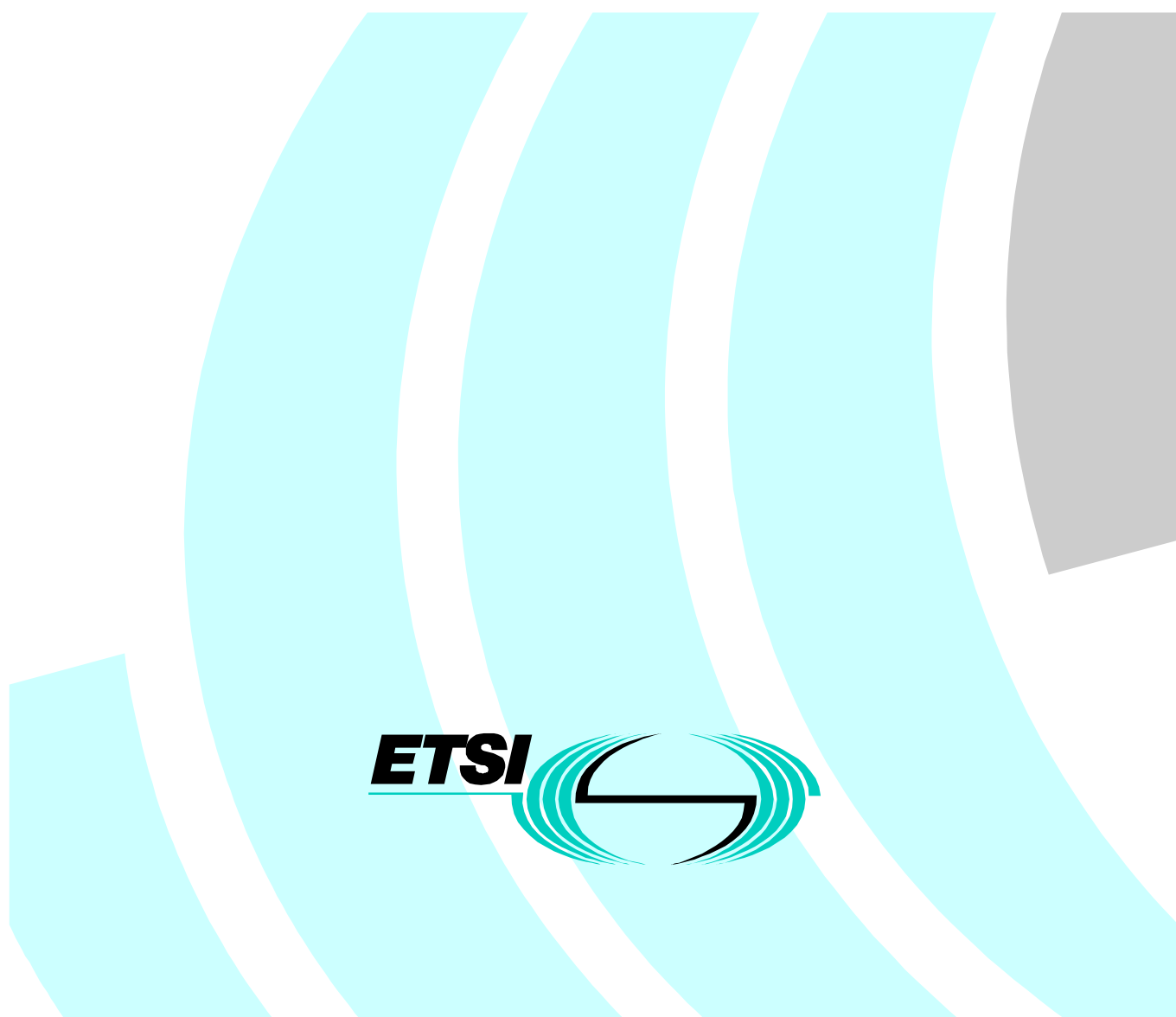# Final draft ETSI EG 201 916 V1.1.1 (2001-08)

Services and Protocols for Advanced Networks (SPAN);
Service Provider Access;
Development of standards to support Open Inter-Network Interfaces and Service Provider Access

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Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN), and is now submitted for the ETSI standards Membership Approval Procedure.

Introduction

The purpose of the present document is to provide a source of reference material to enable Service Providers and Network Operators to determine standardized facilities that are available in published ETSI protocols to support the introduction of services. The present document also validates a number of benchmark services initially identified by the European Commission [1] for third-party service provision using a generic capability set for Open Intelligent Network Interconnection and the Service Provider Access Requirements (SPAR) that are captured in clause 7.3.

A number of open network architectural solutions are assessed including IN, Mobile Networks, Internet and ISDN.

Following regulatory and commercial drivers to expand the range and geographical scope of telecommunications services, ETSI working groups are identifying new requirements and developing appropriate standards solutions to support open inter-network and service provider access. The present document covers the Open Inter-Network and Open Network Access Requirements for the Fixed Network, 2nd and 3rd Generation Mobility and Network Management. It addresses these requirements by taking a top down approach including Service requirements, Functional and Physical Architectures.

The present document commences with an introduction to the initial benchmark services to be provided by a Service Provider/Network Operator under European Commission mandate BC-T-305 [1] using Intelligent Network Interconnection. The present document then describes open access options via either Circuit Related and Non circuit related interfaces utilizing both direct service provider interconnection, via a SPAI, and indirect service provider interconnection via an intermediate Network.

The present document enumerates the activities in relation to the production of a set of open standards for internetwork control plane, management plane and service provider access interfaces. A Public Network Operator can also take the SP role, and indeed nothing in the present document should be taken as precluding such a possibility.

The Service Provider definition is not intended to map to certain country-specific meanings of the term, which are often taken as being "resellers", but is strictly intended in this context to cover the role of producing the telecommunications service.

Requirement Documents
SPA
        EG 201 722
        EG 201 897
PNO
        EG 201 807
API
        EG 201 899
Management
        EG 201 965

SP

Management

Switching
Transmission

SPAI
(MP)

SPAI
(CP/UP)

'X'

Management

'Q'

'Q'

Management

Switching
Transmission

Switching
Transmission

NNI

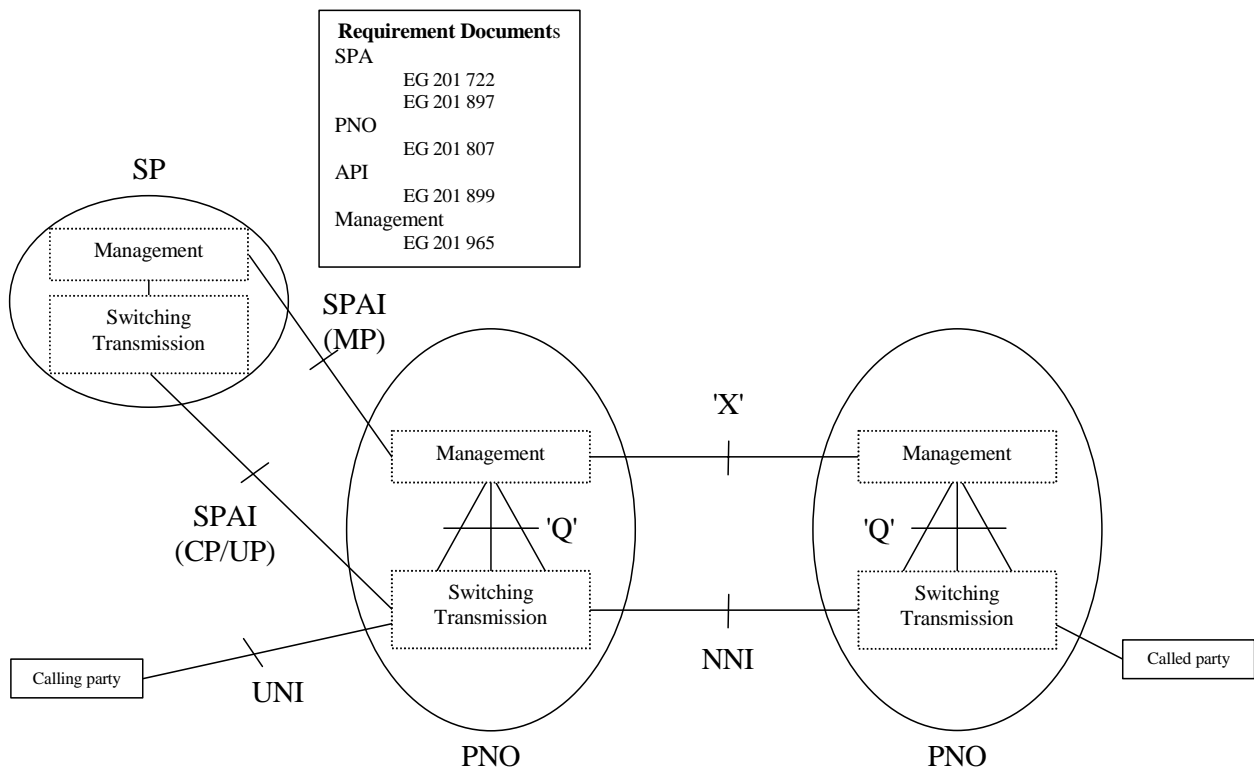Called party

Calling party

UNI

PNO

PNO

Figure 1: Reference Architecture for SP-PTN interfaces

1 Scope

The present document aims to facilitate the technical introduction of open inter-network and service provider access. It includes architectural scenarios and guidelines, and identifies implementation requirements to support these more advanced services. The format is based on a staged approach, covering both circuit-related (CR) and non-circuit-related (NCR) interfaces, including IN-related signalling technologies. It commences with the definition of service provider architectural and implementation capabilities, the implementation of which is initially based on standards existing at the start of the work. ETSI TC SPAN (that has produced the present document) has also been responsible for co-ordination and the enhancement of protocols, where necessary, in order to meet the Service Provider Access Requirements (SPAR) as outlined in the present document. Open Service Provider access is enabled by means of enhanced User to Network and Network-to-Network Interfaces. A number of Initial benchmark Services together with Service support and network management requirements are also considered.

Cross-referencing of the SPAR requirements and the candidate protocols is detailed through sets of tables. Existing protocol standards are utilized in the analysis, and are considered as candidates for re-use. Emerging protocols and APIs were also considered.

The overall objective of the present document is to map out the facilities and protocols needed to allow delivery of telecommunications services across multiple networks, including networks that may be geographically or technically diverse in nature. Where lack of support in protocol capabilities has been identified, these deficiencies are noted as items for further work.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

[1]   ETSI ETR 244: "Intelligent Network (IN); ETSI workplan for IN; (Mandate BC-T-305, step 1)".

[2]   ETSI EG 201 722: "Intelligent Network (IN); Service provider access requirements; Enhanced telephony services".

[3]   ETSI EG 201 807: "Network Aspects (NA); Intelligent Network (IN); Network operators' requirements for the delivery of service provider access".

[4]   ETSI EG 201 897: "Services and Protocols for Advanced Networks (SPAN); Service Provider Access; Service Provider Access Requirements in a Fixed and Mobile Environment".

[5]   Directive 97/33/EC of the European Parliament and of the Council of 30 June 1997 on interconnection in Telecommunications with regard to ensuring universal service and interoperability through application of the principles of Open Network Provision (ONP).

[6]   Directive 98/10/EC of the European Parliament and of the Council of 26 February 1998 on the application of open network provision (ONP) to voice telephony and on universal service for telecommunications in a competitive environment.

[7]   ETSI ETS 300 208: "Integrated Services Digital Network (ISDN); Freephone (FPH) supplementary service; Service description".

[8]   ETSI ETS 300 712: "Integrated Services Digital Network (ISDN); Public Switched Telephone Network (PSTN); Premium Rate (PRM) service; Service description".

[9]   ETSI ETS 300 711: "Integrated Services Digital Network (ISDN); Public Switched Telephone Network (PSTN); Virtual Card Calling (VCC); Service description".

[10]   ETSI ETS 300 779 (Edition 1): "Network Aspects (NA); Universal Personal Telecommunication (UPT); Phase 1 - Service description".

[11]   ETSI EG 201 965: "Services and Protocols for Advanced Networks (SPAN); Service Provider Access; Service Provider Access Management Requirements for Open Network Access".

[12]   ETSI EN 300 403-1 through 7:"Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993/8) modified]". and subsequent parts.

NOTE: Supplementary Services (SS) are described elsewhere.

[13]   ETSI ETS 300 356-1 through 19: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 2 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (1994)]"., and subsequent parts. ISUP Version 2.

[14]   ETSI EN 300 356-1 through 36: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (1997) modified]"., and subsequent parts. ISUP Version 3.

[15]   ETSI EN 300 356-1 through 21: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 4 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (2000) modified]"., and subsequent parts; ISUP Version 4.

[16]   ETSI ETS 300 121 (edition 1): "Integrated Services Digital Network (ISDN); Application of the ISDN User Part (ISUP) of CCITT Signalling System No.7 for international ISDN interconnections (ISUP version 1)". (Based on ITU-T recommendation Q.767)

[17]   3GPP TS 29.002: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Mobile Application Part (MAP) specification (3GPP TS 29.002 version 3.7.1 Release 1999)".

[18]   ETSI ETS 300 374-1: "Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol specification".

[19]   ETSI EN 301 140-1 (V1.3.4): "Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2); Part 1: Protocol specification".

[20]   3GPP TS 22.078: "Digital cellular telecommunications system (Phase 2+); Customized Applications for Mobile network Enhanced Logic (CAMEL) - Phase 3. Service description. Stage 1".

[21]   ETSI EG 201 899 (V1.1.1): "Services and Protocols for Advanced Networks (SPAN); Service Provider Access; Modelling service provider access requirements using an API approach".

[22]   ETSI ES 201 915-1 through 12: "Open Service Access; Application Programming Interface; Part 1: Overview".

[23]   ETSI EG 201 988-1: "Services and Protocols for Advanced Networks (SPAN); Service Provider Access Requirements (SPAR); Open Service Access for API requirements version 1".

[24]   ETSI EG 201 988-2: "Services and Protocols for Advanced Networks (SPAN); Service Provider Access Requirements (SPAR); Open Service Access for API requirements version 2".

[25]   ETSI ES 201 296: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP); Signalling aspects of charging".

[26]   ETSI ETR 172: "Business TeleCommunications (BTC); Virtual Private Networking (VPN); Services and networking aspects; Standardization requirements and work items".

[27]   ETSI EG 201 367: "Intelligent Network (IN); Number Portability Task Force (NPTF); IN and Intelligence Support for Service Provider Number Portability".

[28]   ETSI TR 101 917-1 through 12: "Services and Protocols for Advanced Networks (SPAN); API mapping for Open Service Access; Part 1: General issue on API mapping".

[29]   ETSI EG 201 988-3: "Services and Protocols for Advanced Networks (SPAN); Service Provider Access Requirements (SPAR); Mapping of Open Service Access for API version 1 to SPA requirements".

[30]   ETSI EN 300 650: "Integrated Services Digital Network (ISDN); Message Waiting Indication (MWI) supplementary service; Service description".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions of Service Provider related terms given in [2], [3] and [4] apply.

3.2   Abbreviations

For the purposes of the present document, the following abbreviations apply:

API	Application Programme Interface
BICC	Bearer Independent Call Control
CAMEL	Customized Application for Mobile networks Enhanced Logic
CdPy	Called Party
CgPy	Calling Party
CS-1	IN Capability Set 1
CUSF	Call Unrelated Service Function
DSS1	Digital Subscriber Signalling System No. 1
GMSC	Gateway Mobile Switching Centre
HLR	Home Location Register
IN	Intelligent Network
INAP	Intelligent Network Application Part
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
MAP	Mobile Application Part
NNI	Network-Network Interface
ONP	Open Network Provision
PTN	Public Telecommunications Network
PTNorig	Public Telecommunications Network originating
PTNterm	Public Telecommunications Network terminating
SCF	Service Control Function
SP	Service Provider
SPAI	Service Provider Access Interface
SPorig	Service Provider originating
SPterm	Service Provider terminating
SS	Supplementary Service
SSF	Service Switching Function
SSL	Secure Sockets Layer
TC	Transaction Capabilities
UNI	User-Network Interface
UPT	Universal Personal Telecommunications
UUS	User User Signalling
VMSC	Visited MSC
VPN	Virtual Private Network

4   History and Regulatory Background

4.1   Development of the Market

In the original European work done in the 1980s, a clear link was drawn between the availability of economically efficient telecommunications services and the development of the economy of the region as a whole. Stimulating competition to enable these services was seen as key.

The development of competition in the telecommunications market in Europe has been characterized, initially, by the liberalization of services, at the beginning of the 1990s. This was followed in 1998 by the liberalization of the provision of infrastructure.

