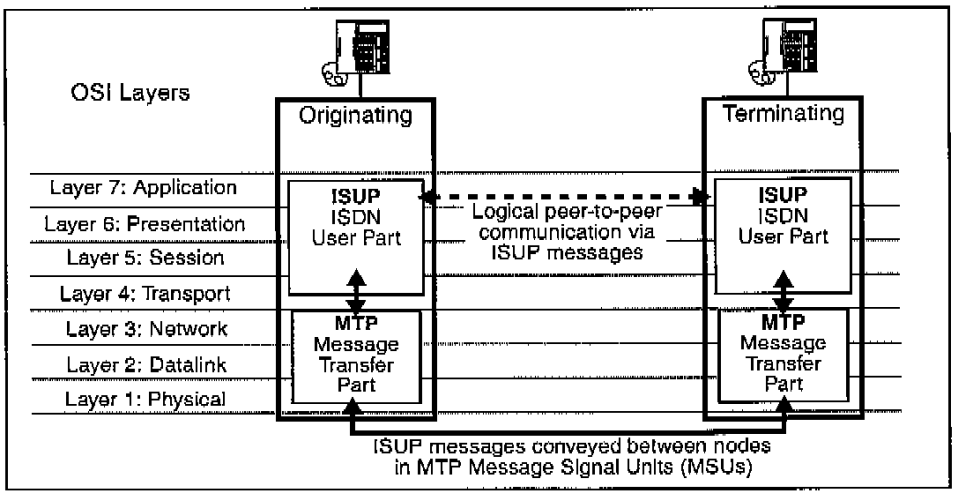

Figure 109: Peer-to-peer ISUP messaging

D19.1.2 Call Setup and Clearing

Figure 110 illustrates the messaging used to set up and clear a typical ISUP call.

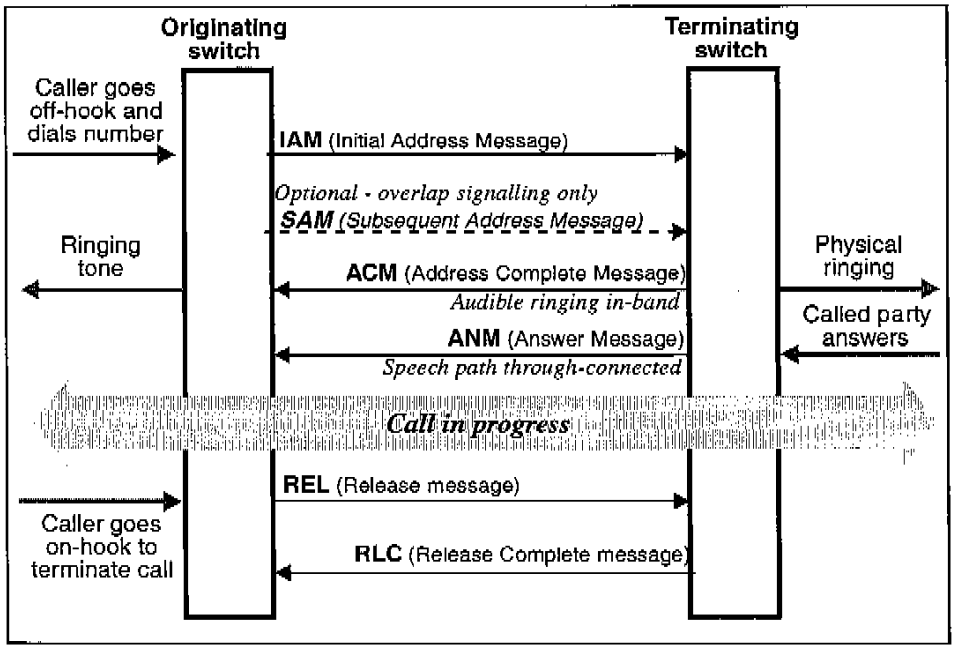

Figure 110: ISUP messaging for call setup and clearing

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Within ISUP there are two functional layers:

- Basic call procedures support call establishment and clearing via the messaging illustrated in figure 110.
- Network services are built on top of basic call. They use extra ISUP messages, or extra parameters in the standard basic call messages, to support services such as the exchange of calling and called party numbers for display. Most of the services currently available are circuit-related, i.e. they are relevant only in the context of a successful call attempt.

D19.1.3 Specifications

D19.1.3.1 International Standards

There are three main sets of ISUP standards. National and proprietary ISUP variants are normally defined in relation to one of these main standards sets. They are:

- ITU (previously CCITT) ISUP, of which there are several iterations (versions):
  - 1988, Blue Book
    CCITT Recommendations Q.761 to Q.764 (1988, Blue Book). These Recommendations define ISUP for intra-network use (typically within a national network).
    CCITT Recommendation Q.767 (1991) specifies an ISUP subset suitable for use as an international interface, i.e. between networks with different characteristics, and defines it in relation to the 1988 CCITT Blue Book Recommendations.
  - 1993, White Book
    ITU-T Recommendations Q.761 to Q.764 (1993, White Book). These Recommendations define ISUP both for intra-network use (typically within a national network) and for international use.
  - ISUP '97
    ITU-T Recommendations Q.761 to Q.764 (1997).
  - ISUP 2000
    ITU-T Recommendations Q.761 to Q.764 (2000).
- ETSI ISUP, of which there are also several iterations (versions):
  - ETSI ISUP Version 1
    ETSI ISUP V1 is the subject of ETS 300 121 (1992), but this ETS merely endorses the text of CCITT Recommendation Q.767 (1991) without any modification.
  - ETSI ISUP Version 2
    ETSI ISUP V2 is defined in ETS 300 356-1 (1995). This ETS is a delta to ITU-T Recommendations Q.761 to Q.764 (1993, White Book). It defines an ISUP subset suitable for use as an international interface, i.e. between networks with different characteristics.
    ETSI ISUP V2 is a superset of ETSI ISUP V1. It supports all capabilities supported by ETSI ISUP V1, plus additional messages and parameters for networked support of ISDN MoU2 services. ETSI ISUP V2 also supports compatibility procedures that cause unrecognised

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parameters to be passed on transparently, rather than being discarded as they would be with V1.

- ETSI ISUPVersion 3
  ETSI ISUP V3 is defined in EN 300 356 (1998) in relation to ITU-T Recommendations Q.761 to Q.764 (1997).
- ETSI ISUPVersion 4
  To be defined in relation to ITU-T Recommendations Q.761 to Q.764 (2000).

❒ ANSI ISUP
This is the North American standard for ISUP, as defined in Bellcore Technical Requirement TR-TSY-000317 (Issue 2, July 1989), which should be read in conjunction with ANSI specification T1.113.1-4 (November 1989).

At a functional level, ANSI ISUP and ETSI ISUP are essentially the same, but at the protocol level there are differences in the parameters and parameter values supported. They also use different formats for the MTP routing label.

D19.1.3.2 National Variants of ETSI ISUP

Although ETSI ISUP (V1 and/or V2) can be used unmodified in a national network, it is common for national regulators to define their own national variants. Such a variant is typically characterised by requirements to provide parameter values, parameters, and even messages in addition to those required by the basic ETSI ISUP specifications. These additional protocol elements may be national-specific, or may be optional standard elements that are regarded as mandatory by the regulator. (There are some cases where national regulators have specified protocol or procedural variations from base ETSI ISUP rather than additions, and also instances where a national variant does not support all base messages and parameters.)

The remainder of this section lists the national ETSI ISUP V1/V2 variants supported in alphabetical order, and summarises their characteristics.

Note: Some ISUP variants are separately described in other chapters of this document, for the reasons explained in the table below.

Chapter describing ISUP variant	Reason for separate decription
Chapter D20: IBN7 (ANSI ISUP+)	IBN7 ISUP is based on ANSI ISUP, not on ETSI ISUP
Chapter D21: North American Feature Group D ISUP	FGD ISUP is based on ANSI ISUP, not on ETSI ISUP
Chapter D22: Australian ISUP Variants (I-ISUP and CA30)	ACIF I-ISUP is a variant of ETSI ISUP V2, but its capabilities need to be described relative to those of older non-ETSI ISUP implementations deployed in Australia
Chapter D23: Japan ISUP Interfaces (JI-ISUP, NCCI ISUP and JPN ISUP)	JI-ISUP is a variant of ETSI ISUP V2, but its capabilities need to be described relative to those of older non-ETSI ISUP implementations deployed in Japan
Chapter D24: Malaysia ISUP Interface (M-ISUP)	Malaysia ISUP is based on the obsolescent AISUP (Australia ISUP) interface, not on ETSI ISUP
Chapter D25: UK ISUP Interface	UK ISUP is an ETSI ISUP V3 variant, but ISN04 (TDM) does not yet support a base/generic V3 agent
Chapter D26: SPIROU Trunk Interface (ISUP V3 for France)	SPIROU is an ETSI ISUP V3 variant, but ISN04 (TDM) does not yet support a base/generic V3 agent

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- Argentina ISUP (a variant of ETSI ISUP V2)
  As defined in Q.763 and Telefonica General Specification GT.EG.s3.003 1.
  Argentina-specific requirements include support for the following messages:
  - TAS (Rating Information)
  - ILM (Malicious Call Information)

- Austrian ISUP (a variant of ETSI ISUP V2)
  Austrian-specific requirements include
  - Support for Carrier Selection information either in the TNS (Transit Network Selection) parameter or prefixed to the Called Party Number.
  - Network Suspend/Resume functionality is turned off.

- Belgian ISUP (a variant of ETSI ISUP V2)
  Belgacom SS7 MTP Specification for the Interconnection with the OLO
  Belgian-specific requirements include
  - Additional Information and Information Request (INF/INR) messages
  - Additional redirection information parameters in REL messages
  - Additional Cause value

- Brazilian ISUP (a variant of ETSI ISUP V1)
  As specified in Telebras Practice 220-250-732, "ISDN - ISUP User Part Common Channel #7 Signalling System, Issue 2, August 1996"
  Brazil-specific requirements include
  - Incoming calling party number manipulation based on CgPN NOA.
  - INR/INF support including request of CgPN and CPC.
  - CPC routing.

- China ISUP (a variant of ETSI ISUP V2)
  As defined in Ministry of Information publications YDN 038-1997 (ISUP) and YDN 038.1-1999 (ISUP - Supplementary).
  China-specific requirements include support for the following messages:
  - CCL (Calling Party Clear)
  - MPM (Meter Pulse Message)
  - OPR (Operator Call)

- Czech ISUP (a variant of ETSI ISUP V1)
  As defined in CCITT SS7 National Specification of MTP and ISUP for Czech Republic and Slovak Republic (MTP/ISUP CS), Version 1, 1993.
  Czech-specific requirements include support for the following messages:
  - Information request (INR)
  - Information (INF)
  - Charge message (CRG)
  - Trunk offering on message (TON)
  - Trunk offering off message (TOF)

  For details, see A59022257.

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- Danish ISUP (a variant of ETSI ISUP V1)
  As specified by Tele Danmark A/S in the "Standard Interconnect Agreement" and the "Interconnect Test Document"
  Denmark-specific requirements include
  - Support not required for Continuity (COT) and Continuity Check Request (CCR) messages.
  - Additional Information and Information Request (INF/INR) messages
  - Support for V2 Redirecting Number, Redirection Information and Original Called Number parameters in IAM and backward messages
  - Support for V2 Generic Number parameter in IAM, ANM and CON
  - Transit support for national Location Number parameter in IAM
  - Support for V2 Generic Notification Indicator and Call Diversion Information parameters in ACM and CPG messages
- Egyptian ISUP (a variant of ETSI ISUP V1)
  As defined in specification EGYPT ISUP V1 PART 1 and PART 2, 1993.
  Egypt-specific requirements include
  - Trunk Offering (OFR) message

  To provide more flexibility for supporting services, ISN04 (TDM) implements Egyptian ISUP as a variant of ETSI ISUP V2, as described in A59017050.
- German ISUP (a variant of ETSI ISUP V2)
  Defined in Nortel SIM spec ND0070 in relation to ETS 300 356
  German-specific requirements include support for the following public network features:
  - Priority Class of Service (PCOS) marking of ISUP calls
  - Emergency calls
  - Propagation delay counter
  - Carrier selection
  - Local Number Portability (LNP)
  - Network Advice Of Charge (NAOC)
  - IDR/IDS support for Malicious Call Identification (MCID)
- Hong Kong ISUP (a variant of ETSI ISUP V2)
  Defined in Network connection specification HKTA 2202, Issue 02, Feb 1998
  Hong Kong ISUP implements a subset of the messages and parameters supported by base/generic ETSI ISUP V2. The unique aspect of Hong Kong ISUP is that it is supported over two types of carrier:
  - The CR15 protocol variant is supported over E1 PCM30 carriers
  - The CR14 protocol variant is supported over T1 PCM24 carriers

  See A59028033 for further information.
- Hungarian ISUP (a variant of ETSI ISUP V3)
  As defined in CCS 0421 HTC Specification for CCS7 Issue 2.2, PKI Telecommunications Development Institute Budapest
  Hungary-specific requirements include:
  - Facility message (FAC)
  - Loopback Acknowledgement message (LOP)
  - Additional V3 parameters in IAM and other messages

  ISN04 (TDM) implements Hungarian ISUP as a variant of ETSI ISUP V2 with support for additional V3 parameters, as described in A59022264.

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- Italian ISUP (two variants: a V1 variant for interconnect and indirect access, and a V2 variant for intra-network support of regulatory services)
  Italian ISUP V1 is defined in ISPT Regola Technica per il Servizio ISDN; Italian ISUP V2 is not based on any ISPT or Telecom Italia specification.
  Italian-specific requirements include
  - Additional Redirection Information parameter in IAM
  - Additional User-to-User Indicators parameter in Answer message and Call Progress (CPG) message
  - Confusion (CON) and Forward Transfer (FOT) messages not supported

- Mexican ISUP (a variant of ETSI ISUP V1)
  As specified in the Mexican ISUP specification (NOM 112).
  As a sub-variant of Mexico ISUP V1, ISN04 (TDM) also supports Telmex ISUP, as defined for use in the Telmex network (see A59036503).
  Mexico-specific requirements include
  - Overlap outpulsing is forced for IAMs containing more than 16 digits in the Called Party Number.
  - Support for Mexico-specific messages: Offer, Offer Cancellation, Recall, False. (Recall not required in Telmex network, as Telmex switches automatically re-ring the called party.)
  - Support for Circuit Group Query Message (CQM) and Circuit Group Query Response (CQR) message.

  Note: Mexico ISUP V1 supports the ETSI ISUP V2 redirection parameters Original Called Number, Redirecting Number, Redirection Information and Redirection Number (see A59027529).

- New Zealand ISUP (a variant of ETSI ISUP V1, with some V2 additions)
  As specified by NZ Telecom in "SpecificationPTC 331"
  New-Zealand-specific requirements include
  - Support for V2 parameters conveying redirection information
  - Cause parameter in CPG message
  - Access Transport parameter in REL message
  - Signalling Point Code parameter in REL message

- Norwegian ISUP (a variant of ETSI ISUP V1, with some V2 additions)
  As specified by TeleNor in "Specifikasjon av signalerings-protokoll"
  Norway-specific requirements include
  - Support for V2 parameters conveying redirection information
  - Support for V2 Generic Number parameter

- Peruvian ISUP (a variant of ETSI ISUP V2)
  As defined in Telefonica Group document GT.EG.S3.403 "Unified Specification of ISUP in the CCSS N7".
  For details of the ISN04 (TDM) implementation and the supported interworkings, see A59022123.

- Polish ISUP (a variant of ETSI ISUP V2)
  As defined in "Technical and Operational Requirements for Digital Switching Systems in the Polish Public Telecommunications Network", Institute of Telecommunications, Department of Switching Systems, Warsaw 1998.
  Polish-specific requirements include support for the following messages:
  - Additional Charge (CRG) message to provide tariff information
  - Unequipped Circuit Identification Code message (UCIC)

  For details, see A59022250.