However, for a provider to deliver services where they do not themselves have control of the access network, this will necessitate interconnection with and access to the network of a relevant network operator. This access has been limited to ordinary user plane interconnection (call origination, transit and call termination), with the attendant limitations on the type of services that can be delivered using this mechanism.

In order to enable advanced services, enhanced forms of access are required. These forms fall into two generic types - control plane access and management plane access. It is in this context that the current work has been progressed.

4.2   EC Directives

EC directives 97/33/EC [5] and 98/10/EC [6] require reasonable requests for access to the networks of operators with Significant Market Power (SMP) to be met. In order to reduce the costs for all parties concerned, this work is aimed at standardizing as many of the envisaged capabilities as possible.

5   Service aspects

In developing the present document, five initial benchmark services have been identified, see [1]. These are currently supported under IN and terminal mobility signalling protocols. The benchmark services will be utilized to test the extension of the signalling protocols in support of open network access.

5.1   Service Definition.

Services, as defined by current ETSI Standards, are taken within the present document as a benchmark for consideration of protocol support - see Benchmark IN services as listed in clause 5.1.2. Service Providers have the opportunity to develop these or create their own services to meet specific user requirements. Such services may be developed by utilizing the flexibility offered through an API or by an IN.

5.2   Benchmark Services

A list of benchmark services are listed in table 1 as defined in ETR 244 [1].

The identified services all have existing service definition for either the PSTN or the ISDN, as defined in table 1.

Table 1: Identification of service definitions for benchmark services (see note)

Identified service	PSTN service definition	ISDN service definition
Freephone	---	ETS 300 208 [7]
Premium rate	ETS 300 712 [8]	ETS 300 712 [8]
Virtual card calling	ETS 300 711 [9]	ETS 300 711 [9]
Virtual private network	ETR 172 [26](see note)	ETR 172 [26](see note)
Universal personal telecommunications	ETS 300 779 [10]	ETS 300 779 [10]
NOTE: This is not a service, but an alternative means of provision of existing services defined for the private network. ETR 172 [26] identifies the work items required for this definition.		

The benchmark services have been used to specify the Open-INAP Protocol work being developed by ETSI WG-SPAN12 as a special PICS Proforma (DEN/SPAN-120084 (see bibliography)) to accompany IN CS-3, and they have also been mapped in the present document against the capabilities noted in the requirements clause 7.3 of the present document.

NOTE: ETSI WG-SPAN12 are also using the number portability service as defined in EG 201 367 [27] as an additional benchmark service for OPEN-INAP.

5.3 Service Provider Access Management

Network Management requirements to support Service Provider Access are listed in the companion Guide EG 201 965 [11].

6 Architectural Aspects

A signalling connection between a public telecommunications network operator and a service provider is shown below in figure 2. The physical connection of the call is only extended from the public telecommunications network to the service provider's equipment for circuit related (CR) access.

For calls from a calling party (CgPy) in the originating PTN (PTNorig) to a called party (CdPy) in the terminating PTN (PTNterm), in which both PTNs and SPs are involved, various call connection scenarios are possible. Figure 2 visualizes two examples of a call connection scenario from the viewpoint of the requirements of the SPs of the originating- and terminating-call-related services, called SPorig and SPterm, respectively.

Figure 2: Examples of call connection scenarios for circuit related SP access

Scenario A is an example of a call in which SPorig is involved. In this scenario A, the call is forwarded from the PTNorig to SPorig which provides a service to the call. SPorig returns the call to the PTNorig. The call is then forwarded from the PTNorig, eventually via a transit network (PTNtran), to the PTNterm in which the call is terminated at the called party's (CdPy) line.

Scenario B is an example of a call in which both the SPorig and the SPterm are involved. In this scenario, the call is forwarded from the PTNorig to SPorig which provides a service to the call. SPorig returns the call to the PTNorig. The call is then forwarded from the PTNorig, eventually via a transit network (PTNtran), to the PTNterm. Then, from the PTNterm the call is forwarded to SPterm which provides a service to the call. SPterm returns the call to the PTNterm, in which the call is terminated at the called party's (CdPy) line.

For calls from a calling party (CgPy) in the originating PTN (PTNorig) to a called party (CdPy) in the terminating PTN (PTNterm), in which both PTNs and SPs are involved, various call connection scenarios are possible. Figure 3 visualizes two examples of a call connection scenario in the NCR case from the viewpoint of the requirements of the SPs of the originating- and terminating-call-related services, called SPorig and SPterm, respectively.
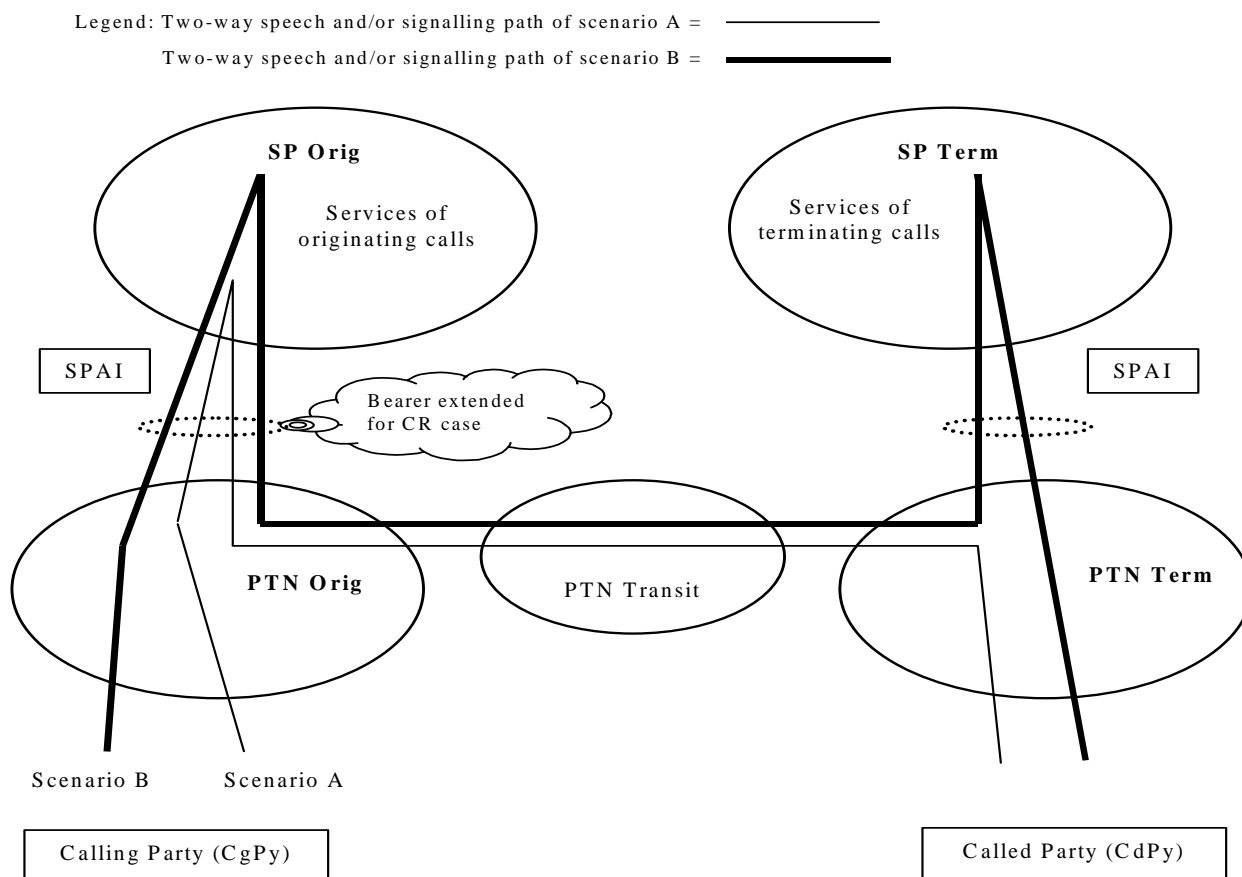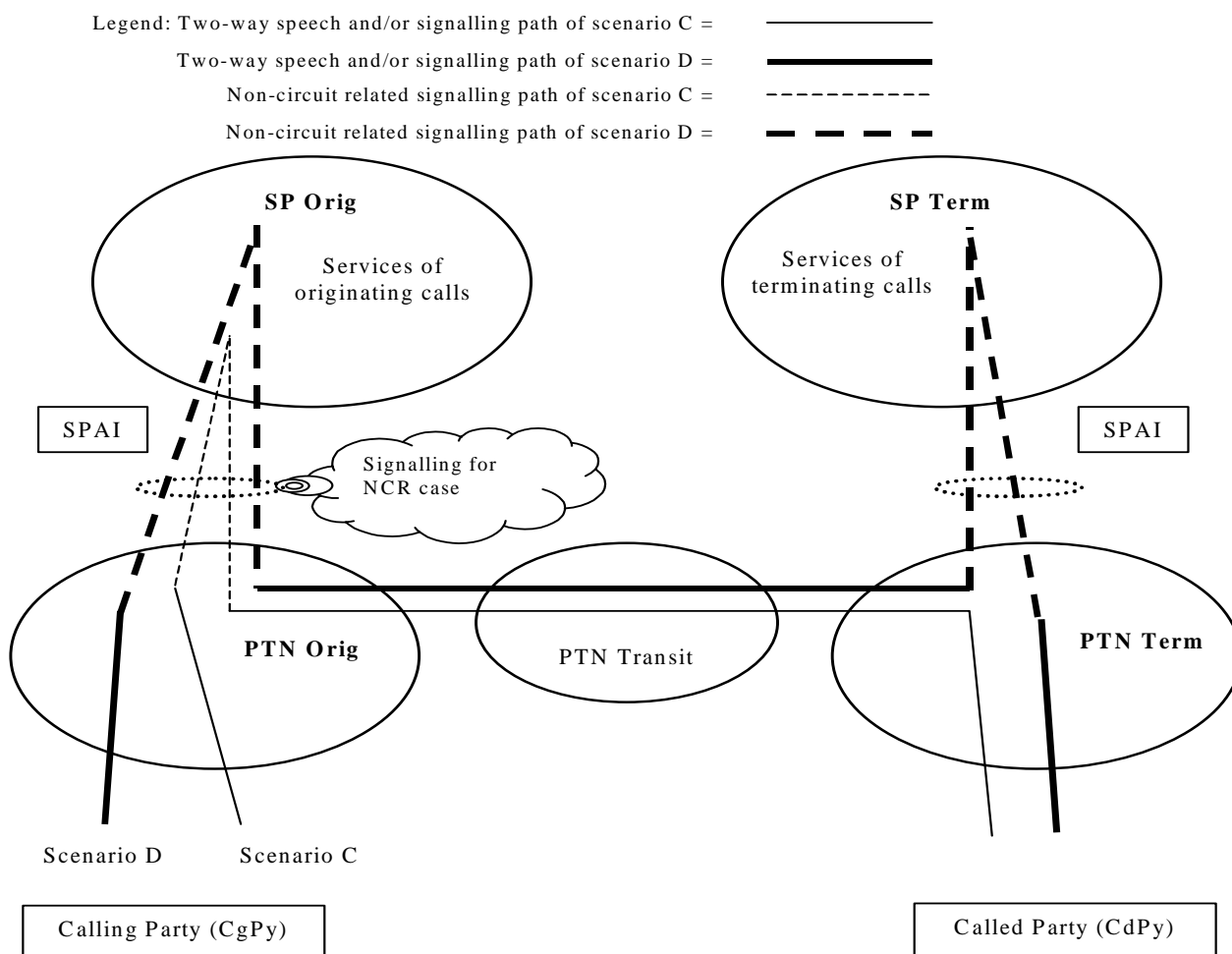

Figure 3: Examples of call connection scenarios in the case of a non-circuit-related SP Access

Scenario C is an example of a call in which SPorig is involved. In this scenario, the signalling in the control plane is forwarded from the PTNorig to SPorig which provides a service to the call. Then, the signalling in the control plane is returned to the PTNorig, which forwards the call to the PTNterm, eventually via a transit network (PTNtran), in which the call is terminated at the called party's (CdPy) line.

Scenario D is an example of a call in which SPorig is involved. In this scenario, the signalling in the control plane is forwarded from the PTNorig to SPorig which provides a service to the call. The signalling in the control plane is then returned to the PTNorig, which forwards the call to the PTNterm, eventually via a transit network (PTNtran). Then, the control plane signalling is forwarded from the PTNterm to SPterm which provides a service to the call. The signalling in the control plane is then returned to the PTNterm, in which the call is terminated at the called party's (CdPy) line.

It is evident that a range of ETSI standards need to be invoked for the provision of the SPAI supporting UNI and NNI configurations e.g. DSS1 [12], ISUP [13], [14], [15], [16], GSM MAP [17], INAP CS1, CS2, CS3 [18], [19], CAMEL [20]). Implementation of these standards will lead to protocol-specific implementations of SP applications.

6.1   API - Architectures

EG 201 899 [21] models service provider requirements using an API approach that leads to API definitions in
ES 201 915-1 [22] and documents EG 201 988-1 [23] and EG 201 988-2 [24] cover open service access API
requirements.

An API modelling approach is referenced in the architecture under consideration in EP TIPHON. API modelling is
being developed in the JAIN and PARLAY consortia and standardized in ETSI WG SPAN12 and 3GPP WG CN5. The
following figure shows how different network technologies existing in today's networks can be integrated through API
to the application control plane.
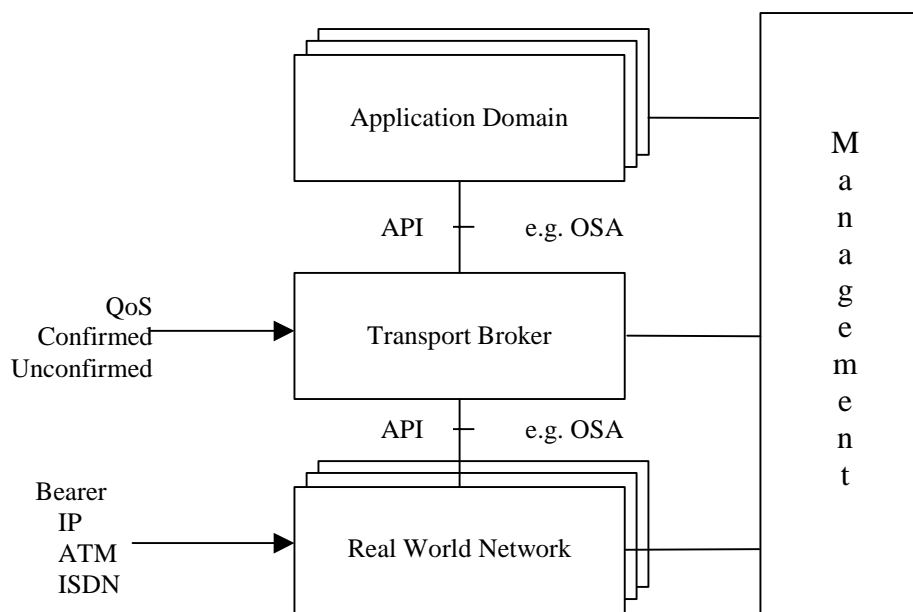
Figure 4: Proposed conceptual model to support IP under consideration by EP TIPHON

6.2 Management Architecture

The management function interface is shown in the following protocol stack allowing current tried and tested signalling layers to be used.
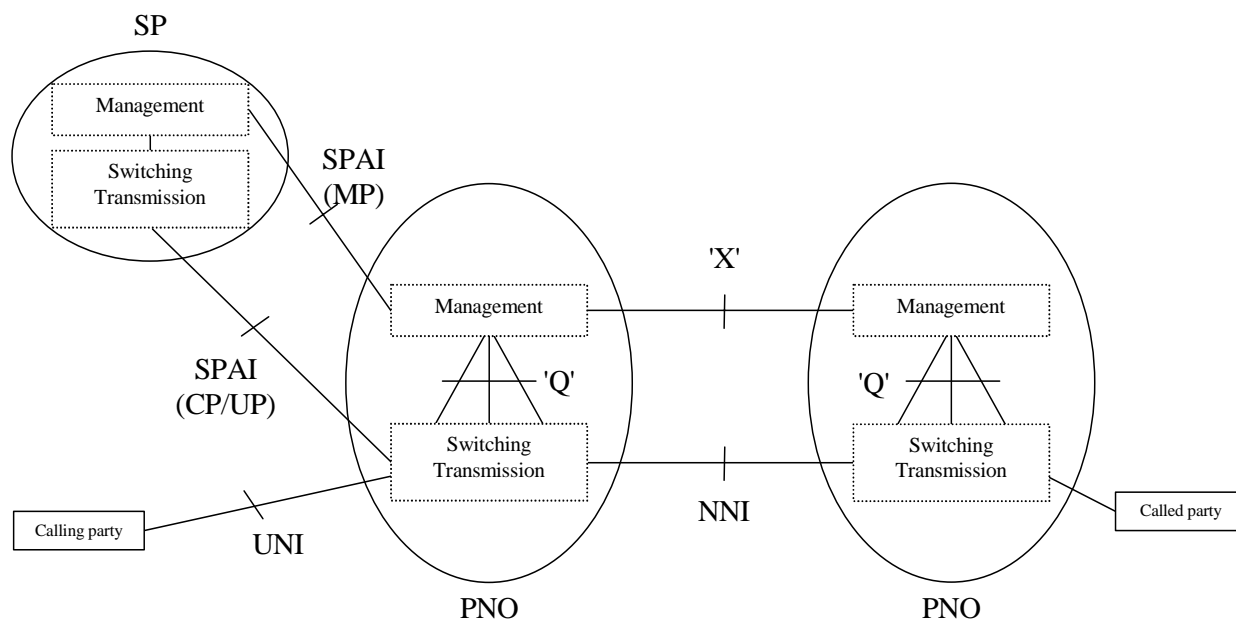
Figure 5: Reference Architecture for SP-PTN management requirements