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- Portuguese ISUP (a variant of ETSI ISUP V1)
  Portugal-specific requirements include
  - Additional Charge Information (CRG) message with Portugal-specific format.
  - Support for V2 Generic Number parameter in IAM, ANM and CON
  - Support for V2 Generic Notification Indicator and Call Diversion Information parameters in ACM and CPG messages
  - Support for V2 Redirecting Number, Redirection Information and Original Called Number parameters in IAM and backward messages
  - Support for V2 Redirection Number and Redirection Number Restriction Indicator parameters in backward messages
  - IDR/IDS support for Malicious Call Identification (MCID)
  - National Forward Call Indicators parameter in IAM
- Saudi Arabian ISUP, a variant of ETSI ISUP V2
  ISN04 (TDM) actually supports two sub-variants of Saudi ISUP. One is used as the backbone signalling system within the Aramco network; the other is used for interconnect betwen the Aramco network and the Saudi PSTN. These differ primarily in how they handle CLI and CPC values on interworking, as described in detail in A59034236.
- Singapore ISUP, a variant of ETSI ISUP V2
- Spanish ISUP (two variants: a V1 variant and a V2 variant)
  As specified by Telefonica
  Spanish-specific requirements include
  - Default bearer capability is 3.1KHz audio, not speech
  - Additional Charge (CRG) message to provide tariff information
  - Pass-Along Message (PAM) for generic service support
  - Additional Information and Information Request (INF/INR) messages
  - National-specific VPN Code parameter in IAM to identify VPN calls
  - Additional Cause values
- Swedish ISUP (a variant of ETSI ISUP V1, with some V2 additions)
  As defined in Telia document 8211-A335 revision C - "ISDN-ISDN Signalling Interface for Sweden".
  So-called Swedish National Parameters are primarily standard V2 parameters, e.g. for notification of call redirection, that have to be supported by Swedish ETSI ISUP V1. ISN04 (TDM) therefore implements Swedish ISUP as a variant of ETSI ISUP V2, as described in detail in A59015832.
- Taiwan ISUP (a variant of ETSI ISUP V2)
  As defined in Specifications for Signalling System No. 7 for CHT Network, Chungwa Telecom Co., Ltd., Jan. 1997.
  No additional Taiwan ISUP messages and paremeters are originated or terminated by ISN04 (TDM), but transit support is provided as described in A59028132.

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- Turkish ISUP (two variants: a V1 variant and a V2 variant)
  Turkish-specific requirements include
  - Turkish ISUP V1 supports only basic call types and is subject to the following restrictions:
    - Overlap outpulsing is not supported. Incoming SAMs accepted, but IAM generated only when all digits are available.
    - Forward Transfer Message (FOT) is not supported
    - Supplementary services are not supported
  - For Turkish ISUP V2, all messages and parameters defined in the minimum recognised set by ITU-T Q.763 (White Book), Helsinki (03/93) are supported. Messages and parameters that are marked for national use or as reserved are not provided.
    There is one Turkey-specific message, IDENT, which is used to support MCT.

- ISN04 (TDM) also supports some variants of ETSI ISUP V2 that were developed by Telrad for deployment in the corresponding national markets:
  - Chile ISUP
  - Costa Rica ISUP
  - Ethiopia ISUP
  - Georgia ISUP
  - Israel ISUP
  - Isdefo-Avnet ISUP
  - Myanmar ISUP
  - Papua New Guinea ISUP
  - Vietnam

  All of these ISUP V2 variants are characterised by supporting the following additional charge-related messages:

  BCM Backward Charge Message
  Sent during call setup to indicate the tariff to be applied.

  TCM Tariff Change Message
  Sent during a call to indicate a change in the tariff to be applied.

  CAM Charging Acknowledge Message
  Sent to acknowledge receipt of a TCM.

  See E0444 for information about protocol differences. See A59027873 for information about recent enhancements to ISN04 (TDM) support.

- In the following national markets, base/generic ETSI ISUP V2 is used to support the standard interconnect interface. No separate national variant has been defined or implemented:
  - Netherlands
  - Switzerland
    Note: Although there is no Swiss national variant, ETSI ISUP V2 in Switzerland is required to support the optional Call Reference parameter in the IAM, which is defined as being for national use. The way in which a given DMS switch inserts, deletes or passes on this parameter depends on its location within the network boundaries, and is controlled via trunk group datafill.

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D19.2 ISN04 (TDM) Implementation

D19.2.1 Documentation

The primary reference document for information about the ISN04 (TDM) implementation of ETSI ISUP is

ISN04 (TDM) ETSI ISUP Compliance Specification

This document specifies the compliance of the ISN04 (TDM) ETSI ISUP implementation evaluated against the 1993 and later versions of ITU-T Recommendations Q.761 to Q.764, as modified by ETSI EN 300 356-1 (1998). The first section is a summary of the ISN04 (TDM) ETSI ISUP implementation in terms of its support for capabilities, messages, parameters and services. The remaining sections are clause-by-clause statements of compliance with Q.761 to Q.764.

D19.2.2 Hardware Support

ISN04 (TDM) supports ETSI ISUP signalling via 64Kb/s signalling channels on copper or optical fibre carriers terminated on trunk peripherals at the switch. Copper carriers are typically 2Mb/s PCM30 E1s, although 1.5Mb/s T1s are supported for ISUP variants in some markets. Optical fibre carriers are 155Mb/s STM-1 carriers, each of which can support up to 63 E1s.

ISUP signalling channels are groomed off from 64Kb/s voice/data channels to terminate on Link Interface Units (LIU7s) in the Link Peripheral Processor (LPP) signalling peripheral. See section B1.4.3.1 on page 74 for a detailed discussion of the various methods supported for grooming off and terminating CCS7 signalling links.

D19.2.3 Software Support

ISN04 (TDM) supports the following ETSI ISUP call processing agents, whose signalling characteristics are distinguished by means of datafill in table TRKSGRP:

- ETSI ISUP V1 / ITU Blue Book (base/generic agent and national variants)
  Table TRKSGRP identifies trunks using the ETSI ISUP V1 agent by means of a signalling type of C7UP, an external protocol of Q767, and a protocol version selector of BLUE_100.
- ETSI ISUP V2 / ITU White Book (base/generic agent and national variants)
  Table TRKSGRP identifies ETSI ISUP V2 trunks by means of a signalling type of C7UP, an external protocol of Q767, and a protocol version selector of WHITE_100.

  Note: The ETSI ISUP V2 call processing agent is sometimes referred to as V2+ because it supports incorporates protocol extensions (additional messages and parameters) for selected V3 capabilities.
- ETSI ISUP V3 (UK and France variants, but no generic agent)
  Table TRKSGRP identifies ETSI ISUP V3 trunks by means of a signalling type of C7UP, an external protocol of Q767, and a protocol version selector of E1V3_100.

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National variants of ETSI ISUP are identified by means of the VARIANT field of table TRKSGRP. This can accommodate a total of up to 64 variants. The following table lists values that have already been reserved.

Supported on ISN04 (TDM)	Interface denoted
BASE variant of **100_BLUE** **BASE** variant of **100_WHITE**	Base / generic variants of ETSI ISUP V1 and V2
ARGENTINA variant of **100_WHITE**	Argentine national variant of ETSI ISUP V2
AUSTRIA variant of **100_WHITE**	Austrian national variant of ETSI ISUP V2
BELGIUM variant of **100_WHITE**	Belgian national variant of ETSI ISUP V2
BRAZIL variant of **100_BLUE**	Brazilian national variant of ETSI ISUP V1
CHINA variant of **100_WHITE**	Chinese national variant of ETSI ISUP V2
CHILE variant of **100_WHITE**	Chilean national variant of ETSI ISUP V2
COSTA_RICA variant of **100_WHITE**	Costa Rican national variant of ETSI ISUP V2
CZECH variant of **100_BLUE**	Czech national variant of ETSI ISUP V1
DENMARK variant of **100_BLUE**	Danish national variant of ETSI ISUP V1
EGYPT variant of **100_WHITE**	Egyptian national variant of ETSI ISUP V2
ETHIOPIA variant of **100_WHITE**	Ethiopian national variant of ETSI ISUP V2
FRANCE variant of **100_BLUE**	French TUP / SSUTR2 (implemented via ETSI ISUP V1 protocol converter)
GEORGIA variant of **100_WHITE**	Georgian national variant of ETSI ISUP V2
GERMANY variant of **100_WHITE**	German national variant of ETSI ISUP V2
HONGKONG variant of **100_WHITE**	Hong Kong national variant of ETSI ISUP V2 supported over both E1 carriers (CR15) and T1 carriers (CR14)
HUNGARY variant of **100_WHITE**	Hungarian national variant of ETSI ISUP V2
ISRAEL variant of **100_WHITE** **ISDEFO-AVNET** variant of **100_WHITE**	Israeli national variants of ETSI ISUP V2
ITALY variant of **100_BLUE** **ITALY** variant of **100_WHITE**	Italian national variants of ETSI ISUP V1 and V2
MEXICO variant of **100_BLUE**	Mexican national variant of ETSI ISUP V1 (Telmex ISUP is defined as sub-variant **V1**)
MYANMAR variant of **100_WHITE**	Myanmar national variant of ETSI ISUP V2
NEW_ZEALAND variant of **100_BLUE**	New Zealand national variant of ETSI ISUP V1 (with some ETSI ISUP V2 additions)
NORWAY variant of **100_BLUE**	Norwegian national variant of ETSI ISUP V1 (with some ETSI ISUP V2 additions)
PERU variant of **100_WHITE**	Peruvian national variant of ETSI ISUP V2
PNG variant of **100_WHITE**	Papua New Guinea national variant of ETSI ISUP V2
POLAND variant of **100_WHITE**	Polish national variant of ETSI ISUP V2
PORTUGAL variant of **100_BLUE**	Portuguese national variant of ETSI ISUP V1
SAUDI variant of **100_WHITE**	Saudi national variant of ETSI ISUP V2

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Supported on ISN04 (TDM)	Interface denoted
SINGAPORE variant of 100_WHITE	Singapore national variant of ETSI ISUP V2
SPAIN variant of 100_BLUE SPAIN variant of 100_WHITE	Spanish national variants of ETSI ISUP V1 and V2
SWEDEN variant of 100_WHITE	Swedish national variant of ETSI ISUP V2
TAIWAN variant of 100_WHITE	Taiwan national variant of ETSI ISUP V2
TURKEY variant of 100_BLUE TURKEY variant of 100_WHITE	Turkish national variants of ETSI ISUP V1 and V2
VIETNAM variant of 100_WHITE	Vietnamese national variant of ETSI ISUP V2

Note: ETSI ISUP variants that are described in other chapters are identified as follows via the VARIANT field:

- ACIF I-ISUP (ETSI-based Australian Interconnect ISUP) and Telstra CA30 ISUP are respectively defined as variants ACIF_AUSTRALIA and CA30_AUSTRALIA of 100_WHITE. Their capabilities are discussed in Chapter D22, along with those of other Australia ISUP variants.
- JI-ISUP (Japan Interconnect ISUP) is defined as variant JPN_INTERCONN of 100_WHITE. Its capabilities are discussed in Chapter D23, along with those of other Japanese ISUP variants.
- UK ISUP V3 is defined as variant UK of EIV3_100. Its capabilities are discussed in Chapter D25.
- SPIROU (French ISUP V3) is defined as variant FRANCE of EIV3_100. Its capabilities are discussed in Chapter D26.

Handling Unrecognised Messages and Parameters

The ETSI ISUP V1 and V2 agents both respond to unrecognised messages by sending a Confusion message with Cause value 97 (message type non-existent or not implemented). This is as specified in Q.764, but not as specified in Q.767 (in which the Confusion message is defined as "not used"), i.e. the capabilities of the ISN04 (TDM) ETSI ISUP V1 implementation exceed those of the Q.767 specification.

The ETSI ISUP V1 and ETSI ISUP V2 agents differ in the way in which they handle unrecognised parameters, as follows:

- Interworking to an outgoing ETSI ISUP V1 trunk
  For ETSI ISUP V2 calls interworked to an outgoing ETSI ISUP V1 trunk, parameters not supported by V1 will be discarded.
- Interworking to an outgoing ETSI ISUP V2 trunk
  For calls interworked or transited to an outgoing ETSI ISUP V2 trunk, unrecognised parameters will be handled in accordance with their PCI (Parameter Compatibility Information) instructions. If a parameter has no PCI instructions, it will be discarded and the Confusion message will be sent.

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D19.2.4 Capabilities and Specification Compliance

D19.2.4.1 Q.761 Capabilities Supported

The following table indicates the support provided by the ISN04 (TDM) implementation of ETSI ISUP for the capabilities listed in Table 1 of Q.761. See section D19.6.2 for information about ISDN service support over ETSI ISUP.

Basic call
Bearer capability: speech
Bearer capability: 3.1 KHz audio
Bearer capability: 64Kb/s unrestricted digital information
Bearer capability: 7 KHz unrestricted digital information
Compatibility procedure (message and parameter compatibility only) [1]
Confusion procedure [2]
Echo control procedure (static and dynamic echo control)
Tones and announcements
MTP pause and resume
Access delivery information
Transportation of user teleservice information
Simple segmentation [3]
Generic procedures for supplementary service support
End-to-end signalling—Pass along method [4]
Generic number transfer [1]
Generic digit transfer [1]
Generic notification procedure [1]

[1] ETSI ISUP V2 only; not supported by ETSI ISUP V1.
[2] Fully supported by ETSI ISUP V2. ISN04 (TDM) ETSI ISUP V1 does not support full confusion procedures, but will send a CFN message on receipt of unrecognised information, which exceeds the requirements specified in Q.767.
[3] ETSI ISUP V2 only. ISN04 (TDM) provides full originating and terminating node support for IAM segmentation, but provides only transit support for segmentation of other messages. See AU3362 for details.
[4] Used only in Spanish ISUP V1; see AJ4819 for details.

D19.2.4.2 Messages Supported

ISN04 (TDM) supports standard messages as summarised in the table below.

Address complete (ACM)	Facility reject (FRJ) [9]
Answer (ANM)	Facility request (FAR) [9]
Application Transport Message (APM) [1]	Forward transfer (FOT) [6] [10]
Backward Charging Message (BCM) [2]	Identification request (IDR) [11]
Blocking (BLO)	Identification response (IRS) [11]
Blocking acknowledgment (BLA)	Information (INF) [11]
Call progress (CPG)	Information Request (INR) [11]
Charge (CRG) [3]	Initial address (IAM)
Charging Acknowledgement Message (CAM) [2]	Loopback Acknowledgement (LPA) [8]
Circuit group blocking (CGB)	Overload (OLM) [12]
Circuit group blocking ack. (CGBA)	Pre-Release Information (PRI) [1]
Circuit group query (CQM) [4]	Release (REL)
Circuit group query response (CQR) [4]	Release complete (RLC)
Circuit group reset (GRS)	Reset circuit (RSC)
Circuit group reset acknowledgment (GRA)	Resume (RES) [13]
Circuit group unblocking (CGU)	Segmentation (SGM) [14]
Circuit group unblocking ack. (CGUA)	Subsequent address (SAM)
Confusion (CFN) [5] [6]	Suspend (SUS) [13]
Connect (CON)	Tariff Change Message (TCM) [2]
Continuity (COT) [7]	Unblocking (UBL)
Continuity check request (CCR) [7]	Unblocking acknowledgment (UBA)
Facility (FAC) [8]	Unequipped circuit identification code (UCIC) [12]
Facility accepted (FAA) [9]	User-to-user information (USR) [9]

[1] ETSI ISUP V3 message supported by the ISN04 (TDM) implementation of ETSI ISUP V2 for conveying QFT Application Transport parameter.
[2] Not defined in Q.764, but supported for all Telrad ISUP V2 variants.
[3] Supported only for Spanish ISUP (see AJ4819 and A59027768), Portuguese ISUP V1 (see A59013627), Czech ISUP V1 (see A59022257) and Egyptian ISUP (see A59017050).
[4] Mexican and Brazilian ISUP only; see A59011863 for details.
[5] Supported by ISN04 (TDM) ETSI ISUP V1 although this is not required by Q.767.
[6] Not supported in Italian ISUP V1; see AJ4939 for details.
[7] Not supported in Danish ISUP; see A59011833 for details.
[8] Hungarian ISUP only; see A59022264 for details.
[9] ETSI ISUP V2 only; not supported by ETSI ISUP V1.
[10] Not supported in Turkey ISUP V1; see A59012394 for details.
[11] Used to request/provide caller info if this is not provided in the IAM. The IDR/IRS and INR/INF mechanisms are supported on a trunk group basis for base/generic ETSI ISUP V1 and V2 and selected national variants, e.g. INR/INF for Spanish ISUP V1. See A59023814 for details.
[12] Polish ISUP only; see A59022250 for details.
[13] Originating / terminating support for suspend/resume functionality was new in EUR010; previously tandem support only. See AU3360 for details.
[14] ETSI ISUP V2 only. ISN04 (TDM) provides full originating and terminating node support for IAM segmentation, but only transit support for segmentation of other messages. See AU3362 for details.