7 Interfaces

7.1 Open Access using the User to Network Interface

Figures 6 and 7 illustrate the SPAI for circuit related and non-circuit-related access using the UNI interface configuration respectively.
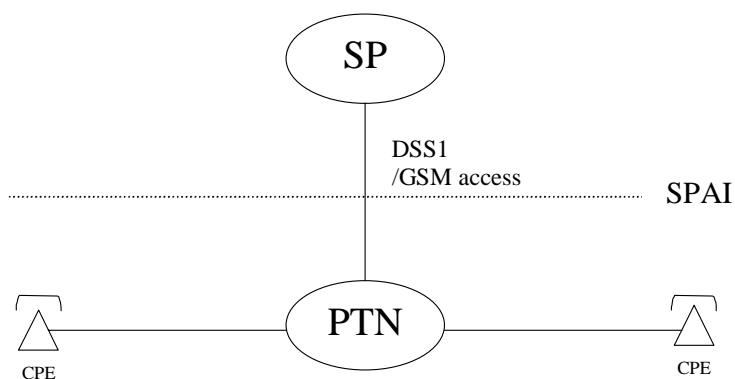
Figure 6: Circuit-related service provider access using UNI
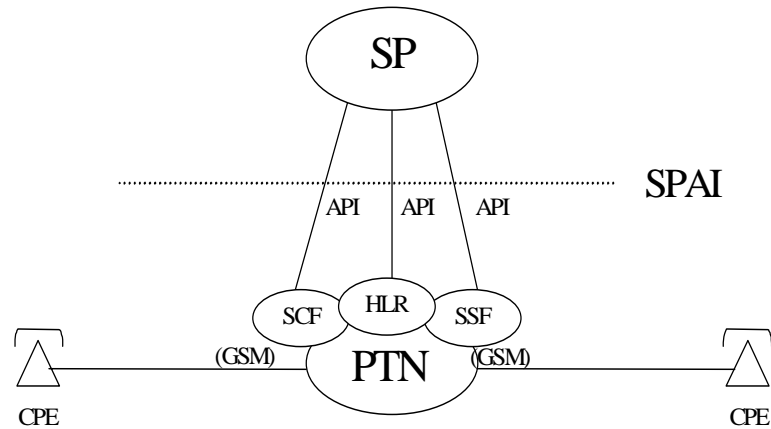
Figure 7: Non-circuit-related service provider access using UNI

7.2   Open Access using the Network to Network interface

Figures 8 and 9 illustrate the SPAI for circuit related and non-circuit-related access using the NNI interface configuration respectively.
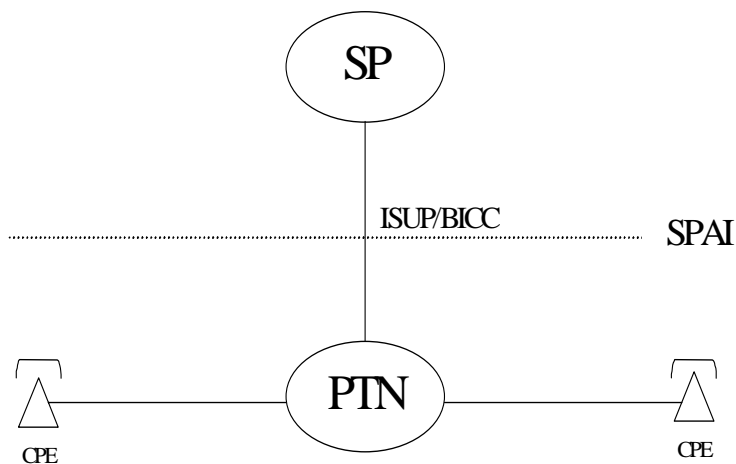
Figure 8: Circuit-related Service Provider access using NNI
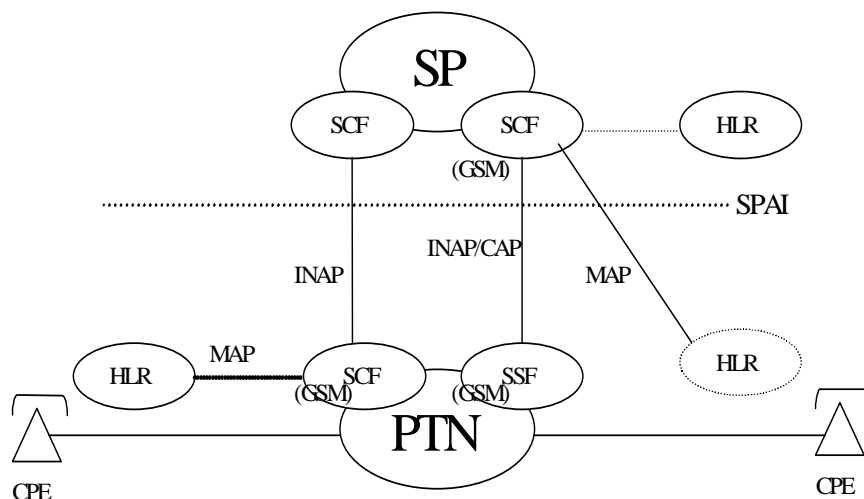
Figure 9: Non-circuit-related Service Provider access using NNI

7.3   Requirements and Priorities

Tables 2 through to 7 give a cross-reference to the various requirements and their allocation to various priorities. Where a requirement priority is indicated, this is taken from the associated requirements document (EG 201 897 [4]).

Table 2: Requirements cross reference - calling party information handling capabilities

No.	Reference	Requirement	Enhanced Telephony		Mobile and Internet	
			CR	NCR	CR	NCR
A1	[2] 5.2.1 [3] 5.2.2	Reception of the calling line identity - Application of the CLIR supplementary service	High/High	High/High		
A2	[2] 5.2.2	Presentation of the complete CLI information to the PTN	High	High	---	---
A3	[2] 5.2.3	Addition or substitution of a calling line identity	High	High	---	---
A4	[2] 5.2.4	Provision of CLI information to an SP-initiated call	High	High	---	---
A5	[2] 5.2.5 [3] 5.2.1	Relaying of the malicious call identification data of a received call	High/High	NA/NA	---	---
A6	[4] 5.1.1	Network Location Determination	---	---	High	High
A7	[4] 5.1.2	Geographic Location Determination	---	---	High	High
A8	[4] 5.2.1	Determination of the terminal capabilities of the SP's service user	---	---	High	High

Table 3: Requirements cross reference - basic call set-up and clear-down capabilities

No.	Reference	Requirement	Enhanced Telephony		Mobile and Internet	
			CR	NCR	CR	NCR
B1	[2] 5.3.1	Return speech path connection from the terminating PTN to the calling party	High	High		
B2	[2] 5.3.2	Routeing of an originating or incoming call from the PTN to the SP	High	NA		
B3	[2] 5.3.3	Indication of an originating or incoming call from the PTN to the SP	NA	High		
B4	[2] 5.3.4	Routeing of a terminating call from the PTN to the SP	High	NA		
B5	[2] 5.3.5	Indication of a terminating call from the PTN to the SP	NA	High		
B6	[2] 5.3.6	Reception of a notification of the cause of an unsuccessful call	High	High		
B7	[2] 5.3.7	Provision of information for the destination and routeing of a call	High	High		
B8	[2] 5.3.8	Call drop-back	Medium	NA		
B9	[2] 5.3.9	User interaction without service charging of the end user	Medium/ High	NA/NA		
B10	[2] 5.3.10	Reception of the originally dialled digits by the SP	low	low		
B11	[3] 5.3.1	Reception of the originally dialled digits by the PTN	low	low		
B12	[2] 5.3.11	Disconnection of a call in progress	Medium	Medium		
B13	[2] 5.3.12	Connection of a call to an interactive voice response unit in the PTN	NA	Medium		
B14	[2] 5.3.13	Alternate routeing of calls or the indications of calls to another "point of presence" of the SP	Medium	Medium		
B15	[3] 5.3.2	Alternate routeing of a call or the indication of a call to another "point of presence" of the PTN	Medium	Medium		
B16	[4] 5.4.1	Indication of the disconnection of a call	---	---	High	High
B17	[4] 5.4.5	Supervision of a dropped-back call	---	---	Void	Medium
B18	[4] 5.4.2	Join operation of individual legs of a call	---	---	High	High
B19	[4] 5.4.3	Split operation of individual legs of a call	---	---	High	High
B20	[4] 5.4.7	Multimedia Multiparty call control	---	---	High	High
B21	[4] 5.4.8	User Interaction for Text Delivery	---	---	High	High
B22	[4] 5.4.9	User-Plane resource negotiation and selection	---	---	High	High

Table 4: Requirements cross reference - supplementary call and data processing capabilities

No.	Reference	Requirement	Enhanced Telephony		Mobile and Internet	
			CR	NCR	CR	NCR
C1	[2] 5.4.1	Interrogation of a network termination point for data delivery	Medium	Medium		
C2	[2] 5.4.2	Overriding of the "incoming call barring" supplementary service	High	High		
C3	[2] 5.4.3	Bypassing of the "call diversion" supplementary service	low	low		
C4	[2] 5.4.4	Message waiting indication	High	High		
C5	[3] 5.5.1	Application contents screening	High	High		
C6	[4] 5.2.2	Modification of the terminal capabilities of the SP's service user	---	---	High	High
C7	[4] 5.2.3	Modification of the Personality Device/Module of the SP's service user	---	---	High	High
C8	[4] 5.3.1	Alteration of the profile of the SP's Service Subscriber	---	---	High	High
C9	[4] 5.4.4	Delivery of information to the SP's service user prior to alerting	---	---	Medium	Medium

Table 5: Requirements cross reference - charging-related capabilities

No.	Reference	Requirement	Enhanced Telephony		Mobile and Internet	
			CR	NCR	CR	NCR
D1	[2] 5.5.1	Changes in the charging rate of a call - Dynamic	High	High		
D2	[3] 5.5.2	Charging mechanisms between SP and PTNO - Dynamic	High	High		
D3	[4] 5.6.1	Provision of call charging information in real time	---	---	High	High
D4	[4] 5.6.2	Exchange of charge detail record information in real time	---	---	High	High
D5	[11]	Billing and Accounting mechanisms between SP and PNO	Medium	Medium	Medium	Medium

Table 6: Requirements cross reference - traffic-related capabilities

No.	Reference	Requirement	Enhanced Telephony		Mobile and Internet	
			CR	NCR	CR	NCR
E1	[2] 5.6.1	Event traceability requested by the SP	Medium	Medium		
E2	[3] 5.4.1	Event traceability requested by the PTN	High	High		
E3	[2] 5.6.2	Traffic control capabilities controlled by the SP	Medium	Medium		
E4	[3] 5.4.2	Traffic control capabilities controlled by the PTN	High	High		
E5	[2] 5.6.3 [3] 5.4.3	Avoidance of the cyclical routeing of a call	Medium/ High	NA/NA		
E6	[4] 5.4.6	Avoidance of the cyclical routeing of signalling or user messages	---	---	High	High

Table 7: Requirements cross reference - management-related capabilities

No.	Reference	Requirement	Enhanced Telephony		Mobile and Internet	
			CR	NCR	CR	NCR
F1	[4] 5.5.1	Reporting of network events for measuring the quality of service	---	---	Medium	Medium
F2	[4] 5.5.2	Reporting of network events for the purpose of fault diagnostics	---	---	High	High
F3	[4] 5.5.3	Request for event monitoring and subsequent reporting	---	---	High	High
F4	[4] 5.5.4	Electronic ordering of network management functions	---	---	High	High

Table 8: Monitored deliverables

Deliverable	Work item number	Title
EG 201 722 (V1.2.1) [2]	DEG/SPAN-061601	Intelligent Network (IN); Service provider access requirements; Enhanced telephony services
EG 201 897 [4]	DEG/SPAN-141602	Services and Protocols for Advanced Networks (SPAN); Service Provider Access; Service Provider Access Requirements in a fixed and mobile environment
EG 201 807 (V1.1.1) [3]	DEG/SPAN-141603	Network Aspects (NA);Intelligent Network (IN); Network operators' requirements for the delivery of service provider access
EG 201 899 (v1.1.1) [21]	DEG/SPAN-140504	Services and Protocols for Advanced Networks (SPAN); Service Provider Access; Modelling service provider access requirements using an API approach
EG 201 988-3 [29]	DEG/SPAN-1451606-3	Services and Protocols for Advanced Networks (SPAN); Service Provider Access Requirements Mapping of Open Service Access API Version 1
ES 201 915-1 through 12 [22]	DEN/SPAN-120070-1/12	Services and Protocols for Advanced Networks (SPAN); Open Service Access; Application Programming Interface; All Parts
TR 101 917-1 through 12 [28]	DEN/SPAN-120075-1/18	Services and Protocols for Advanced Networks (SPAN); API mapping for Open Service Access; All Parts
EG 201 965 [11]	DEG/SPAN-141607	Services and Protocols for Advanced Networks (SPAN); Service Provider Access; Service Provider Access Management Requirements for Open Network Access
Not allocated yet (see bibliography)	DEN/SPAN-120084	PICS-Proforma for OPEN CORE INAP based on OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.
NOTE:	CS-3 is not revising the SCF-SCF interface or the CUSF, which are being carried forward from CS-2. Therefore the PICS proforma for OPEN-INAP will be applied to the CS-2 interfaces noted above.	

7.4   SP-PNO Scenarios analysed in this ETSI Guide

The following figure identifies the results for the various SP-PNO configurations contained in clauses 8 and 9. The direct cases apply when the SPAI is connected to the same network as the SP' service user, whilst in the indirect case.

Table 9: Index to results of SP-PNO scenarios analysed in the present document

	Service Provider Access Interface					
	DSS1 93, 98, 01	ISUP V1-4	INAP CS-1/2/3	CAMEL Phase 1/2/3	Open INAP CS-2; CS-3	ETSI OSA API
Direct	10	11	12	12	12	12
Indirect	13	13	13	13	13	13

8   Protocol Aspects

8.1   Impact of a service provider's access interface on the UNI between network operators and service providers

Any UNI that provides a circuit-related service provider interface will need to transfer additional information as well as the existing basic call requirements. Table 10 shows the results of the analysis of the Service Provider Access Requirements against a Service Provider Access Interface configured using DSS.1 (1993, 1998, 2001). Support mechanism and parameters are indicated in table 10.

Table 10: Requirements assessment for SP<>NO circuit-related UNI interface

NOTE: Any feature provided as an application over UUS requires each of the Users to have an ISDN terminal.

No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
A1	Reception of the calling line identity - Application of the CLIR supplementary service.	*Receive CLI (which may be restricted) including the Restricted flag (if set) for calls from, or to, one of the SPs service-subscribers.*	The current protocol requires procedures of CLIP supplementary service to provide this capability. CLIR will restrict provision of CLI, unless some form of override capability is available. In the case where national regulation allows release of a restricted CLI to the service provider, this is not regarded as an adequate solution.	*Support available as a supplementary service. Override of CLIR for the SPs Service user is subject to national regulation.*	*Support available as a supplementary service. Override of CLIR for the SPs Service user is subject to national regulation.*	*Support available as a supplementary service. Override of CLIR for the SPs Service user is subject to national regulation.*

No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
A2	Presentation of the complete CLI information to the PTN.	*Provide to the Network the CLI (which may have been restricted as in (1) above) together with the restricted flag (if set) for calls from or to one of the SPs service-subscribers.*	In the current protocol basic call will only transfer CLI, but not relay the original screening indicators or presentation indicators. It is assumed that the special arrangement would have to be available. Functionality in respect of the screening indicator is not regarded as an adequate solution.	*No support*	*No support*	*No support*
A3	Addition or substitution of a calling line identity.	*Provide to the Network a CLI, which may be additional to any CLI, or the substitution of original CLI, with the agreement of the SPs service-subscribers. This applies to calls destined to that service subscriber.*	A new parameter would need to be defined within the SETUP message. Potentially an existing transport mechanism could be used to send the information between the SPorig and the PTNterm, but an application would need to be defined.	*No support*	*No support*	*No support*
A4	Provision of CLI information to an SP-initiated call.	*Provide to the Network a CLI, provisioned by the SP. This applies to calls destined to that service subscriber.*	In the current protocol basic call will transfer CLI, but not allow the supplied screening indicator to be controlled. This is not regarded as an adequate solution.	*No support*	*No support*	*No support*

No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
A5	Relaying of the malicious call identification data of a received call.	*Passing on the CLI (which may be restricted) including the Restricted flag, (if set), for calls from or to one of the SPs service-subscribers.*	MCID data is the called party number, the calling party number and optionally the calling party sub-address. In order for the service provider to receive this information, the procedures of MSN/DDI and CLIP will be required. CLIR will restrict provision of CLI, unless some form of override capability is available. In returning the information to the network provider, there is no problem with transferring the called party number, but if this is different from the original called party number, then a new parameter will be required. (or an additional enhanced Called party number). The current protocol basic call will only transfer CLI, but not relay the original screening indicators or presentation indicators. It is assumed that the special arrangement would have to be available. This is not regarded as an adequate solution.	*No support*	*No support*	*No support*
A6	Network Location Determination.	*Network Identities, e.g. Port Numbers; BS Numbers, etc.*		*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. PTN to SP a PTN application client would be required.*	*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. PTN to SP a PTN application client would be required.*	*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. PTN to SP a PTN application client would be required.*

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No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
A7	Geographic Location Determination.	*Geodetic data*		*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. Service user's Terminal to SP transparent.*	*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. Service user's Terminal to SP transparent.*	*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. Service user's Terminal to SP, transparent.*
A8	Determination of the terminal capabilities of the SP's service user.	*Coded terminal class capabilities.*		*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. Service user's Terminal to SP transparent.*	*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. Service user's Terminal to SP transparent.*	*Yes, Data could be passed in a FIE. A new FIE parameter would need to be defined. Service user's Terminal to SP transparent.*
B1	Return speech path connection from the terminating PTN to the calling party.	*Early set-up of the backward connection path. No additional information required.*	Requires use of Annex K of basic call [12], which is not implemented in all exchanges and is not allowed to be provided on international connections. Note that the protocol is running a timer within this state.	*No support for international use.*	*No support for international use.*	*No support for international use.*
B2	Routeing of an originating or incoming call from the PTN to the SP.	*Setting up a call. No additional information required.*	No impact on protocol at service providers interface.	*Yes, no impact*	*Yes, no impact*	*Yes, no impact*
B3	Indication of an originating or incoming call from the PTN to the SP, VOID.	*NCR requirement VOID.*		*Void*	*Void*	*Void*
B4	Routeing of a terminating call from the PTN to the SP.	*Setting up a call. No additional information required.*	No impact on protocol at the service provider's interface.	*Yes, no impact*	*Yes, no impact*	*Yes, no impact*
B5	Indication of a terminating call from the PTN to the SP, VOID.	*NCR requirement VOID.*	No impact on protocol at the service provider's interface.	*Void*	*Void*	*Void*

No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
B6	Reception of a notification of the cause of an unsuccessful call.	*Call Unsuccessful cause value.*	The reason for the failure of the call is carried by a Cause information element within the DISCONNECT message. Creating a new SETUP message towards the network provider, containing new call information provides further activity by the service provider. It has been assumed that the network provider retains no connection between the original failed call and the future new call.	*Yes*	*Yes*	*Yes*
B7	Provision of information for the destination and routeing of a call.	*Provision to the network of Routing Numbers in addition to Dialled (directory) numbers. E.g. Carrier selection codes, and (multiple) transit network selection codes.*	It is assumed that the use of the Called party number information element and the Transit network selection information element (if supported) provide adequate support for this requirement.	*Yes, single carrier selection possible through use of Transit Network Selection Information Element.* *Service provider invocation of carrier selection, support available subject to composite length of the Presented number including the CSC.*	*Yes, single carrier selection possible through use of Transit Network Selection Information Element.* *Service provider invocation of carrier selection, support available subject to composite length of the Presented number including the CSC.*	*Yes, single carrier selection possible through use of Transit Network Selection Information Element.* *Service provider invocation of carrier selection, support available subject to composite length of the Presented number including the CSC.*
B8	Call drop-back	*Drop back indication for a call.*	This requirement could potentially be met by provision of procedures for the call deflection supplementary service. This would however increase the diversion hop count by one.	*No support*	*Yes: A call can be dropped back from the SP to the local exchange with which the SP is connected via DSS.1 via the ECT Supplementary Service.*	*Yes: A call can be dropped back from the SP to the local exchange with which the SP is connected via DSS.1 via the ECT Supplementary Service.*

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No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
B9	User interaction without service charging of the end user.	*Allowing and End to End Exchange before the start the charging maybe by providing two phase answering.*	ETSI specifications do not specify the point at which charging commences for a call. It is therefore unlikely that ETSI will create specifications changing the point at which charging commences for a call. Most networks commence charging at the point of transfer of the CONNECT/ANSWER message. Some networks/service providers delay the transfer of the CONNECT/ANSWER message to allow the provision of services prior to charging. There is potential in DSS1 for user interaction prior to the transfer of this message, e.g. in the User-to-user supplementary service. Some networks commence charging at an earlier point, at which time even the network provider may still be providing services.	*No*	*No*	*No*
B10	Reception of the originally dialled digits by the SP.	*Originally dialled digits*	A new parameter would need to be defined within the SETUP message (or an additional enhanced Called party number). Potentially an existing transport mechanism could be used to send the information between the PTNorig and the SPorig or	*No support*	*No support*	*No support*

No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12]	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12]	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12]
				Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters
			SPterm, but an application would need to be defined.			
B11	Reception of the originally dialled digits by the PTN.	*Originally dialled digits*	A new parameter would need to be defined within the SETUP message (or an additional enhanced Called party number). Potentially an existing transport mechanism could be used to send the information between the PTNorig and the SPorig or SPterm, but an application would need to be defined.	*No support*	*No support*	*No support*
B12	Disconnection of a call in progress	*Send Disconnect*	It is believed that this requirements can be met by the existing basic call sending a DISCONNECT message in both forward and backward directions.	*Yes*	*Yes*	*Yes*
B13	Connection of a call to an interactive voice response unit in the PTN.	*Setting up a call to the IVR possibly by routing number. No additional information required.*	No additional information required.	*Yes*	*Yes*	*Yes*
B14	Alternate routeing of calls to another 'point of presence' of the SP, at the instruction of the SP	*Setting up a call to the PoP possibly by routing number. No additional information required.*	It is possible that this requirement could be met by use of procedures of either the line hunting/trunk hunting supplementary or (in a limited manner) by the diversion services.	*Not required-management application*	*Not required-management application*	*Not required-management application*
B15	Alternate routeing of a call to another 'point of presence' of the SP, at the instruction of the PTN.	*Re-routeing a call to the PoP possibly by routing number. No additional information required.*	Depends on equipment used by service provider; trunk selection is an inherent part of any PTNX DSS1 implementation.	*Not required-management application*	*Not required-management application*	*Not required-management application*
B16	Indication of the disconnection of a call.	*Receiving the Disconnect message.*		*Yes, but cause value is implicit.*	*Yes, but cause value is implicit.*	*Yes, but cause value is implicit.*

No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
B17	Supervision of a dropped-back call.	*Special Drop back indication for a call, and continued NCR interface.*		*No*	*No*	*No*
B18	Join operation of individual legs of a call.	*Send Join request.*		*Yes, limited support by CONF Supplementary Service.*	*Yes, limited support by CONF Supplementary Service.*	*Yes, limited support by CONF Supplementary Service.*
B19	Split operation of individual legs of a call.	*Send Split request.*		*No, but parties may be dropped from the Conference.*	*No, but parties may be dropped from the Conference.*	*No, but parties may be dropped from the Conference.*
B20	Multimedia Multiparty call control.	*Multimedia call control.*		*Yes, narrowband multimedia multiparty call control available between ISDN end-points using the CONF supplementary service.*	*Yes, narrowband multimedia multiparty call control available between ISDN end-points using the CONF supplementary service.*	*Yes, narrowband multimedia multiparty call control available between ISDN end-points using the CONF supplementary service. There may be some BICC support in 2001.*
B21	User Interaction for Text Delivery	*Exchange use/text data*		*Yes, a new FIE would need to be defined for delivering the text information.*	*Yes, a new FIE would need to be defined for delivering the text information, or the UUS Supplementary Service could be used, but this is subject to limited implementation. Or use UUS SSs.(for ISDN terminals).*	*Yes, a new FIE would need to be defined for delivering the text information, or the UUS Supplementary Service could be used, but this is subject to limited implementation. Or use UUS SSs.(for ISDN terminals).*
B22	User-Plane resource negotiation and selection.	*Multimedia bearer control.*		*No support*	*No support*	*No support*

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No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
C1	Interrogation of a network termination point for data delivery.	*Setting up a data call with no alerting.*	The teleaction teleservice was designed to provide a similar capability (but has a low level of implementation). User to user service could also be used for such an exchange of data. NCICS with a Facility information element could also be extended to provide this.	*Yes, but limited implementation in current networks.*	*Yes, but limited implementation in current networks.*	*Yes, but limited implementation in current networks.*
C2	Overriding of the "incoming call barring" supplementary service.	*Ability to send a Special SS override request to the network for an SPs service user.*	No current capability. An alternative mechanism of providing this solution would be for the destination exchange to allow all calls from specifically identified service providers, see requirement A3.	*No capability within DSS.1.*	*No capability within DSS.1.*	*No capability within DSS.1.*
C3	Bypassing of the "call diversion" supplementary service.	*Ability to send a Special SS override request to the network for an SPs service user.*	No current capability.	*No capability within DSS.1.*	*No capability within DSS.1.*	*No capability within DSS.1.*
C4	Message waiting indication.	*Transfer the MWI data/pulse.*	Capabilities provided by the message waiting indication supplementary service.	*No support*	*Yes, by the MWI Supplementary Service.*	*Yes, by the MWI Supplementary Service.*
C5	Application contents screening.	*Application SLA issues. No additional information required.*	No protocol implications. The service profile of the service provider for a given interface will provide the basis for meeting this requirement.	*No capability within DSS.1. Screening, where required, would be done at application level.*	*No capability within DSS.1. Screening, where required, would be done at application level.*	*No capability within DSS.1. Screening, where required, would be done at application level.*
C6	Modification of the terminal capabilities of the SP's service user.	*Ability to exchange with the terminal Coded terminal class capabilities.*		*No capability within DSS.1. Modification, where required, would be done at application level.*	*No capability within DSS.1. Modification, where required, would be done at application level. Or use UUS SSs (for IDSN terminals).*	*No capability within DSS.1. Modification, where required, would be done at application level. Or use UUS SSs.(for IDSN terminals).*

No.	Requirement	Information to transfer	Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12] Support Mechanism(s) and Parameters	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12] Support Mechanism(s) and Parameters	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12] Support Mechanism(s) and Parameters
C7	Modification of the Personality Device/module of the SP's service user.	*Ability to exchange with the User Agent Coded scripts or class capabilities.*		*No capability exists or is required within DSS.1. Modification, where required, would be done at application level.*	*No capability exists or is required within DSS.1. Modification, where required, would be done at application level.*	*No capability exists or is required within DSS.1. Modification, where required, would be done at application level.*
C8	Alteration of the profile of the SP's service subscriber.	*Ability to exchange with the Profile database Coded scripts or class capabilities.*	Not applicable.	*Not required within DSS.1- management requirement.*	*Not required within DSS.1- management requirement.*	*Not required within DSS.1- management requirement.*
C9	Delivery of information to the SP's service user prior to alerting.	*Opening the forward speech path, to exchange information.*		*No support*	*No support*	*No support*
D1	Changes in the charging rate of a call - Dynamic.	*Exchange charging rate.*	No support in existing protocol.	*No support*	*No support*	*No support*
D2	Charging mechanisms between SP and PNO - Dynamic.	*Exchange charging rate parameters and SLAs.*	This requirement could be dealt with entirely by bilateral agreement and based on changes in the characteristics of the call. No explicit call charge protocol mechanism exists.	*Yes, where the charging information needs to be included in a signalling message, a new FIE would need to be defined.*	*Yes, where the charging information needs to be included in a signalling message, a new FIE would need to be defined.*	*Yes, where the charging information needs to be included in a signalling message, a new FIE would need to be defined.*
D3	Provision of call charging information in real time	*Exchange an Accounting Record, AOC or CDR at defined intervals.*	AOC	*No Support*	*No Support*	*No Support*
D4	Exchange of charge detail record information in real time.	*Exchange an Accounting Record, AOC or CDR at defined intervals.*		*Yes, where the charging information needs to be included in a signalling message, a new FIE would need to be defined.*	*Yes, where the charging information needs to be included in a signalling message, a new FIE would need to be defined.*	*Yes, where the charging information needs to be included in a signalling message, a new FIE would need to be defined.*
D5	Billing and Accounting mechanisms between SP and PTNO.	*Billing and accounting information.*		*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*
E1	Event traceability requested by the SP.	*Exchanging statistics.*	No support in existing protocol.	*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*

			Issues relating to the support of the requirement	UNI Protocol 1 DSS.1 1993 EN 300 403 (all) (Edition 1) [12]	UNI Protocol 2 DSS.1 1998 EN 300 403 (all parts, dates up to 1998) [12]	UNI Protocol 3 DSS.1 2001 EN 300 403 (all parts, dates up to 2001) [12]
No.	Requirement	Information to transfer		Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters
E2	Event traceability requested by the PTN.	*Exchanging statistic.s*	No support in existing protocol.	*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*
E3	Traffic control capabilities controlled by the SP.	*Exchange configuration data.*	No support in current protocol.	*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*
E4	Traffic control controlled by the PTN	*Exchange configuration data.*	No support in current protocol.	*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*
E5	Avoidance of the cyclical routeing of a call.	*Passing some data with the call associated signalling, e.g. Hop count, or transaction number.*	No mechanism exists, except in the form of rigid control of routeing tables. Mechanism in some protocols, e.g. QSIG, is to use a transit counter. Where diversion explicitly occurs, then a hop counter does exist, but supporting other services is not an appropriate use of this service or the parameter.	*No support*	*No support*	*No support*
E6	Avoidance of the cyclical routeing of signalling or user messages.	*Passing some data with the user message, e.g. Hop count or transaction number.*		*No support*	*No support*	*No support*
F1	Reporting of network events for measuring the quality of service.	*Exchange QoS SLA configuration data.*		*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement. There may be some BICC support in 2001.*
F2	Reporting of network events for the purpose of fault diagnostics.	*Exchange fault data.*		*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*
F3	Request for event monitoring and subsequent reporting.	*Exchange Monitoring configuration data.*		*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*
F4	Electronic ordering of network management functions.	*Exchange SLA data.*		*Not required - management requirement.*	*Not required - management requirement.*	*Not required - management requirement.*

8.2 Impact of a service provider's access interface on the NNI between network operators and service providers

Any NNI that provides a circuit-related service provider interface will need to transfer additional information as well as the existing basic call requirements.

Table 11 shows the results of the analysis of the Service Provider Access Requirements against a Service Provider Access Interface configured using ISUP v1/2/3/4. Support mechanism and parameters are indicated in table 11.