ISN04 (TDM) also supports the following national-specific messages:

- Argentina-specific TAS (Rating Information) and ILM (Malicious Call Information) messages. See A59036336 for details. Transit support only.
- China-specific CCL (Calling Party Clear) message, MPM (Meter Pulse Message) and OPR (Operator Call) message. See A59036494 for details. Transit support only.
- Czech-specific TON (Trunk Offering On) and Trunk Offering Off (TOF) messages. See A59022257 for details.
- Egypt-specific OFR (Trunk Offering) messages. See A59017050 for details.
- Mexico-specific messages: Offer, Offer Cancellation, Recall, False. See A59011863 for details.
- Turkey-specific IDENT message used to support MCT. See A59012394 for details.

D19.2.4.3 Parameters Supported

Parameters supported.

Automatic congestion level [1]	Information request indicators
Access delivery information	Location number
Access transport	MCID request indicators
Additional CLI (ACLI) [2]	MCID response indicators
Application transport [3]	Message compatibility information [4]
Backward call indicators	National forward call indicators [16]
Call diversion information [4]	Nature of connection indicators
Call diversion treatment indicators [5]	Network management controls [5]
Call history information	Number of charge units [9]
Call offering treatment indicators [5]	Optional backward call indicators
Call reference [6]	Optional forward call indicators
Called IN number [5]	Original called number [4] [17]
Called party number	Next charge rate [10]
Calling party number	Parameter compatibility information [4]
Calling party's category	Private network code [15]
Call transfer number [7]	Propagation delay counter
Carrier Selection Parameter (CSP) [8]	Range and status
Cause indicators	Rating units [15]
CCBS parameter [4]	Redirecting number [4] [17]
Charge band number [9]	Redirection information [4] [17]
Charge indicator [10]	Redirection number [4] [17]
Circuit group supervision message type ind.	Redirection number restriction [4]
Closed user group interlock code	SCF identifer [5]
Conference treatment indicators [5]	Service activation [4]

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Collect call requirements [5]	Signalling point code
Connected number [11]	Subsequent number
Connection request [12]	Suspend/resume indicators
Continuity indicators	Tariff [18]
Current charge rate [10]	Time indicator [10]
Display information [5]	Transit network selection [19]
End of optional parameters indicator	Transmission medium requirement [20]
Event information	Transmission medium requirement prime [7]
Facility indicator [4]	UID action indicators [5]
Forward call indicators	UID capability indicators [5]
Generic digits [4]	User service information [20]
Generic notification indicator [4]	User teleservice information [4]
Generic number [4] [13]	User-to-user indicators
Hop counter [14]	User-to-user information
Incoming circuit identification [15]	VPN code [21]
Information indicators	Zone number [15]

[1] Implemented for ETSI ISUP by ISN04 (TDM) feature A59034132. A congested switch includes this in every REL it sends (regardless of cause value), to tell adjacent switches not to initiate new call attempts for a datafillable period in the range 0s-240s.
[2] Singapore ISUP V2 only. Used to convey N2 (routing number) as well as Calling Party Number for calls from ported-in LNP numbers. See A59034058.
[3] ETSI ISUP V3 parameter supported by ISN04 (TDM) implementation of ETSI ISUP V2 for conveying QFT information.
[4] ETSI ISUP V2 only; not defined for ETSI ISUP V1.
[5] Hungarian ISUP only; see A59022264 for details.
[6] Introduced for use in Switzerland as described in A59023264. Generic parameter, but reserved for national use. Intra-network call reference assigned at ingress switch and used to co-ordinate AMA records between switches (removed at egress switch if call leaves network again).
[7] Used only in Polish ISUP (see A59022250) and Hungarian ISUP (see A59022264).
[8] German ISUP V2 only, for use in carrier selection. See AF7580 for details.
[9] Used only in Czech ISUP (see A59022257), Polish ISUP (see A59022250) and Egyptian ISUP (see A59017050).
[10] Telrad ISUP variants only; used in BCM and/or TCM.
[11] Always sent in ANM for Telrad ISUP variants.
[12] Specific to Telrad ISUP variants.
[13] Used with NQI (Number qualifier indicator) indicating "additional calling party number" to support the conveying of a Presentation Number, if available, in addition to the Network Number (which is conveyed in the CgPN parameter).
[14] ETSI ISUP V3 parameter supported by the ISN04 (TDM) implementation of ETSI ISUP V2 as described in A59016998 (base/generic V2) and A59022264 (Hungarian ISUP).
[15] Specific to Argentina ISUP V2. See 59036336. Transit support only.
[16] Specific to Czech ISUP; see A59022257 for details.
[17] Supported in Mexican ISUP V1 as described in A59027529.
[18] Used only in Spanish ISUP Charge (CRG) message; see AJ4819 and A59037768 for details.
[19] German and Austran ISUP V2 only, for use in carrier selection. For details, see AF7580 (German ISUP) or A59017057 (Austrain ISUP).
[20] Spanish ISUP allows USI value to be relayed unchanged even if it is inconsistent with the TMR value, even though this is not allowed by Q.767. See A59024150 for details.
[21] Specific to Spanish ISUP; see AJ4819 for details.

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D19.2.4.4 Miscellaneous Capabilities

Capabilities not explicitly listed in the standards:

- ISUP V2 support for QSIG Feature Transparency (see AJ4986 for details)
  Allows bearer-related QSIG information to be transparently transported across the ETSI ISUP network using the application transport mechanism. Enables ISN04 (TDM) to:
  - Segment and send QSIG information
  - Receive and reassemble segmented QSIG information
  - Pass segmented QSIG information transparently to the next node
  - Trigger QSIG GFT capabilities and respond to the processing
  - Perform QSIG gateway and transit functions

  Support provided by ISUP V3 APM (Application Transport Mechanism) messages / parameters, implemented by ISN04 (TDM) as extensions to ETSI ISUP V2:
  - An Application Transport Parameter (APP) that can be conveyed in the existing ISUP message IAM, ACM, ANM, CON and CPG.
  - An Application Transport Message (APM) that can be sent independently to convey an APP.
  - A Pre-Release Information (PRI) message that can be sent prior to a REL message to convey an APP.
- ISUP V2 support for DPNSS Feature Transparency (see A59016980)
  Use of general-purpose ETSI ISUP APM capabilities, as defined for QFT, to support encapsulation and transparent conveyance of signalling information for DPNSS features and services, previously supported only via IBN7.
- ISUP V2 support for networked Centrex features (see A59016927 for NACD, A59021736 for NMWI, A59016841 for NRAG)
  Use of general-purpose ETSI ISUP APM capabilities, as defined for QFT, to support encapsulation and transparent conveyance of signalling information for proprietary features and services, previously supported only via IBN7.
- Call processing is based on EDCP (Event-Driven Call Processing), which means that ETSI ISUP calls can trigger as IN (Intelligent Network) calls.
- Continuity checking
- Translation / routing based on:
  - Bearer Capability
  - Numbering Plan Indicator / Nature Of Address (see AJ5346)
  - Calling Party Category (see AJ5343)
- Overlap outpulsing for all interworkings supporting overlap
- Full originating and terminating node support for suspend/resume functionality and use of the reanswer timer T6 (see AU3360).
- DCME (see AJ4442 for details)
  Support for an interface between a DMS switch and external Digital Circuit Multiplication Equipment (DCME) using TS16 of PCM30 multiframes conforming to Q.50 Annex A (Q.50 Annex B is not supported). DMS supports DCME via external ECI-Telecom DTX-360B DCME units, as described in

section B3.4 on page 116. This configuration provides DCME gain (speech traffic concentration) by a factor of up to 10:1. It is possible to use echo cancellers alongside DCME.

Support for DCME has been verified on interworking between ETSI ISUP V2 and Australian and Japanese ISUP variants (see 59009302).

- Ability to suppress timer T9 for FreePhone calls. Timer T9 is started at an originating switch when an ACM is received, and causes the call to be released if it expires before an ANM is received. RTE and CONT translation selectors can now prevent this by specifying NO_ANSWER_TIMING (see 59010023).

- Rerouting on congestion (see A59013395 for details)
  If a call routed out over an ETSI ISUP trunk encounters congestion (indicated by receipt of a REL message with cause value 34 or 42), this option allows ISN04 (TDM) to make another attempt to route the call.
  Note: Alternative names for rerouting on congestion are Conditional Re-Routing and NRR (Network Re-Routing (NRR).