Table 11: Requirements assessment for SP<>NO circuit-related NNI interface

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
A1	Reception of the calling line identity - Application of the CLIR supplementary service.	*Receive CLI (which may be restricted) including the Restricted flag (if set) for calls from or to one of the SPs service-subscribers.*	Adequate support based on the use of the Calling party number and Generic number parameters within the IAM message. Application of the CLIR supplementary service is not specified in ISUP, but may form a part of many ISUP gateway implementations. No impact on protocol, only on service application. ISUP version 2 onwards.	No	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter*	*Yes: IAM message, Calling Party number parameter*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
A2	Presentation of the complete CLI information to the PTN.	*Provide to the Network the CLI (which may have been restricted as in (1) above) together with the restricted flag (if set); for calls from or to one of the SPs service-subscribers.*	Adequate support based on the use of the Calling party number and Generic number parameters within the IAM message. No impact on protocol, only on service application. ISUP version 2 onwards.	No	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*
A3	Addition of a calling line identity.	*Provide to the Network a CLI, which may be additional to any CLI, or the substitution of original CLI, with the agreement of the SPs service-subscribers. This applies to calls destined to that service subscriber.*	ISUP version 4 with original CLI of calling user in generic number and identity of service provider in the calling number with marking identified by the network. This however only has the capability if two number delivery is not being used. If existing two number delivery is being used, it will have to override one of the numbers. If this is an unacceptable constraint, the requirement cannot be met.	No	*Yes(limited): IAM message, Calling Party number parameter. ETSI version of EN 300 356-3 [14] if presentation number is replaced, if national regulations permit ISUPv2 does not provide the ability to change the CgPy number in conjunction with changing the relevant indicator.*	*Yes(limited): IAM message, Calling Party number parameter. ETSI version of EN 300 356-3 [14] if presentation number is replaced, if national law permits. As per ISUP v2, ISUP v3does not provide the ability to change the CgPy number in conjunction with changing the relevant indicator.*	*ISUP v4 meets this requirement. completely. The implementation is subject to national regulations.*
A4	Provision of CLI information to an SP-initiated call.	*Provide to the Network a CLI, provisioned by the SP. This applies to calls destined to that service subscriber.*	Adequate support based on the use of the Calling party number parameter within the IAM message. ISUP version 2 onwards.	No	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*

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A5	Relaying of the malicious call identification data of a received call.	*Passing on the CLI (which may be restricted) including the Restricted flag, (if set), for calls from or to one of the SPs service-subscribers.*	Adequate support based on the use of the Calling party number and ATP parameters. ISUP version 2 onwards. Based on possible manipulation of data of previous requirements e.g. 3, then there may be a loss of MCID information.	No	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*
A6	Network Location Determination.	*Network Identities, e.g. Port Numbers; BS Numbers, etc.*	Note: ISUP version 4 call reference includes a network identity of the assigning network, but the generator of the call reference is not necessarily the network of the SP's customer.	*No*	*No*	*No*	*Yes: IAM message, additional callingParty number parameter.*
A7	Geographic Location Determination.	*Geodetic data*	ISUP version 4 includes the geodetic location parameter which will fulfil this requirement.	*No*	*No*	*No*	*Yes: IAM message, additional Geodetic data parameter.*
A8	Determination of the terminal capabilities of the SP's service user.	*Coded terminal class capabilities.*	There is no explicit support for this function in ISUP; this requirement would have to be implemented either using an alternative protocol or at the application level.	*No*	*No*	*No*	*No*

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B1	Return speech path connection from the terminating PTN to the calling party	*Early set-up of the backward connection path. No additional information required.*	Adequate support based on the assumption that all transit exchanges (including that supporting the NNI to the service provider) connect the speech path in both directions, and the originating exchange connects the speech path in the backward direction. ISUP version 2 onwards.	*No*	*Yes: E.g. Connect before Answer.*	*Yes: E.g. Connect before Answer.*	*Yes: E.g. Connect before Answer.*
B2	Routeing of an originating or incoming call from the PTN to the SP.	*Setting up a call. No additional information required.*	No impact on protocol at service providers interface.	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*
B3	Indication of an originating or incoming call from the PTN to the SP.	*NCR requirement VOID.*	VOID- Non-Circuit-Related Requirement.	*N/a*	*N/a*	*N/a*	*N/a*
B4	Routeing of a terminating call from the PTN to the SP.	*Setting up a call. No additional information required*	No impact on protocol at service providers interface.	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*
B5	Indication of a terminating call from the PTN to the SP.	*NCR .requirement VOID.*	VOID- Non-Circuit-Related Requirement.	*N/a*	*N/a*	*N/a*	*N/a*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
B5	Reception of a notification of the cause of an unsuccessful call.	*Call Unsuccessful cause value.*	The reason for the failure of the call is carried by a Cause parameter within the REL message. Further activity by the service provider is provided by creating a new IAM message towards the network provider, containing new call information. It has been assumed that the network provider retains no connection between the original failed call and future new call.	*Yes: Release and disconnect messages; Release cause value.*	*Yes: Release and disconnect messages; Release cause value.*	*Yes: Release and disconnect messages; Release cause value.*	*Yes: Release and disconnect messages; Release cause value.*
B7	Provision of information for the destination and routeing of a call.	*Provision to the network of Routing Numbers in addition to Dialled (directory) numbers. E.g. Carrier selection codes, and (multiple) transit network selection codes.*	It is assumed that the use of the Called party number parameter (ISUP version 2 onwards) and the Transit network selection parameter (ISUP version 3 onwards, if supported) provide adequate support for this requirement. The service provider will need to take account of any interaction with number portability and the presence of ported numbers.	*Yes: Extremely limited support possible in ETSI version 1. Carrier selection codes, can be utilized in Called Party Number unless incompatible with national regulations, but the number of digits available in the CdPy number is unlikely to support the requirement.*	*Yes: Some support possible in ETSI version 2. Carrier selection codes, up to four digits, can be utilized in Called Party Number unless incompatible with national regulations.*	*Yes: Some support in ETSI version of EN 300 356-3 v3 [14], Where signalling between ISUP v4 endpoints is supported by transparent parameter delivery over ISUP v3; the Routing number parameter, The Transit Network Selection parameter, supported in ISUP v4 may be carried across ISUPv3 for number portability. This is subject to national regulations.*	*Yes: Full support of carrier and transit network selection can be achieved in ETSI version of EN 300 356-3 v4 [15], which gives greater flexibility for the use of an extended CdPy number, the Nature of Address Indicator, and the Routing number parameter, also used for number portability. Implementation of this mechanism will require an application document to cover the conventions used for packing and unpacking the information. Subject to national regulations.*

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No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
B8	Call drop-back.	*Drop back indication for a call.*	This requirement can be supported by provision of the procedures for pivot routeing and redirection. This is only available in ISUP v4 for use in a national context.	*No*	*No*	*No*	*Yes: by pivot routeing and redirection. Implementation of pivot routeing and redirection across network boundaries will be subject to national interconnection conventions and regulations.*
B9	User interaction without service charging of the end user.	*Allowing and End to End Exchange before starting the charging maybe by providing two phase answering.*	ETSI specifications do not specify the point at which charging commences for a call. It is therefore unlikely that ETSI will create specifications changing the point at which charging commences for a call. Most networks commence charging at the point of transfer of the CONNECT/ANSWER message. ISUP version 4 includes the OCCRUI/UTSI procedures which could provide a mechanism for this user interaction. There is also potential in ISUP for user interaction prior to the transfer of CONNECT/ANSWER message, e.g. in the User-to-user supplementary service. Some networks commence charging at an earlier point, at which time even the network provider may still be providing services. NB the user interaction requirement	*Not explicitly supported in the ISUP Call Model: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service, but in v1, there are some limitations.*	*No: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service.*	*No: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service.*	*No: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service, and via the OCCRUI/UTSI procedures.*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
			could well be an in-band requirement see [2] 6.3.9.				
B10	Reception of the originally dialled digits by the SP.	*Originally dialled digits*	ISUP version 3 contains The called IN number parameter which is sufficient for this purpose.	*No*	*No*	*Yes: via use of the called number parameter.*	*Yes: via use of the called number parameter.*
B11	Reception of the originally dialled digits by the PTN.	*Originally dialled digits*	ISUP version 3 contains The called IN number parameter which is sufficient for this purpose.	*No*	*No*	*Yes: via use of the called number parameter.*	*Yes: via use of the called number parameter.*
B12	Disconnection of a call in progress.	*Send Disconnect*	This requirement can be met by the existing basic call sending a REL message in both forward and backward directions.	*Yes: Release and disconnect messages, Release cause value.*	*Yes: Release and disconnect messages, Release cause value.*	*Yes: Release and disconnect messages, Release cause value.*	*Yes: Release and disconnect messages, Release cause value.*
B13	Connection of a call to an interactive voice response unit in the PTN.	*Setting up a call to the IVR possibly by routing number. No additional information required.*	There is no explicit support needed in ISUP for this requirement, which can be fulfilled using standard ISUP procedures.	*Yes:*	*Yes:*	*Yes:*	*Yes:*
B14	Alternate routeing of calls or the indications of calls to another "point of presence" of the SP.	*Setting up a call to the PoP possibly by routing number. No additional information required.*	This may be achieved by routeing procedures for out of service routes, which are outside the scope of the signalling protocol. This is a management requirement.	*N/a*	*N/a*	*N/a*	*N/a*
B15	Alternate routeing of a call or the indication of a call to another "point of presence" of the TNP.	*Re-routeing a call to the PoP possibly by routing number. No additional information required.*	This may be achieved by routeing procedures for out of service routes, which are outside the scope of the signalling protocol. This is a management requirement.	*N/a*	*N/a*	*N/a*	*N/a*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
B16	Indication of the disconnection of a call	*Receiving the Disconnect message*	If the SP is in the call path, the requirement is fulfilled as the SP receives the REL message.	*Yes: Release and disconnect messages; Release cause value.*	*Yes: Release and disconnect messages; Release cause value.*	*Yes: Release and disconnect messages; Release cause value.*	*Yes: Release and disconnect messages; Release cause value.*
B17	Supervision of a dropped-back call.	*Special Drop back indication for a call, and continued NCR interface.*	There is no support in ISUP for this requirement, except via the Pivot Routeing and Redirection Procedures in ISUP v4.	*No*	*No*	*No*	*Yes: Available in ISUP v4 for use in a national context, by pivot routeing and redirection. Supervision of a dropped back call is written into ISUP v4 but as at the time of publication this has not yet been implemented at national level. See requirement 17.*
B18	Join operation of individual legs of a call.	*Send Join request.*	There is no explicit support within ISUP. This requirement will therefore be met at the application level.	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*
B19	Split operation of individual legs of a call.	*Send Split request.*	There is no explicit support within ISUP. This requirement will therefore be met at the application level.	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*	*Yes (limited): this must be effective at the application level in conjunction with a bridging device.*
B20	Multimedia Multiparty call control.	*Multimedia call control.*	There is no explicit support within ISUP. This requirement will therefore be met at the application level.	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
B21	User Interaction for Text Delivery.	*Exchange use/text data.*	No explicit solution in ISUP. Out-of band requirements may be implemented via the UUS Supplementary Service, or may require a different interconnect protocol. In-band solutions may be possible, using ISUP as a bearer channel only. Additional out-band solutions are available in ISUP v4.	No: Time-limited Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. UUS is limited in ISUP v1. *In-band solutions may be possible, using ISUP as a bearer channel only.*	*No: Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.* *In-band solutions may be possible, using ISUP as a bearer channel only.*	*No: Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.* *In-band solutions may be possible, using ISUP as a bearer channel only.*	*No: Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. Or these may be implemented via the OCCRUI/UTSI procedures depending on terminal capabilities.* *In-band solutions may be possible, using ISUP as a bearer channel only.*
B22	User-Plane resource negotiation and selection.	*Multimedia bearer control.*	No support is available within ISUP.	*No*	*No*	*No*	*No*
C1	Interrogation of a network termination point for data delivery.	*Setting up a data call with no alerting.*	No explicit solution in ISUP. Out-of band requirements may be implemented via the UUS Supplementary Service, or may require a different interconnect protocol. In-band solutions may be possible, using ISUP as a bearer channel only. Additional out-band solutions are available in ISUP v4.	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. UUS is limited in ISUP v1.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. Non time-limited out-of band requirements may be implemented via the OCCRUI/UTSI procedures depending on terminal capabilities.*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
C2	Overriding of the "incoming call barring" supplementary service.	*Ability to send a Special SS override request to the network for an SPs service user.*	No current capability. The remote control service has some of the capabilities, but this is provided on behalf of the served user via DSS.1. This could be implemented via a SCCP service. Call Barring is a terminating switch/line card supplementary service.	*No*	*No*	*No*	*No*
C3	Bypassing of the "call diversion" supplementary service.	*Ability to send a Special SS override request to the network for an SPs service user.*	This is supported by ISUP version 3, using the parameters and procedures specified in Q.1600.	*No*	*No*	*Yes: Using the parameters and procedures specified in Q.1600 mapping INAP CS-1 to ISUPv3.*	*Yes: Using the parameters and procedures specified in Q.1600 mapping INAP CS-1 to ISUPv3.*
C4	Message waiting indication.	*Transfer the MWI data/pulse.*	Capabilities provided by the message waiting indication supplementary service. Note that this is not a circuit related service. Implementation of this SCCP-based service between network provider and service provider will require bilateral agreement on global title translation and SCCP. See EN 300 650 [30] for MWI service description.	*No support within basic ISUP: needs to be implemented as an SCCP-based service.*	*No support within basic ISUP: needs to be implemented as an SCCP-based service.*	*No support within basic ISUP: needs to be implemented as an SCCP-based service.*	*No support within basic ISUP: needs to be implemented as an SCCP-based service.*
C5	Application contents screening.	*Application SLA issues. No additional information required.*	No impact on protocol, only on service application. ISUP version 2 onwards.	*Not required: this requirement is met at the application level.*	*Not required: this requirement is met at the application level.*	*Not required: this requirement is met at the application level.*	*Not required: this requirement is met at the application level.*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
C6	Modification of the terminal capabilities of the SP's service user.	*Ability to exchange with the terminal Coded terminal class capabilities.*		*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*
C7	Modification of the Personality Device/ module of the SP's service user.	*Ability to exchange with the User Agent Coded scripts or class capabilities.*	Not applicable.	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*
C8	Alteration of the profile of the SP's service subscriber.	*Ability to exchange with the Profile database Coded scripts or class capabilities.*	Not applicable.	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*	*No Explicit Support in ISUP.*
C9	Delivery of information to the SP's service user prior to alerting.	*Opening the forward speech path, to exchange information.*		*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. Or these may be implemented via the OCCRUI/UTSI procedures depending on terminal capabilities.*
D1	Changes in the charging rate of a call - Dynamic.	*Exchange charging rate.*	Capabilities of ES 201 296 [25] (ISUP Support of charging) [25] can be used in a national context where implemented. Otherwise the PTN will need to determine this by number analysis.	*No*	*Yes: ES 201 296 [25] can be used but this is very limited in national implementation.*	*Yes: ES 201 296 [25] can be used but this is very limited in national implementation.*	*Yes: ES 201 296 [25] can be used but this is very limited in national implementation.*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
D2	Charging mechanisms between SP and PNO - Dynamic.	*Exchange charging rate parameters and SLAs.*	Assuming this is based on offline exchange of information, then does not form part of the ISUP protocol.	*Yes, where the charging information needs to be included in a signalling message, a new mechanism within ISUP would need to be defined.*	*Yes, where the charging information needs to be included in a signalling message, a new mechanism within ISUP would need to be defined.*	*Yes, where the charging information needs to be included in a signalling message, a new mechanism within ISUP would need to be defined.*	*Yes, where the charging information needs to be included in a signalling message, a new mechanism within ISUP would need to be defined.*
D3	Provision of call charging information in real time.	*Exchange an Accounting Record, AOC or CDR at defined intervals.*	No explicit support within ISUP.	*No*	*No*	*No*	*No*
D4	Exchange of charge detail record information in real time.	*Exchange an Accounting Record, AOC or CDR at defined intervals.*	Capabilities of ES 201 296 [25] (ISUP Support of charging) can be used in a national context where implemented, however this does not meet all the elements of the requirement.	*No*	*No*	*No*	*No*
D5	Billing and Accounting mechanisms between SP and PNO.			*Void*	*Void*	*Void*	*Void*
E1	Event traceability requested by the SP.	*Exchanging statistics.*	No support in existing protocol. A "global" call reference can be supported in ISUP version 4.	*No*	*No*	*No*	*Yes (limited): Correlation parameter.*
E2	Event traceability requested by the PTN.	*Exchanging statistics.*	No support in existing protocol. A "global" call reference can be supported in ISUP version 4.	*No*	*No*	*No*	*Yes (limited): Correlation parameter.*
E3	Traffic control capabilities controlled by the SP.	*Exchange configuration data.*	Automatic congestion control provided in ISUP version 2 onwards will fulfil this requirement.	*No*	*Yes: Automatic congestion control procedure.*	*Yes: Automatic congestion control procedure.*	*Yes: Automatic congestion control procedure.*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 v3.x.x [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 v4.x.x [15] Support Mechanism(s) and Parameters
E4	Traffic control capabilities controlled by the PTN.	*Exchange configuration data.*	Automatic congestion control provided in ISUP version 2 onwards will fulfil this requirement.	*No*	*Yes: Automatic congestion control procedure.*	*Yes: Automatic congestion control procedure.*	*Yes: Automatic congestion control procedure.*
E5	Avoidance of the cyclical routeing of a call.	*Passing some data with the call associated signalling, e.g. Hop count or transaction number.*	ISUP version 3 supports a hop counter parameter that can be used to fulfil this function. Use of this procedure is optional.	*No*	*No*	*Yes: Hop Count parameter in EN 300 356 [14] v3.*	*Yes: Hop Count parameter in EN 300 356 [15] v4.*
E6	Avoidance of the cyclical routeing of signalling or user messages.	*Passing some data with the user message, e.g. Hop count or transaction number.*		*No*	*No*	*Yes: via Hop Count parameter in EN 300 356 v3 [14].*	*Yes: via Hop Count parameter in EN 300 356 v4 [15].*
F1	Reporting of network events for measuring the quality of service.	*Exchange QoS SLA configuration data.*		*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*
F2	Reporting of network events for the purpose of fault diagnostics.	*Exchange fault data.*		*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*
F3	Request for event monitoring and subsequent reporting.	*Exchange Monitoring configuration data.*	Where CR interface is used, many events are reported through the normal signalling messages, but setting up the preconditions is a separate management requirement.	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*
F4	Electronic ordering of network management functions.	*Exchange SLA data.*		*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*

8.3 IN Protocol and API Assessment

Table 12 shows the results of the analysis of the Service Provider Access Requirements against a Service Provider Access Interface configured using INAP CS-1/2/3, CAMEL Phase 1/2/3, OPEN INAP CS-2 and CS-3 and ETSI Open Service Access API. Support mechanism and parameters are indicated in table 12.

Table 12: Requirements assessment for SP<>NO NNI interface

No.	Requirement	Notes	INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF Support Mechanism(s) and Parameters,	CAMEL Phase 1/2/3, all reference points Support Mechanism(s) and Parameters,	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF. Support Mechanism(s) and Parameters,	ETSI Open Service Access API Support Mechanism(s) and Parameters,
A1	Reception of the calling line identity - Application of the CLIR supplementary service.		initialDP, (CS-1 and above)	initialDP (Phase 1 and above)	initialDP.	reportNotification().
A2	Presentation of the complete CLI information to the PTN.		initiateCallAttempt, connect (CS-1 and above)	initiateCallAttempt not supported connect can alter CLI parameters e.g. the restricted flags, but cannot alter the CLI itself. (Phase 1 and above)	initiateCallAttempt, connect.	createCallLeg, createAndRouteCallLegReq, routeReq.
A3	Addition of a calling line identity.		initiateCallAttempt, connect (CS-1 and above)	initiateCallAttempt not supported connect with Generic numbers (Phase 1 and above)	initiateCallAttempt, connect	createCallLeg, createAndRouteCallLegReq, routeReq.
A4	Provision of CLI information to an SP-initiated call.		initiateCallAttempt (CS-1 and above)	Not supported	initiateCallAttempt	createCallLeg, createAndRouteCallLegReq, routeReq.
A5	Relaying of the malicious call identification data of a received call.		connect (CS-1 and above)	Not supported	connect	createCallLeg, createAndRouteCallLegReq, routeReq.
A6	Network Location Determination.		initialDP (CS-2 and above)	initialDP (Phase 1 and above)	initialDP	reportNotification().
A7	Geographic Location Determination.		initialDP (CS-3)	initialDP (Phase 1 and above)	initialDP	reportNotification().

No.	Requirement	Notes	INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
			Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
A8	Determination of the terminal capabilities of the SP's service user.		initialDP{uSIInformation (CS-2 and above), terminalType (CS-1 and above)} (scenario 2); reportUTSI (CS-2 and above), sendSTUI (CS-2 and above), requestReportUTSI (CS-2 and above: scenario 1 and 3)	Not supported Note: Supported by USSD.	initialDP{uSIInformation, terminalType} (scenario 2); reportUTSI , sendSTUI, requestReportUTSI (scenario 1 and 3)	getTerminalCapabilities.
B1	Return speech path connection from the terminating PTN to the calling party.		No impact of protocol, return speech path is handled within the user-plane signalling through asymmetrical switch-through. If blocked, would need to connect to a SRF.	No impact of protocol, return speech path is handled within the user-plane signalling through asymmetrical switch-through. If blocked, would need to connect to a SRF.	No impact of protocol, return speech path is handled within the user-plane signalling through asymmetrical switch-through. If blocked, would need to connect to a SRF.	No impact of protocol, return speech path is handled within the user-plane signalling through asymmetrical switch-through. If blocked, would need to connect to a SRF.
B2	Routeing of an originating or incoming call from the PTN to the SP.		connect, (CS-1 and above)	Originating call and terminating call in the GMSC: connect (Phase 1 and above)	connect	createCallLeg, createAndRouteCallLegReq, routeReq
B3	Indication of an originating or incoming call from the PTN to the SP.		initialDP (CS-1 and above)	Originating call and terminating call in the GMSC: intialDP (Phase 1 and above)	initialDP	ReportNotification,
B4	Routeing of a terminating call from the PTN to the SP.		connect (CS-1 and above)	Terminating call in the VMSC: connect (Phase 3)	connect	createCallLeg, createAndRouteCallLegReq, routeReq
B5	Indication of a terminating call from the PTN to the SP.		initialDP (CS-1 and above)	Terminating call in the VMSC: IntialDP (Phase 3)	initialDP	reportNotification()

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
B6	Reception of a notification of the cause of an unsuccessful call.		initialDP, requestReportBCSMEvent (CS-1 and above) eventReportBCSM (CS-1 and above)	initialDP (Phase 3) requestReportBCSMEvent (Phase 2 (GMSC only) and above (also VMSC)) eventReportBCSM (Phase 2 (GMSC only) and above (also VMSC))	initialDP, requestReportBCSMEvent eventReportBCSM	reportNotification eventReportRes
B7	Provision of information for the destination and routeing of a call.		connect, initiateCallAttempt (CS-1 and above)	connect (Phase 1 and above) initiateCallAttempt not supported	connect, initiateCallAttempt	createCallLeg, createAndRouteCallLegReq, routeReq
B8	Call drop-back.		VOID	VOID	VOID	VOID
B9	User interaction without service charging of the end user.		connectToResource, establishTemporaryConnection (CS-1 and above)	connectToResource, establishTemporaryConnection (Phase 2 and above)	connectToResource, establishTemporaryConnection	createUICall
B10	Reception of the originally dialled digits by the SP.		initialDP -if from originating exchange (CS-1 and above)	initialDP -only at originating VMSC (Phase 1 and above)	initialDP -if from originating exchange	reportNotification()
B11	Reception of the originally dialled digits by the PTN.		connect (CS-1 and above)	In the connect PTNTerm may not receive BCD dialled digits as DNr.	connect	
B12	Disconnection of a call in progress.		releaseCall, (CS-1 and above) disconnectLeg (CS-2 and above)	releaseCall (Phase 1 and above) disconnectLeg not supported	releaseCall, disconnectLeg	release (IpMultiPartyCall); release (IpCallLeg)
B13	Connection of a call to an interactive voice response unit in the PTN.		connectToResource, (CS-1 and above) establishTemporaryConnection (CS-1 and above)	connectToResource, (Phase 2 and above) establishTemporaryConnection (Phase 2 and above)	connectToResource, establishTemporaryConnection	createUICall
B14	Alternate routeing of calls or the indications of calls to another 'point of presence' of the SP.		Handled at CCF level	Handled at CCF level	Handled at CCF level	Handled by the underlaying network

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			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
B15	Alternate routeing of a call or the indication of a call to another 'point of presence' of the PTN.		Handled at CCF level	Handled at CCF level	Handled at CCF level	Handled by the underlaying network
B16	Indication of the disconnection of a call.		requestReportBCSMEvent (CS-1 and above) eventReportBCSM, (CS-1 and above) initialDP (CS-1 and above)	requestReportBCSMEvent (Phase 1 and above) eventReportBCSM, (Phase 1 and above) initialDP (not supported)	requestReportBCSMEvent eventReportBCSM, initialDP	eventReportReq, reportNotification
B17	Supervision of a dropped-back call.		VOID			
B18	Join operation of individual legs of a call.		moveLeg, mergeCallSegments (CS-2 and above)	Not supported	moveLeg, mergeCallSegments	moveCallLeg, mergeSubconference
B19	Split operation of individual legs of a call.		splitLeg, moveLeg (CS-2 and above)	Not supported	splitLeg, moveLeg	splitSubConference, moveCallLeg
B20	Multimedia Multiparty call control.		No support for multimedia- for multiparty support see requirements B18 and B19, supported by CS-2 and above.	Not supported	No support for multimedia- for multiparty support see requirements B18 and B19	Supported by the following services: MultiParty Call Control Service; MultiMedia Call Control Service; Conference Call Control Service (see service description. for available methods - ES 201 915-4 [22]

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
B21	User Interaction for Text Delivery.		connect (CS-2 and above), continueWithArgument (CS-2 and above)connnectToResource (CS-1 and above), playAnnouncement, promptAndCollectUper Information, PromptAndReceiveMessage establishTemporaryConnection (CS-1 and above) Call related support only.	Supported by USSD	connect, continueWithArgument connnectToResource, playAnnouncement, promptAndCollectUserI nformation, promptAndReceive Message establishTemporary Connection Call related support only.	createUICall, createUI, sendInfoReq, sendInfoRes, recordMessageReq, recordMessageRes
B22	User-Plane resource negotiation and selection.		No support in any protocol	Not supported	No support in any protocol	Monitoring and acceptance of under-laying network resource negotiation via; mediaChannelMonitor Req, mediaChannelMonitor Res, mediaChannelAllow, getMediaChannels, close
C1	Interrogation of a network termination point for data. delivery		reportUTSI (CS-2 and above), sendSTUI(CS-2 and above), requestReportUTSI(CS-2 and above)	Not supported	reportUTSI , sendSTUI, requestReportUTSI	createUICall, sendInfoReq, sendInfoRes
C2	Overriding of the 'incoming call barring' supplementary service.		continueWithArgument (with SIITwo) , connect (with SIITwo) (CS-2	Not supported	continueWithArgument (with SIITwo) , connect (with SIITwo)	Not provided

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
			and above)			
C3	Bypassing of the 'call diversion' supplementary service.		continueWithArgument (with SIITwo), connect(with SIITwo) (CS-2 and above)	continueWithArgument (with SIITwo; Phase 3), connect (with SIITwo) (Phase 3)	continueWithArgument (with SIITwo), connect(with SIITwo)	Not provided.
C4	Message waiting indication.		sendSTUI; (CS-2 and above) or; connectToResource, (CS-1 and above) establishTemporaryConnection, (CS-1 and above) playAnnouncement (CS-1 and above)	sendSTUI not supported connectToResource, (Phase 2 and above) establishTemporaryConnection, (Phase 2 and above) playAnnouncement (Phase 2 and above) NOTE: Supported by USSD.	sendSTUI; or; connectToResource, establishTemporaryConnection, playAnnouncement	createUICall, sendInfoReq, sendInfoRes
C5	Application contents screening.		Protocol Independent	Protocol Independent = not supported by CAMEL protocol	Protocol Independent	Depending on the under-laying network
C6	Modification of the terminal capabilities of the SP's service user.		sendSTUI (CUSF) (CS-2 and above)	Not supported NOTE: Supported by USSD.	sendSTUI (CUSF)	createUI, sendInfoReq,
C7	Modification of the Personality Device/ module of the SP's service user.		sendSTUI (CUSF) (CS-2 and above)	Not supported NOTE: Supported by USSD.	sendSTUI (CUSF)	createUI, sendInfoReq

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
C8	Alteration of the profile of the SP's service subscriber:		manageTriggerData (CS-2 and above), setServiceProfile (CS-3), createOrRemoveTriggerData (CS-3) sendSTUI (CUSF) (CS-2 and above)	manageTriggerData is not supported, Camel Service Subscription Information will be downloaded by the insertSubscriberData MAP message from HLR to VMSC (phase 1 and above), and by the acknowledgement from HLR to GMSC of the MAP sendRoutingInformation message (phase 1 and above) . Camel Service Subscription Information in the HLR can be enabled or disabled by the anyTimeModification MAP message to the HLR (Phase 3)	manageTriggerData setServiceProfile createOrRemoveTriggerData sendSTUI (CUSF)	createUI, sendInfoReq
C9	Delivery of information to the SP's service user prior to alerting.		setServiceProfile (CS-3), SendSTUI (CUSF) (CS-2 and above)	Supported by USSD	setServiceProfile sendSTUI (CUSF)	createUI, sendInfoReq

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism(s) and Parameters,	Support Mechanism(s) and Parameters,	Support Mechanism(s) and Parameters,
D1	Changes in the charging rate of a call - Dynamic.		furnishChargingInformation and/or sendChargingInformation (CS-1 and above)	furnishChargingInformation. (Phase 2 and above) [sendChargingInformation can also be used, but is not recommended - Phase 2 and above) Any tariff switch may influence post-processing.	furnishChargingInformation and/or sendChargingInformation	setChargePlan
D2	Charging mechanisms between SP and PTNO - Dynamic.	Note: parameters will need specific agreement in each SP/PTN combination.	For the PTN to charge the SP: furnishChargingInformation + applyCharging, and applyChargingReport (CS1 and above) For SP to charge the PTN: furnishChargingInformation (CS1 and above).	For the PTN to charge the SP: furnishChargingInformation + applyCharging, and applyChargingReport (Phase 2 and above) For SP to charge the PTN: furnishChargingInformation (Phase 2 and above).	For the PTN to charge the SP: furnishChargingInformation + apply Charging, and applyChargingReport For SP to charge the PTN: furnishChargingInformation.	Not supported

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
D3	Provision of call charging information in real time.		applyCharging, sendChargingInformation (for tariff switch) applyChargingReport (CS-1 and above) requestNotificationChargingEvent, eventNotifiactionCharging (CS-2 and above)	applyCharging, sendChargingInformation (for tariff switch), applyChargingReport (Phase 2 and above) will indicate the used time, no charging units are indicated. The time of answer and of tariff switches (provided by the gsmSCF) will be considered in the duration information provided.	applyCharging, sendChargingInformation, applyChargingReport requestNotificationChargingEvent eventNotifiactionCharging,	setAdviceOfCharge, superviseReq and superviseRes(IpMultiPartyCall and IpCallLeg)
D4	Exchange of charge detail record information in real time.		For the PTN to charge the SP: applyCharging, applyChargingReport (CS-1 and above) eventNotificationCharging, requestNotificationChargingEvent (CS-2 and above) For SP to charge the PTN: furnishChargingInformation (CS1 and above).	For the PTN to charge the SP: applyCharging, applyChargingReport (Phase 2 and above) will indicate the used time. furnishChargingInformation will provide charging information (Phase 2 and above) For SP to charge the PTN: furnishChargingInformation will provide charging information (Phase 2 and above)	For the PTN to charge the SP: applyCharging, applyChargingReport eventNotificationCharging, requestNotificationChargingEvent For SP to charge the PTN: FurnishChargingInformation	SetAdviceOfCharge, superviseReq and superviseRes(IpMultiPartyCall and IpCallLeg)
D5	Billing and Accounting mechanisms between SP and PNO.		N/a	N/a	N/a	N/a

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,	Support Mechanism (s) and Parameters,
E1	Event traceability requested by the SP.		requestReportBCSMEvent (CS-1 and above) eventReportBCSM, (CS-1 and above) callInformationRequest, callInformationReport (CS-1 and above),	Higher phases will result in more details for the specific events and more events. requestReportBCSMEvent (Phase 1 and above) eventReportBCSM, (Phase 1 and above) callInformationRequest, callInformationReport (Phase 2 and above),	requestReportBCSMEvent eventReportBCSM, callInformationRequest, callInformationReport	eventReportReq, eventReportRes, getInfoReq and getInfoRes(IpMultiPartyCall and IpCallLeg),
E2	Event traceability requested by the PTN.		not supported handled by network management	Not supported	not supported handled by network management	Not supported
E3	Traffic control capabilities controlled by the SP.		activateServiceFiltering and serviceFilteringResponse (CS-1 and above)	Not supported	activateServiceFiltering and serviceFilteringResponse	setCallLoadControl, callOverloadEncountered, callOverloadCeased
E4	Traffic control capabilities controlled by the PTN.		callGap (CS-1 and above)	callGap (Phase 3)	callGap	setCallLoadControl, callOverloadEncountered, callOverloadCeased
E5	Avoidance of the cyclical routeing of a call.		initialDP contains the loop counter of the redirectionInformation (CS-1-encoding) and Redirecting number (ISUP-encoding) CS1 and above)	initialDP contains the loop counter of the redirectionInformation (CS-1-encoding) and Redirecting number (ISUP-encoding)	initialDP contains the loop counter of the redirectionInformation (CS-1-encoding) and Redirecting number (ISUP-encoding)	Not supported
E6	Avoidance of the cyclical routeing of signalling or user messages.		Not supported	Not supported , no cyclic routing of CAMEL signalling or USSD messages	Not supported	Not supported