- Automatic Congestion Control (ACC), as described in A59034132
  With ACC (as defined in Q.764 section 2.11), a congested switch includes an Automatic Congestion Level (ACL) parameter in every REL it sends (regardless of cause value), to tell adjacent switches not to initiate new call attempts for a datafillable period in the range 0s-240s.

- Hop Counter support to prevent IAM looping during call setup (see A59016998)
  Value can be assigned to Hop Counter parameter in outgoing IAMs, specifying maximum number of intermediate switches through which each IAM can be routed before call attempt is abandoned. HC value decreased by 1 at each intermediate switch. Switch where HC expires (reaches zero), will send back a REL indicating a translation error unless it can complete the call.
  Note: HC is an ETSI ISUP V3 parameter, but is supported by the ISN04 (TDM) implementation of ETSI ISUP V2.

- Co-ordination of billing records via call reference (see A59023264)
  To co-ordinate AMA records generated by different switches belonging to a given network operator, a call reference can be assigned to each incoming call when it enters the network and conveyed across the network as an IAM parameter. This intra-network reference overwrites any call reference in the original incoming IAM, and is removed again if the call leaves the network.

- IAM parameter suppression on a trunk group basis
  Selected optional IAM parameters can be automatically omitted from outgoing IAMs to avoid potential problems with a destination switch that may not handle them correctly. This capability is controlled via the ISPARM option in table TRKOPTS, which provides an index into table ISPARM for retrieving a list of parameters to be suppressed. See A59028040 for details.

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D19.3 Limitations

D19.3.1 Q.761 Capabilities Not Supported

Capabilities listed in Table 1 of Q.761 but not supported by the DMS implementation of ETSI ISUP V1 or ETSI ISUP V2.

Basic call
Multirate connection types
Signalling procedures for connection type allowing fallback capability
User part availability control
Propagation delay determination procedure [1]
Generic procedures for supplementary service support
End-to-end signalling—SCCP Connection Oriented
End-to-end signalling—SCCP Connectionless
Simple service activation procedure
Remote operations procedure
Network specific facility procedures

[1] Partially supported, as described in Compliance Statement.

D19.3.2 Messages Not Supported

The following messages are not supported, i.e. they are never generated by the ISN04 (TDM). If received from other exchanges, they are treated according to the message compatibility procedures of Q.764.

Loop prevention (LOP)	User part available (UPA)
Network resource management (NRM)	User part test (UPT)

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D19.3.3 Parameters Not Supported

Parameters that are not supported, i.e. they are never originated by the ISN04 (TDM), are treated according to the compatibility procedures of Q.764 if received from other exchanges, except that the recommendations for unrecognised optional parameter values are not implemented.

At a transit node, unrecognised parameters will be handled in accordance with their PCI (Parameter Compatibility Information) instructions. If a parameter has no PCI instructions, it will be discarded and the Confusion message will be sent.

D19.3.4 Miscellaneous Restrictions

Unsupported capabilities not explicitly listed in the standards:

- Only bi-directional trunks are supported, not uni-directional trunks.
- If a Calling Party Number optional parameter is received in the IAM with either invalid digits or an invalid Numbering Plan Indicator, the parameter will be discarded and the call will proceed.
- ISN04 (TDM) uses proprietary timers instead of specified timers for overlap inpulsed calls, as follows:
  - Proprietary timer T37 is used instead of T10 as the short inter-digit timer.
  - Proprietary timer T35 is used instead of T11 as the long inter-digit timer.
- An ACM sent backwards to establish a speech connection for the application of a local treatment or tone contains no Cause Indicator parameter.
- No support for user part congestion control (as defined in Q.764 section 2.10)
- No support for international exchange procedures

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D19.4 ETSI ISUP Signalling Interworkings

See section D1.8 on page 175 for explanations of the abbreviations used.

D19.4.1 Interworkings for ETSI ISUP V1 Variants

Interworking between ETSI ISUP V1 and	Design support?											Further information
	V1 Base	Brazil	Czech	Denmark	Italy V1	Mexico	New Zealand	Norway	Portugal	Spain	Turkey V1	
Standard IBN lines	Y	t	Y	Y	Y [1]	Y	Y	Y	Y	Y [2]	t	Overlap outpulsing supported for I/W to ETSI ISUP V2
Business set lines	Y	t	Y	Y	Y [1]	Y	Y	Y	Y	Y [2]	t	Overlap outpulsing supported for I/W to ETSI ISUP V2
CAS multiplexer lines	Y	t	Y	Y	t	Y	Y	Y	Y	t	t	
V5.2 lines	Y	t	Y	Y	Y [1]	Y	Y	Y	Y	Y [2]	t	
Cornerstone lines	Y	t	t	t	t	t	t	t	t	t	t	
CentrexIP lines	Y	t	t	Y	Y	Y	Y	Y	Y	Y	t	
Attendant console	t	N	N	N	N	N	Y	N	N	N	N	Base capabilities enhanced to implement AC I/W for UK ISUP (see 59008831), but no testing done for V1 or V2
SMDI	N	N	N	N	N	N	N	N	N	N	N	
ACD	Y	t	t	Y	Y	Y	Y	Y	Y	Y	t	
SCAI (ICM / CompuCALL)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	For an incoming ETSI ISUP call with a CLI more than 10 digits in length, only the least significant (rightmost) 10 digits are passed on to SCAI.
TOPS (GOSS7)	Y	t	t	t	t	t	t	t	t	t	t	
ISDN BRI	Y	t	Y	Y	Y [1]	Y	Y	Y	Y	Y [2]	t	
ISDN PRI [3]	Y	Y	Y	Y	Y [1] [4]	Y	Y	Y	Y	Y [5]	Y	Overlap inpulsing and outpulsing supported in both directions
QSIG	Y	N	N	N	t	N	Y	Y	N	Y [2]	N	
CAS PBX	Y	X	X	X	X	X	Y [6]	X	X	X	X	
DPNSS	Y [7]	X	X	X	X	X	Y	Y	X	X	X	
DASS2	N	X	X	X	X	X	X	X	X	X	X	
ETSI ISUP V1	Y	Y [8]	Y	Y [9]	Y [1] [10]	Y	Y	Y	Y [11]	Y [5]	Y [12]	
ETSI ISUP V2	Y	Y	Y	Y	Y [1]	Y	Y	Y	Y	Y [2]	Y [12]	
IBN7 (ANSI ISUP+)	Y	t	Y	Y	Y [1]	Y	Y	Y	Y	Y [5]	t	Interworking includes NETINFO generation

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Interworking between ETSI ISUP V1 and	Design support?											Further information
	V1 Base	Brazil	Czech	Denmark	Italy V1	Mexico	New Zealand	Norway	Portugal	Spain	Turkey V1	
USA FGD ISUP	Y	X	X	X	X	X	X	X	X	X	X	
Australian ACIF I-ISUP	N	X	X	X	X	X	X	X	X	X	X	DCME and dynamic echo control supported on interworking (see 59009302)
Japan ISUP variants	N	X	X	X	X	X	X	X	X	X	X	DCME and dynamic echo control supported on interworking (see 59009302)
Malaysia ISUP	N	X	X	X	X	X	X	X	X	X	X	
UK ISUP	Y [13]	X	X	X	X	X	X	X	X	X	X	
SPIROU (French ISUP)	Y	X	X	X	X	X	X	X	X	X	X	
ITU TUP [14]	Y	Y	X	X	X	X	X	X	X	X	X	
IUP / BTUP	Y [15]	X	X	X	X	X	X	X	X	X	X	
SSUTR2 / FTUP	Y	X	X	X	X	X	X	X	X	X	X	
INAP	Y [16]	Y	t	t	Y [1]	Y	Y	t	t	Y	Y [17]	Suspend / resume supported for IN calls terminating to ETSI ISUP (see A59023749).
R1 CAS	Y	X	X	X	X	X	Y	X	X	X	N	See 5908443
Global R2 CAS	Y [18]	Y [19]	X	X	X	Y [20]	N	N	X	X	Y [21]	Includes support for Carrier Connect AMA
Flexible CAS	Y	N	Y	N	Y [22]	N	N	N	N	N	N	
USA R1 CAS	Y	X	X	X	X	X	X	X	X	X	X	

[1] See AJ4939 for details.
[2] See AJ5438 for details.
[3] For information about PRI national variant interworkings, see Chapter D14 on page 297.
[4] Italian ISUP V1 interworks with Italian PRI as well as base ETSI PRI.
[5] See AJ4820 for details.
[6] DC5A only.
[7] See AG5324 for details.
[8] Brazilian ISUP V1 interworks with Brazilian ISUP V1 as well as base ETSI ISUP V1.
[9] Danish ISUP V1 interworks with Danish ISUP V1 as well as base ETSI ISUP V1.
[10]Italian ISUP (V1 and V2) interworks with Italian ISUP as well as base ETSI ISUP V1.
[11]Portuguese ISUP V1 interworks with Portuguese ISUP V1 as well as base ETSI ISUP V1.
[12]Turkish ISUP (V1 and V2) interworks with Turkish ISUP as well as base ETSI ISUP.
[13]See AR2195 for details.
[14]For information about TUP national variant interworkings, see Chapter D27 on page 434.
[15]See AJ4398 for details.
[16]See SIM specification "INAP Generic Interworking Specification" for details.
[17]Interaction with an external IP is not supported for Turkish ISUP.
[18]See AJ4779 for details.
[19]Brazilian R2 CAS (5C) only.
[20]Mexican R2 CAS only.
[21]Turkish R2 CAS only.
[22]See AU3016 for details.