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No.	Requirement	Notes	INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF Support Mechanism(s) and Parameters,	CAMEL Phase 1/2/3, all reference points Support Mechanism (s) and Parameters,	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF. Support Mechanism (s) and Parameters,	ETSI Open Service Access API Support Mechanism (s) and Parameters,
F1	Reporting of network events for measuring the quality of service.		initialDP + parameter extension (no support in any protocol), requestReportBCSMEvent (CS-1 and above) eventReportBCSM, (CS-1 and above) callInformationReport (CS-1 and above), applyChargingReport (CS-1 and above), + parameter extension needed (no support, in any protocol) Call related, no agreed QoS classes.	no QoS requestReportBCSMEvent (Phase-1 and above) eventReportBCSM, (Phase-1 and above) callInformationReport (Phase-2 and above), applyChargingReport (Phase-2 and above) + parameter extension needed (no support, in any protocol) Call related, no agreed QoS classes.	initialDP + parameter extension (no support in any protocol), requestReportBCSMEvent eventReportBCSM, callInformationReport applyChargingReport + parameter extension needed (no support, in any protocol) Call related, no agreed QoS classes.	
F2	Reporting of network events for the purpose of fault diagnostics.		requestReportBCSMEvent (CS-1 and above) eventReportBCSM (CS-1 and above), activityTest (CS-1 and above), entityReleased (CS-2 and above)	requestReportBCSMEvent (Phase 1 and above) eventReportBCSM (Phase 1 and above), activityTest (Phase 2 and above), no entityReleased	requestReportBCSMEvent eventReportBCSM activityTest , entityReleased	eventReportReq, eventReportRes,

			INAP CS-1/2/3, - all reference points; SCF-SSF, SCF-SCF (CS-2), CUSF (CS-2) and SCF-SRF	CAMEL Phase 1/2/3, all reference points	OPEN-INAP CS-2 subset, SCF-SCF, CUSF; OPEN-INAP CS-3 subset; SCF-SSF and SCF-SRF.	ETSI Open Service Access API
No.	Requirement	Notes	Support Mechanism(s) and Parameters,	Support Mechanism(s) and Parameters,	Support Mechanism(s) and Parameters,	Support Mechanism(s) and Parameters,
F3	Request for event monitoring and subsequent reporting.		CallInformationRequest, callInformationReport (CS-1 and above), requestReportBCSMEvent, eventReportBCSM(CS-1 and above): call related; statusReport, requestEveryStatusChangeReport, requestFirstStatusMatchReport, requestCurrentStatusReport: CS-3 applyCharging and applyChargingReport for call supervision (CS-1 and above)	callInformationRequest CallInformationReport (Phas-2 and above), requestReportBCSMEvent, eventReportBCSM (Phase -1 and above): call related; applyCharging and applyChargingReport for call supervision (Phase 2 and above)	CallInformationRequest, callInformationReport, requestReportBCSMEvent, eventReportBCSM: call related; statusReport, requestEveryStatusChangeReport, requestFirstStatusMatchReport, requestCurrentStatusReport applyCharging and applyChargingReport for call supervision:	eventReportReq, eventReportRes,
F4	Electronic ordering of network management functions.		VOID	VOID	VOID	

8.4   Telephony IP Harmonization Aspects

TIPHON release 3 supports basic call and hence may support the SPAR requirements in EG 201 722 [2] and EG 201 807 [3], however no explicit support has been given to open the service provision to service control.

The capabilities described by TC SPAN for advanced telephony services match the service capabilities define by EP TIPHON. EP TIPHON has not explicitly defined a Service Provider Access Interface (SPAI), but it is believed that should such an interface to a telecommunications network be provided to meet the requirements contained in EG 201 722 [2], EG 201 807 [3] and EG 201 897 [4], this would also be consistent with the TIPHON service architecture.

In addition, TIPHON Release 4 and beyond may include an SPAI in the relevant TIPHON deliverables. In any case, EP TIPHON maps the service requirements through service capabilities onto the network in a technology independent way. Hence, circuit switched and packet network implementations support the TIPHON service requirements.

Other User-to-User IP protocols for the support of multimedia are under development, e.g. H.323 (see bibliography), SIP; these protocols are considered outside the scope of the present document and the analysis.

Other IP protocols for the support of multimedia, e.g. between gateways and gateway controllers, are under development, e.g. H.248/Megaco (see bibliography); these protocols are considered outside the scope of the present document and the analysis.

9   Indirect Service Provider access interface (I-SPAI)

This clause analyses the impact of a service provider's access interface where the SPAI is not directly connected to the local network where the SP-Service user is connected (i.e. the originating or terminating network), but instead is connected via an intermediate PTN. This results in a reliance on the protocol used at the NNI between network providers. The following table analyses the capabilities of ISUP used at the NNI for its potential impact or restriction on the capabilities that the Service Provider can deliverer to its service user.
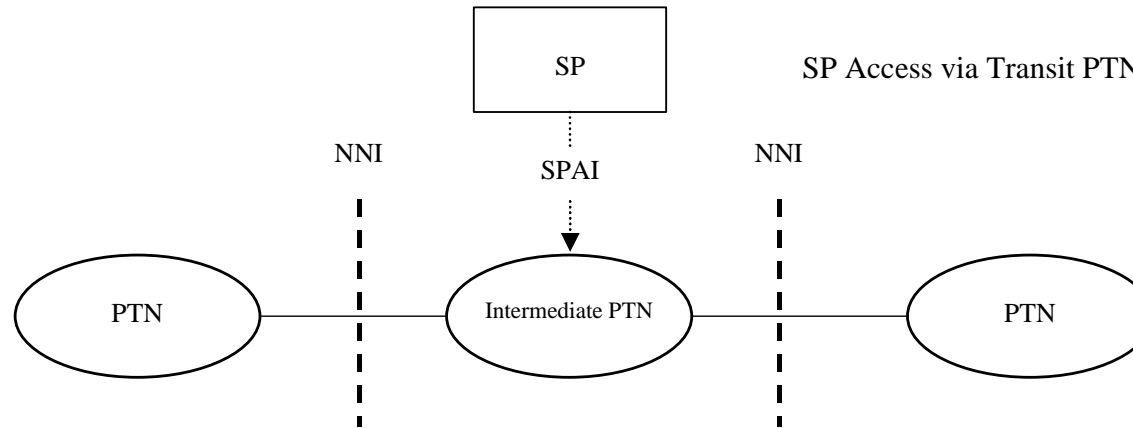
Figure 10: Indirect Service Provider Access via a Transit PTN.

For a Service Provider connected via a Transit PTN, the NNI will need to transfer additional information to the basic call requirements. (Requirements assessment for NNI interface between networks in the "call path" to relay information required as a result of circuit-related or non-circuit-related SP interfaces.) This table is to be used to indicate whether or not the requirement can be fulfilled with a "perfect" Indirect SPAI but with the relevant version of ISUP in the "call path" between the Intermediate PTN and the originating or terminating network as appropriate.

   NOTE: The least capable network in the call path will limit any relayed support of Supplementary Services.

Table 13: Requirements assessment for PTN<>NO PTN NNI interface.

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 (v3.x.x) [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 (v4.x.x) [15] Support Mechanism(s) and Parameters
A1	Reception of the calling line identity - Application of the CLIR supplementary service	*Passing the Received CLI or CLIs through the network for calls from or to one of the SPs service-subscribers, together with any "restricted" CLI flags left unaltered.*	Adequate support based on the use of the Calling party number and Generic number parameters within the IAM message. Application of the CLIR supplementary service is not specified in ISUP, but may form a part of many ISUP gateway implementations. No impact on protocol, only on service application. ISUP version 2 onwards.	No	*Yes: IAM message, Calling Party number parameter*	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*
A2	Presentation of the complete CLI information to the PTN	*Passing the SP-Provided CLI or CLIs through the network for calls from or to one of the SPs service-subscribers, together with any "restricted" CLI flags left unaltered.*	Adequate support based on the use of the Calling party number and Generic number parameters within the IAM message. No impact on protocol, only on service application. ISUP version 2 onwards.	No	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*

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No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 (v3.x.x) [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 (v4.x.x) [15] Support Mechanism(s) and Parameters
A3	Addition or substitution of a calling line identity	*As per #A2 above.*	ISUP version 4 with original CLI of calling user in generic number and identity of service provider in the calling number with marking identified by the network. This however only has the capability if two number delivery is not being used. If existing two number delivery is being used, it will have to override one of the numbers. If this is an unacceptable constraint, the requirement cannot be met.	No	*Yes(limited): IAM message, Calling Party number parameter. ETSI version of EN 300 356-3 [13] if presentation number is replaced, if national regulations permit.* *ISUP v2 does not provide the ability to change the CgPy number in conjunction with changing the relevant indicator.*	*Yes(limited): IAM message, Calling Party number parameter. ETSI version of EN 300 356-3 [14] if presentation number is replaced, if national regulations permit.* *As per ISUP v2, ISUP v3 does not provide the ability to change the CgPy number in conjunction with changing the relevant indicator.*	*Yes: ISUP v4 meets this req. completely*
A4	Provision of CLI information to an SP-initiated call	*As per#A2 above.*	Adequate support based on the use of the Calling party number parameter within the IAM message. ISUP version 2 onwards.	No	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter*	*Yes: IAM message, Calling Party number parameter*
A5	Relaying of the malicious call identification data of a received call	*Passing on the CLI (which may be restricted) including the Restricted flag, (if set), for calls from or to one of the SPs service-subscribers*	Adequate support based on the use of the Calling party number and ATP parameters. ISUP version 2 onwards. Based on possible manipulation of data of previous requirements e.g. A3, then there may be a loss of MCID information.	No	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*	*Yes: IAM message, Calling Party number parameter.*

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A6	Network Location Determination	*Passing the provided Network Identities, e.g. Port Numbers; BS Numbers, etc.*	Note that the proposed ISUP version 4 call reference includes a network identity of the assigning network, but the generator of the call reference is not necessarily the network of the SP's customer.	*No*	*No*	*No*	*Yes: IAM message, additional Calling Party number parameter. EN 300 356-3 v4* [15]
A7	Geographic Location Determination	*Passing the provided Geodetic data*	ISUP version 4 includes the geodetic location parameter which will fulfil this requirement.	*No*	*No*	*No*	*Yes: IAM message, additional Geodetic data parameter. EN 300 356-3 v4* [15]
A8	Determination of the terminal capabilities of the SP's service user	*Passing the provided Coded terminal class capabilities*	There is no explicit support for this function in ISUP; this requirement would have to be implemented either using an alternative protocol or at the application level.	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*
B1	Return speech path connection from the terminating PTN to the calling party	*Allowing Early set-up of the backward connection path. No additional information required.*	Adequate support based on the assumption that all transit exchanges (including that supporting the NNI to the service provider) connect the speech path in both directions, and the originating exchange connects the speech path in the backward direction. ISUP version 2 onwards.	*No*	*Yes: E.g. Connect before Answer.*	*Yes: E.g. Connect before Answer.*	*Yes: E.g. Connect before Answer.*

			General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16]	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13]	ISUP Version 3 (1997) EN 300 356 (v3.x.x) [14]	ISUP Version 4 (2000) EN 300 356 (v4.x.x) [15]
No.	Requirement	Information to transfer		Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters
B2	Routeing of an originating or incoming call from the PTN to the SP	*Allowing the Setting up of a call. No additional information required.*	No impact on protocol at service providers interface.	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*
B3	Indication of an originating or incoming call from the PTN to the SP	*VOID*	VOID- Non-Circuit-Related Requirement.	*N/A*	*N/A*	*N/A*	*N/A*
B4	Routeing of a terminating call from the PTN to the SP	*Allowing the Setting up of a call. No additional information required*	No impact on protocol at service providers interface.	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*	*Yes: No specific mechanism required other than use of standard ISUP messages.*
B5	Indication of a terminating call from the PTN to the SP	*VOID*	VOID- Non-Circuit-Related Requirement.	*N/A*	*N/A*	*N/A*	*N/A*
B6	Reception of a notification of the cause of an unsuccessful call	*Passing the Call Unsuccessful cause value through the network.*	No impact on protocol between networks in the call path. ISUP is transparent in this respect.	*Yes*	*Yes*	*Yes*	*Yes*

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B7	Provision of information for the destination and routeing of a call	*Passing the Provided Routing Numbers in addition to Dialled (directory) numbers. E.g. Carrier selection codes, and (multiple) transit network selection codes.*	It is assumed that the use of the Called party number parameter (ISUP version 2 onwards) and the Transit network selection parameter (ISUP version 3 onwards, if supported) provide adequate support for this requirement. The service provider will need to take account of any interaction with number portability and the presence of ported numbers.	*Yes: Extremely limited support possible in ETSI version 1. Carrier selection codes, can be utilized in Called Party Number unless incompatible with national regulations, but the number of digits available in the CdPy number is unlikely to support the requirement.*	*Yes: Some support possible in ETSI version 2. Carrier selection codes, up to four digits, can be utilized in Called Party Number unless incompatible with national regulations.*	*Yes: Some support in ETSI version 3, where signalling between ISUP v4 endpoints is supported by transparent parameter delivery over ISUP v3; the Routing number parameter, the Transit Network Selection parameter, supported in ISUP v4 may be carried across ISUPv3 for number portability. This is subject to national regulations.*	*Yes: Full support of carrier and transit network selection can be achieved in ETSI version of EN 300 356-3 v4 [15], which gives greater flexibility for the use of an extended CdPy number, the Nature of Address Indicator, and the Routing number parameter, also used for number portability. Implementation of this mechanism will require an application document to cover the conventions used for packing and unpacking the information. Subject to national regulations.*
B8	Call drop-back	*Drop back indication for a call, where route is optimized across network boundaries.*	This requirement can be supported by provision of the procedures for pivot routeing and redirection. This is only available in ISUP v4 for use in a national context. Transparent support of these procedures across a third party network in the call path is dependent on the SLA between the networks.	*Yes as long as pivotal routing, ISUP v4, is available within the PTN(s) that consent to do, or get involved in, the dropback. The other parties in the call control-signalling path need only support an earlier version of ISUP.*	*Yes as long as pivotal routing, ISUP v4, is available within the PTN(s) that consent to do, or get involved in, the dropback. The other parties in the call control-signalling path need only support an earlier version of ISUP.*	*Yes as long as pivotal routing, ISUP v4, is available within the PTN(s) that consent to do, or get involved in, the dropback. The other parties in the call control-signalling path need only support an earlier version of ISUP.*	*Yes. For the networks that are involved in the call path other than those between the SP (pivot direction point) and the PTN which performs the redirection, there is no transparency issue in any version of ISUP.*

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				Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters	Support Mechanism(s) and Parameters
B9	User interaction without service charging of the end user	*Allowing an End-to-End exchange of data before the start of charging, e.g. by providing two phase answering, or UUS.*	ETSI specifications do not specify the point at which charging commences for a call. It is therefore unlikely that ETSI will create specifications changing the point at which charging commences for a call. Most networks commence charging at the point of transfer of the CONNECT/ANSWER message. ISUP version 4 includes the OCCRUI/UTSI procedures which could provide a mechanism for this user interaction. There is also potential in ISUP for user interaction prior to the transfer of CONNECT/ANSWER message, e.g. in the User-to-user supplementary service. Some networks commence charging at an earlier point, at which time even the network provider may still be providing services. NB the user interaction requirement could well be an in-band	*No: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service, but in v1, there are some limitations. Any Relayed support of SS will be limited by the least capable network in the call path. See note.*	*No: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service.*	*No: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service.*	*No: In-band requirements are not supported, but may be possible at national level, depending on the national line-charging and interconnection policies.* *Out-of band requirements may be implemented via the UUS Supplementary Service, and via the OCCRUI/UTSI procedures.** **Provided that the endpoints are ISUPv4 capable and links in the call path are ISUPv2 or above.*

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			requirement see [2] 6.3.9 ; the two-phase answer is not guaranteed to work across the network boundary.				
B10	Reception of the originally dialled digits by the SP	*Relaying Originally dialled digits*	ISUP version 3 contains The called IN number parameter which is sufficient for this purpose.	*No*	*No*	*Yes: via use of the called IN number parameter.*	*Yes: via use of the called IN number parameter.*
B11	Reception of the originally dialled digits by the PTN	*Relaying Originally dialled digits*	ISUP version 3 contains The called IN number parameter which is sufficient for this purpose.	*No*	*No*	*Yes: via use of the called IN number parameter.*	*Yes: via use of the called IN number parameter.*
B12	Disconnection of a call in progress	*Relaying the Disconnect signal.*	This requirement can be met by the existing basic call sending a REL message in both forward and backward directions. No impact on protocol between networks in the call path. ISUP is transparent in this respect.	*Yes*	*Yes*	*Yes*	*Yes*
B13	Connection of a call to an interactive voice response unit in the PTN.	*Relaying the Setting up of a call to the IVR possibly by routing number. No additional information required*	There is no explicit support needed in ISUP for this requirement, which can be fulfilled using standard ISUP procedures. No impact on protocol between networks in the call path. ISUP is transparent in this respect.	*Yes*	*Yes*	*Yes*	*Yes*