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D19.4.2 Interworkings for ETSI ISUP V2 Variants

Interworking between ETSI ISUP V2 and	Design support?																									Further information
	V2 BASE	Argentina	Austria	Belgium	Chile	China	Costa Rica	Egypt	Ethiopia	Georgia	Germany	Hong Kong	Hungary	Israel	Italiy V2 [1]	Myanmar	Papua NG	Peru	Poland	Saudi	Singapore	Spain	Sweden	Taiwan	Turkley V2	Vietnam	
Standard IBN lines	Y	t	Y	Y [2]	Y	Y	Y	Y	Y	Y	Y	t	Y	Y	Y [3]	Y	Y	Y	Y	Y [4]	t	Y	Y	t	t	Y	Overlap outpulsing supported for I/W to ETSI ISUP V2
Business set lines	Y	t	Y	Y [2]	Y	t	Y	Y	Y	Y	Y	t	Y	Y	Y [1]	Y	Y	Y	Y	Y [3]	t	Y	Y	t	t	Y	Overlap outpulsing supported for I/W to ETSI ISUP V2
CAS multiplexer lines	Y	t	Y	t	Y	t	Y	Y	Y	Y	Y	t	Y	Y	t	Y	Y	Y	Y	Y [4]	Y [5]	t	Y	t	t	Y	
V5.2 lines	Y	t	Y	Y [6]	Y	Y	Y	Y	Y	Y	Y	t	Y	Y	Y [1]	Y	Y	Y	Y	Y [4]	t	T	Y	t	t	Y	
Cornerstone lines	Y	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	
CentrexIP lines	Y	t	t	Y	t	t	t	t	t	t	Y	t	t	t	Y	t	t	t	t	Y	t	t	t	t	t	t	
Attendant console	t	t	N	N	N	t	N	N	N	N	N	N	N	N	N	N	N	N	N	N	t	N	N	N	N	N	Base capabilities enhanced to implement AC I/W for UK ISUP (see 59008831), but no testing done for V1 or V2
SMDI	Y	t	Y	Y	t	t	t	Y	t	t	Y	t	Y	t	Y	t	t	Y	Y	Y	t	t	Y	t	Y	t	ETSI ISUP supports message retrieval for Networked VMS; ETSI TCAP supports MWI (de)activation for Networked VMS [7]
ACD	Y	t	t	Y	t	t	t	t	t	t	Y	t	t	t	Y	t	t	t	t	Y	t	Y	t	t	t	t	QFT and NETINFO info can be conveyed in call setup messages for calls to (N)ACD agents, and is correctly handled at the switch serving the (N)ACD agent (see A59028016).
CompuCALL	Y	t	Y	Y	t	t	t	Y	t	t	Y	t	Y	t	Y	t	t	Y	Y	Y	t	Y	Y	t	Y	t	For an incoming ETSI ISUP call with a CLI more than 10 digits in length, only the least significant (rightmost) 10 digits are passed on to CompuCALL.
TOPS (GOSS7)	Y	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	t	
ISDN BRI	Y [8]	t	Y	Y [2]	t	t	t	Y	t	t	Y	t	Y	t	Y [1]	t	t	Y	Y	Y [4]	t	Y	Y	t	t	t	
ISDN PRI [9]	Y [8]	Y	Y	Y [3] [10]	Y	t	Y	Y	Y	Y	Y	Y	Y	Y	Y [1] [11]	Y	Y	Y	Y	Y [4]	Y	Y	Y	t	Y	Y	Overlap inpulsing and outpulsing supported in both directions
QSIG	Y [12]	N	N	t	N	t	N	N	N	N	Y	N	N	N	t	N	N	N	Y	t	N	Y	Y	N	N	N	
CAS PBX	Y	X	X	X	X	t	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	X	
DPNSS	Y	X	X	X	X	t	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	X	

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Interworking between ETSI ISUP V2 and	Design support?																									Further information
	V2 BASE	Argentina	Austria	Belgium	Chile	China	Costa Rica	Egypt	Ethiopia	Georgia	Germany	Hong Kong	Hungary	Israel	Italiy V2 [1]	Myanmar	Papua NG	Peru	Poland	Saudi	Singapore	Spain	Sweden	Taiwan	Turkley V2	Vietnam	
DASS2	N	X	X	X	X	t	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	X	
ETSI ISUP V1	Y	Y	Y	Y [2]	Y	t	Y	Y	Y	Y	Y	Y	Y	Y	Y [1] [10]	Y	Y	Y	Y	Y [4]	Y	Y	Y	Y	Y [13]	Y	
ETSI ISUP V2	Y	Y	Y	Y [2] [14]	Y	Y [15]	Y	Y	Y	Y	Y	Y	Y	Y	Y [1]	Y	Y	Y	Y	Y [4]	Y	Y	Y	Y	Y [1 3]	Y	
IBN7 (ANSI ISUP+)	Y	Y	Y	Y [2]	Y	X	Y	Y	Y	Y	Y	Y	Y	Y	Y [1]	Y	Y	Y	Y	Y [4]	Y	Y	Y	Y	t	Y	Interworking includes NETINFO generation
USA FGD ISUP	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Australian ACIF I-ISUP	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	DCME and dynamic echo control supported on interworking (see 59009302)
Japan ISUP variants	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	DCME and dynamic echo control supported on interworking (see 59009302)
Malaysia ISUP	N	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
UK ISUP	Y [16]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
SPIROU (French ISUP)	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
ITU TUP [17]	Y	X	X	X	X	X	X	X	X	X	X	Y	X	X	X	X	X	X	X	Y	X	X	X	Y	X	X	
IUP / BTUP	Y [18]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
SSUTR2 / FTUP	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
INAP	Y [16]	t	t	Y	t	t	t	t	t	t	Y	Y	t	t	Y [1]	t	t	t	t	t	t	Y	t	Y	Y [19]	t	Monitoring not supported for QFT calls over ETSI ISUP V2 (except for internal routing failure). Suspend / resume supported for IN calls terminating to ETSI ISUP (see A59023749).
R1 CAS	Y	X	X	X	X	X	X	X	X	X	X	N	X	X	X	X	X	X	X	X	X	X	X	N	N	X	See 5908443
Global R2 CAS	Y [18]	X	X	X	X	X	X	Y	X	X	X	Y	X	X	X	X	X	X	X	Y [4]	Y [20]	X	X	Y	Y [21]	X	Includes support for Carrier Connect AMA
Flexible CAS	Y	N	N	N	Y	N	Y	N	Y	Y	N	Y	N	Y	Y [22]	Y	Y	N	Y	N	N	N	N	Y	N	Y	
USA R1 CAS	Y	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

[1] See AU2983 for details.
[2] See AJ4910 for details.
[3] See AJ4939 for details.
[4] See A59010190 for details.

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[5] Singapore ISUP V2 interworks only with DC5A CAS off GPP. See A59036664.
[6] See AU2525 for details.
[7] See A59013065 for details.
[8] Interworking can support two CLIs (NN and PN), as required for French market. See A59027509 for details.
[9] For information about PRI national variant interworkings, see Chapter D14 on page 297.
[10]Belgian ISUP V2 interworks with Belgian PRI as well as base ETSI PRI.
[11]Italian ISUP V1 interworks with Italian PRI as well as base ETSI PRI.
[12]Includes support for QSIG Feature Transparency (QFT), as described in AJ4986 and AF7185.
[13]Turkish ISUP (V1 and V2) interworks with Turkish ISUP as well as base ETSI ISUP.
[14]Belgian ISUP V2 interworks with Belgian ISUP V2 as well as base ETSI ISUP V2.
[15]The only trunk interworking tested and productised for China ISUP V2 is with China ISUP V2 itself. See A59036494.
[16]See AJ4319 for details.
[17]For information about TUP national variant interworkings, see Chapter D27 on page 434.
[18]See AJ4398 for details.
[19]Interaction with an external IP is not supported for Turkish ISUP.
[20]Singapore ISUP V2 interworks only with Singapore R2 CAS. See A59036664.
[21]Turkish R2 CAS only.

D19.5 Commercial Software Packaging

SW Order Code	Description
NETK0001	ETSI ISUP Base (NETK Core)
NETK0002	Public Network Trunking (ETSI ISUP V1)
NETK0003	Public Network Trunking (ETSI ISUP V2)
NETK0005	ISUP Bearer Capability billing
NETK0006	Belgian ISUP V2
NETK0007	Spanish ISUP V1
NETK0009	Italian ISUP V1
NETK0012	Austrian ISUP - Including Carrier Pre-selection Support
NETK0013	Norwegian ISUP V1
NETK0016	New Zealand ISUP V1
NETK0029	Mexican ISUP V1
NETK0030	Danish ISUP V1
NETK0034	Turkish ISUP V1 and V2
NETK0036	Egyptian ISUP - Including MCID, Trunk Offer
NETK0038	Portuguese ISUP V1
NETK0039	Brazilian ISUP V1
NETK0041	ETSI ISUP V2 Hop Counter
NETK0042	Polish ISUP (Including MCID)
NETK0043	Swedish ISUP
NETK0047	Czech ISUP
NETK0049	Hungarian ISUP
NETK0061	Israel ISUP
NETK0062	Chile ISUP
NETK0063	Papua New Guinea ISUP
NETK0064	Ethiopia ISUP
NETK0065	Costa Rica ISUP
NETK0066	Georgia ISUP

SW Order Code	Description
NETK0067	Myanmar ISUP
NETK0069	Hong Kong ISUP
NETK0070	Taiwan ISUP
NETK0071	Spanish ISUP V2
TKCL0002	Echo Control
TKCL0003	DCME Control

D19.6 Overview of Feature Set Support

D19.6.1 VPN Services

ETSI ISUP V1 and V2 both support the following basic VPN services:

- On-net routing
- Off-net routing
- Automatic route selection
- Expensive route warning tone
- Time of day routing
- Authorisation codes for screening indirect and customer group access
- CLI-based screening for indirect and customer group access
- Billing to specified account codes
- Virtual Facility Group support (SFG/NARS)

The ISN04 (TDM) implementation of ETSI ISUP V2 also supports private numbering plans via the general-purpose ETSI ISUP V3 APM (Application Transport Mechanism) extensions, as described in section E11.2.2.1 on page 667.

See Chapter E13: APM Feature Transparency for information about how as defined in Q.764 section 2.11 uses the ETSI ISUP APM to support specific sets of value-added features, both open/standard and proprietary.

See A59028106 for systematic comparisons between these open ETSI ISUP V2+ APM service implementations and the original proprietary IBN7 implementations.

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D19.6.2 ISDN Supplementary Services

Support for the networking of ISDN services over ETSI ISUP V1 and V2 is as summarised in the table below. See Chapter E7: ISDN Supplementary Services for descriptions of the services supported.

ISDN supplementary service	Networked support over	
	ETSI ISUP V1	ETSI ISUP V2
MoU Priority 1 services		
CLIP	Yes	Yes
CLIR	Yes	Yes
DDI	Yes [1]	Yes [1]
MSN	Yes [1]	Yes [1]
TP	No	Yes [2]
MoU Priority 2 services		
Advice Of Charge at Setup (AOC-S)	N/A [3]	N/A [3]
Advice Of Charge During Call (AOC-D)	N/A [3]	N/A [3]
Advice Of Charge at End of Call (AOC-E)	N/A [3]	N/A [3]
Call Waiting (CW)	Yes [4]	Yes
Call Hold (HOLD)	Yes [4]	Yes
Closed User Group (CUG)	Yes	Yes
Connected Line Identification Presentation (COLP)	No	Yes [2]
Connected Line Identification Restriction (COLR)	No	Yes [2]
Call Completion to Busy Subscriber (CCBS)	No	Yes [5]
Call Completion on No Reply (CCNR)	No	Yes
Call Forward Unconditional (CFU)	Yes [6]	Yes [7]
Call Forward on Busy (CFB)	Yes [6]	Yes [7]
Call Forward on No Reply (CFNR)	Yes [6]	Yes [7]
Call Deflection (CD)	No	Yes [2]
Partial Rerouting (PRR)	Yes [6]	Yes [7]
Explicit Call Transfer (ECT)	Yes [8]	Yes [8]
Freephone (FPH) [9]	No	Yes [2]
Malicious Call Identification (MCI)	Yes [10]	Yes
Subaddressing (SUB)	Yes	Yes
Three-Party Service (3PTY)	No	Yes [2]
Conference Call, Add-On (CONF)	No	Yes [2]

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ISDN supplementary service	Networked support over	
	ETSI ISUP V1	ETSI ISUP V2
Meet-Me Conference (MMC)	No	Yes [2]
User-to-User Signalling (UUS)	Yes [11]	Yes [11] [12]
Message Waiting Indication (MWI)	Yes	Yes
Reverse Charging (REV)	No	Yes [13]
Non-ETSI ISDN services		
Network Advice Of Charge (NAOC)	No	Yes [14]
Priority Class Of Service (PCOS) for Germany	No	Yes
Emergency Calls	No	Yes
Line Group Hunting	Yes [1]	Yes [1]
Random and Circular Hunting for PRI	Yes [1]	Yes [1]

[1] No additional network signalling required.
[2] Transit node support only, via ETSI ISUP V2 compatibility mechanism (unrecognised parameters relayed transparently, not discarded.
[3] Service-specific signalling applies only to access interface.
[4] Functionality supported, but not called party notification via Generic Notification Indicator parameter (ETSI ISUP V1 protocol limitation).
[5] See AR2196 for details.
[6] Forwarding supported, but notification not provided (ETSI ISUP V1 protocol limitation).
[7] Call reconfiguration functionality supported, but only transit support for notification.
[8] Call reconfiguration functionality supported, but no ECT notification is provided back to caller or forward to new called party. (For ETSI ISUP V1 as defined in Q.767, such ECT notifications are not defined.)
[9] This is the FreePhone service defined in ETS 300 208 and ETS 300 210. A number of national regulatory authorities have defined non-ETSI FreePhone services, which ISN04 (TDM) supports by means of translations and routing, as described in section G2.1.2 on page 878 (recognition of 0800 prefix and appropriate rerouting of call).
[10]For networked MCID support over ETSI ISUP V1, switch datafill must be used to initiate an INR/INF or IDR/IRS message sequence to obtain the necessary caller information.
[11]Full transit support for UUS1 (implicit), but only partial support on interworking with PRI, as follows:
- UUI IE mapped SETUP -> IAM -> SETUP, as required for implicit service invocation.
- UUI IE not mapped between other PRI and ISUP call setup messages (except CONNECT -> ANM).
- UUI IE always mapped between PRI release messages (DISCONNECT, REL, REL COMPLETE) and ISUP RELs; should actually be mapped only if initial SETUP message also included a UUI IE.

[12]Transit node support for other UUS variants via ETSI ISUP V2 compatibility mechanism.
[13]Tested and supported only over the Turkey variant of ETSI ISUP V2.
[14]German variant of ETSI ISUP V2 only.

D19.6.3 Feature Transparency

The ETSI ISUP V3 APM (Application Transport Mechanism) has been defined by the ITU-T to serve as a general-purpose service support mechanism for conveying service-related information across the network. With this approach, ISUP does not need to understand the information being conveyed, only to relay it between two access interfaces that do understand it. This is known as ***feature transparency.***

The ETSI ISUP V3 APM is supported by the as defined in Q.764 section 2.11 implementation of ETSI ISUP V2 (which is therefore sometimes referred to as ETSI ISUP V2+). For information about the implementation and the services supported, see Chapter E13: APM Feature Transparency.

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