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B14	Alternate routeing of calls or the indications of calls to another "point of presence" of the SP	*VOID in terms of its requirement on user plane NNI protocols.*	This may be achieved by routeing procedures for out of service routes, which are outside the scope of the signalling protocol. This is a management requirement.	*N/a*	*N/a*	*N/a*	*N/a*
B15	Alternate routeing of a call or the indication of a call to another "point of presence" of the PTN	*See 22 above.*	This may be achieved by routeing procedures for out of service routes, which are outside the scope of the signalling protocol. This is a management requirement.	*N/a*	*N/a*	*N/a*	*N/a*
B16	Indication of the disconnection of a call	*Relaying the Receipt of the Disconnect message.*	No impact on protocol between networks in the call path. ISUP is transparent in this respect.	*Yes*	*Yes*	*Yes*	*Yes*
B17	Supervision of a dropped-back call	*Relaying of control plane information for continued supervision of a call, where route is optimized across network boundaries.*	There is no support in ISUP for this requirement, except via the Pivot Routeing and Redirection Procedures in ISUP v4. For the networks that are involved in the call path other than those between the SP (pivot direction point) and the PTN which performs the redirection, there is no transparency issue in any version of ISUP.	*No*	*Yes as long as pivotal routing, ISUP v4, is available within the PTN(s) that consent to do, or get involved in, the pivot or redirection. The other parties in the call control-signalling path need only support version2 or above of ISUP that have the ability to tunnel the relevant ISUP v4 messages.*	*Yes as long as pivotal routing, ISUP v4, is available within the PTN(s) that consent to do, or get involved in, the pivot or redirection. The other parties in the call control-signalling path need only support version2 or above of ISUP that have the ability to tunnel the relevant ISUP v4 messages.*	*Yes. For the networks that are involved in the call path other than those between the SP (pivot direction point) and the PTN which performs the redirection, there is no transparency issue in any version of ISUP.*

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B18	Join operation of individual legs of a call - Void in the inter-network case	VOID	There is no explicit support within ISUP. This requirement will therefore be met at the application level. No impact on protocol between networks in the call path. ISUP is transparent in this respect. It is assumed that the conference bridge has to be supported in the PTN to which the SP has a SPAI.	Yes	Yes	Yes	Yes
B19	Split operation of individual legs of a call	VOID	There is no explicit support within ISUP. This requirement will therefore be met at the application level. No impact on protocol between networks in the call path. ISUP is transparent in this respect. It is assumed that the conference bridge has to be supported in the PTN to which the SP has a SPAI.	Yes	Yes	Yes	Yes

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B20	Multimedia Multiparty call control	*Full Transit functionality for Multimedia call control is supported in some versions of ISUP. Note: all or some of the multimedia capabilities may be in the evolving versions of SIP, H.323, BICC, etc.*	No impact on protocol between networks in the call path. ISUP is transparent in this respect. It is assumed that the conference bridge has to be supported in the PTN to which the SP has a SPAI.	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*	*Yes (limited): narrowband multimedia multiparty call control support available, but this must be effective in conjunction with a bridging device.*
B21	User Interaction for Text Delivery	*Relay use/text data*	No explicit solution in ISUP. Out-of band requirements may be implemented via the UUS Supplementary Service, or may require a different interconnect protocol. In-band solutions may be possible, using ISUP as a bearer channel only. Additional out-band solutions are available in ISUP v4. Transparent support of these procedures across the third party network is dependent on the SLA between the networks.	*No* *Transparent delivery of in-band solutions is possible, using ISUP as a bearer channel only.* *Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. UUS is limited in ISUPv1. Any relayed support of SS will be limited by the least capable network in the call path.*	*No* *Transparent delivery of in-band solutions is possible, using ISUP as a bearer channel only.* *Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No* *Transparent delivery of in-band solutions is possible, using ISUP as a bearer channel only.* *Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No* *Transparent delivery of in-band solutions is possible, using ISUP as a bearer channel only.* *Out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. These requirements may also be implemented via the OCCRUI/UTSI procedures depending on terminal capabilities. ** **Provided that the endpoints are ISUPv4*

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							capable and links in the call path are ISUPv2 or above.
B22	User-Plane resource negotiation and selection	*Multimedia bearer control, ability to make requests and indications to the PTN on behalf of service users.*	No support is available or relevant within ISUP.	*No*	*No*	*No*	*No*
C1	Interrogation of a network termination point for data delivery	*Relaying the messages for setting up a data call with no alerting.*	No explicit solution in ISUP. Out-of band requirements may be implemented via the UUS Supplementary Service, or may require a different interconnect protocol. In-band solutions may be possible, using ISUP as a bearer channel only. Additional out-band solutions are available in ISUP v4.	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. Non time-limited out-of band requirements may be implemented via the OCCRUI/UTSI procedures depending on terminal capabilities. ** **Provided that the endpoints are ISUPv4 capable and links in the call path are ISUPv2 or above.*

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C2	Overriding of the 'incoming call barring' supplementary service- Void in the inter-network case		The requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected.	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*
C3	Bypassing of the 'call diversion' supplementary		The requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected.	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*
C4	Message waiting indication	*Transparent relaying required if treated as a remote supplementary service, e.g. using UUS or SMS.*	The requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected.	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*
C5	Application contents screening	*Application SLA issues. No additional information required.*	The requirement can only be enabled over a SPAI with the PTN to which the service provider is directly connected. There is thus no impact of ISUP. Not a NNI protocol requirement.	*N/a*	*N/a*	*N/a*	*N/a*
C6	Modification of the terminal capabilities of the SP's service user	*Relay the information exchange with the terminal, e.g. Coded terminal class capabilities*	*Transparent support of these procedures across the third party network is not possible. Secure tunnelling of the SPAI across the transit network may be a solution; e.g.. SSL/IP.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*

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C7	Modification of the Personality Device/ module of the SP's service user	*Relay the information exchange e.g. User Agent coded scripts or class capabilities.*	*Transparent support of these procedures across the third party network is not possible. Secure tunnelling of the SPAI across the transit network may be a solution; e.g. SSL/IP.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*
C8	Alteration of the profile of the SP's service subscriber	*Relay the information exchange with the Profile database, e.g. coded scripts or class capabilities.*	The requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected.	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*
C9	Delivery of information to the SP's service user prior to alerting	*Allowing the opening of the forward speech path, to exchange information.*	*Transparent support of these procedures across the third party network is dependent on the SLA between the networks.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. UUS is Limited in ISUPv1.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities.*	*No: Time-limited out-of band requirements may be implemented via the UUS Supplementary Service, depending on terminal capabilities. Or these may be implemented via the OCCRUI/UTSI procedures depending on terminal capabilities. ** **Provided that the endpoints are ISUPv4 capable and links in the call path are ISUPv2 or above.*

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D1	Changes in the charging rate of a call - Dynamic	*Exchanging charging rate information.*	The requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected.	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*	*No support within ISUP, but it may be possible as a TC based service using SCCP routing within SS#7.*
D2	Charging mechanisms between SP and PTNO - Dynamic	*VOID*	Assuming this is based on offline exchange of information, then does not form part of the ISUP protocol. The requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected.	*N/a.*	*N/a.*	*N/a.*	*N/a.*
D3	Provision of call charging information in real time	*Same as #D2 above: e.g. Exchange an Accounting Record, AOC or CDR at defined intervals.*	No explicit support within ISUP.	*No explicit support within ISUP.*	*No explicit support within ISUP.*	*No explicit support within ISUP.*	*No explicit support within ISUP.*
D4	Exchange of charge detail record information in real time	*Exchange an Accounting Record, AOC or CDR at defined intervals*	Capabilities of ES 201 296 [25] (ISUP Support of charging) can be used in a national context where implemented, however this does not meet all the elements of the requirement.	*No*	*No*	*No*	*No*
D5	Billing and Accounting mechanisms between SP and PNO			*N/a*	*N/a*	*N/a*	*N/a*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 (v3.x.x) [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 (v4.x.x) [15] Support Mechanism(s) and Parameters
E1	Event traceability requested by the SP	*Exchanging statistics-VOID as no real-time requirement.*	No support in existing protocol. A "global" call reference can be supported in ISUP version 4.	*No*	*No*	*No*	*Yes (limited): Correlation parameter.*
E2	Event traceability requested by the PTN	*Exchanging statistics-VOID as no real-time requirement.*	No support in existing protocol. A "global" call reference can be supported in ISUP version 4.	*No*	*No*	*No*	*Yes (limited): Correlation parameter.*
E3	Traffic control capabilities controlled by the SP	*VOID*	Not applicable. It is assumed that the requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected. There is thus no impact of ISUP from a transparency perspective.	*N/a*	*N/a*	*N/a*	*N/a*
E4	Traffic control capabilities controlled by the PTN	*VOID*	Not applicable. It is assumed that the requirement can only be enabled over a SPAI with the PTN to which the service user is directly connected. There is therefore no impact on ISUP from a transparency perspective.	*N/a*	*N/a*	*N/a*	*N/a*

No.	Requirement	Information to transfer	General Notes on Requirement	ISUP Version 1 (1991) ETS 300 121 (Edition 1) [16] Support Mechanism(s) and Parameters	ISUP Version 2 (1995) ETS 300 356 (Edition 1) [13] Support Mechanism(s) and Parameters	ISUP Version 3 (1997) EN 300 356 (v3.x.x) [14] Support Mechanism(s) and Parameters	ISUP Version 4 (2000) EN 300 356 (v4.x.x) [15] Support Mechanism(s) and Parameters
E5	Avoidance of the cyclical routeing of a call	*Passing some data with the call associated signalling, e.g. Hop count or transaction number.*	ISUP version 3 supports a hop counter parameter, which can be used to fulfil this function. Use of this procedure is optional.	*No*	*No*	*Yes: Hop Count parameter in EN 300 356 v3*	*Yes: Hop Count parameter in EN 300 356 v4*
F1	Reporting of network events for measuring the quality of service	*Exchange QoS SLA configuration data e.g. for broadband calls.*		*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*
F2	Reporting of network events for the purpose of fault diagnostics	*No additional inter-network required, but where such information is available, it should be relayed transparently.*		*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*
F3	Request for event monitoring and subsequent reporting	*Likely to be VOID as no contractual arrangement with further networks in the route.*	Where CR interface is used, many events are reported through the normal signalling messages, but setting up the preconditions is a separate management requirement.	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*
F4	Electronic ordering of network management functions	*VOID*		*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*	*N/a: Management requirement.*

10   Mapping of Requirements against Benchmark Services

Table 14 shows the results of mapping between the Service Provider Access Requirements and "Freephone", "Premium Rate", "Virtual Calling Card", "Virtual Private Network" and "Universal Personal Telecommunication" Benchmark Services. The level of support is indicated in table 14.

Table 14: Requirements assessment for Benchmark Services supported by Open-INAP (or other NCR Interface)

		Freephone	Premium Rate	Virtual Card Calling	Virtual Private Network	Universal Personal Telecommunications
No.	Requirement	ETS 300 208 [7] (Edition 1)	ETS 300 712 [8] (Edition 1)	ETS 300 711 [9] (Edition 1)	ETR 172 [26] (Edition 2)	ETS 300 779 [10] (Edition 1)
		* Y1 (required for core feature), Y2 (required for optional feature), or N/A (not applicable to the requirement). Where the answer is "Y2", the option(s) are specified. Alternatively P (possibly, not specified in standard but could be included as part of the relevant service), G (General, not service-specific).				
A1	Reception of the calling line identity - Application of the CLIR supplementary service	Y1	Y1	Y1	Y1	Y1
A2	Presentation of the complete CLI information to the PTN	Y1	Y1	Y1	Y1	Y1
A3	Addition or substitution of a calling line identity	N/A	N/A	N/A	P	P
A4	Provision of CLI information to an SP-initiated call	N/a	N/a	N/a	N/A	N/A
A5	Relaying of the malicious call identification data of a received call	Y1	Y1	Y1	Y1	Y1
A6	Network Location Determination	P	P	P	P	P
A7	Geographic Location Determination	P	P	P	P	P
A8	Determination of the terminal capabilities of the SP's service user	N/a	N/a	N/a	P	P
B1	Return speech path connection from the terminating PTN to the calling party	P	P	P	P	P
B2	Routeing of an originating or incoming call from the PTN to the SP	P	N/a	Y1	Y1	Y1
B3	Indication of an originating or incoming call from the PTN to the SP	P	N/a	Y1	Y1	Y1
B4	Routeing of a terminating call from the PTN to the SP	Y1	Y1	N/a	Y1	Y1
B5	Indication of a terminating call from the PTN to the SP	Y1	Y1	N/a	Y1	Y1
B6	Reception of a notification of the cause of an unsuccessful call	Y2 (Alternative destination on busy/no reply - 5.2.8, call queuing - 5.2.9)	Y2 (Call distribution - 5.2.2)	Y2 (Call logging - 5.2.12)	Y1	Y2 (UPT Supplementary Services. - 4.3)
B7	Provision of information for the destination and routeing of a call	Y1	Y1	Y1	Y1	Y1
B8	Call drop-back	N/a	N/a	N/a	N/A	N/A

No.	Requirement	Freephone ETS 300 208 [7] (Edition 1)	Premium Rate ETS 300 712 [8] (Edition 1)	Virtual Card Calling ETS 300 711 [9] (Edition 1)	Virtual Private Network ETR 172 [26] (Edition 2)	Universal Personal Telecommunications ETS 300 779 [10] (Edition 1)
B9	User interaction without service charging of the end user	P	N/A	P	P	P
B10	Reception of the originally dialled digits by the SP	Y1	Y1	Y1	Y1	Y1
B11	Reception of the originally dialled digits by the PTN	Y1	Y1	Y1	Y1	Y1
B12	Disconnection of a call in progress	P	P	Y1	Y1	Y1
B13	Connection of a call to an interactive voice response unit in the PTN	Y2 (call queuing - 5.2.9)	Y2 (presentation of charging information - 5.2.1, custom*ized* recorded announcements - 5.2.4, Originating User Prompter - 5.2.5)	Y1, Y2 (language selection - 5.2.10)	P	Y1, Y2 (language selection)
B14	Alternate routeing of calls or the indications of calls to another "point of presence" of the SP	N/a	N/a	N/a	Y1	N/A
B15	Alternate routeing of a call or the indication of a call to another "point of presence" of the PTN	N/a	N/a	N/a	Y1	N/A
B16	Indication of the disconnection of a call	Y2 (call limiter - 5.2.6, call queuing - 5.2.9, statistics - 5.2.13)	Y2 (statistics - 5.2.7) P	Y2 (Call logging - 5.2.12) P	Y1	Y1
B17	Supervision of a dropped-back call	N/a	N/a	N/a	N/A	N/A
B18	Join operation of individual legs of a call	N/a	N/a	N/a	P	P
B19	Split operation of individual legs of a call	N/a	N/a	N/a	P	P
B20	Multimedia Multiparty call control	P	P	P	P	P
B21	User Interaction for Text Delivery	P	P	P	P	P
B22	User-Plane resource negotiation and selection	N/a	N/a	N/a	P	N/A
C1	Interrogation of a network termination point for data delivery	N/a	N/a	N/a	P	N/A
C2	Overriding of the 'incoming call barring' supplementary service	P	Y1 (Service specific calls only - 5.2.10)	N/a	P	P
C3	Bypassing of the 'call diversion' supplementary service	P	Y1 (Service specific calls only - 5.2.10)	N/a	P	P
C4	Message waiting indication	N/a	N/a	N/a	P	P
C5	Application contents screening	P	P	P	P	P
C6	Modification of the terminal capabilities of the SP's service user	P	P	N/a	P	P
C7	Modification of the Personality Device/module of the SP's service user	N/a	N/a	N/a	N/A	P
C8	Alteration of the profile of the SP's service subscriber	P (especially if Individual Number Allocation is enabled)	P (esp. if Individual Number Allocation is enabled)	Y2, P (Depending on implementation of Speed Dialling - 5.2.8)	Y1	Y1

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No.	Requirement	Freephone ETS 300 208 [7] (Edition 1)	Premium Rate ETS 300 712 [8] (Edition 1)	Virtual Card Calling ETS 300 711 [9] (Edition 1)	Virtual Private Network ETR 172 [26] (Edition 2)	Universal Personal Telecommunications ETS 300 779 [10] (Edition 1)
C9	Delivery of information to the SP's service user prior to alerting	P	P	N/A	Y1	Y1
D1	Changes in the charging rate of a call - Dynamic	N/a	P	P	P	P
D2	Charging mechanisms between SP and PNO - Dynamic	Y1	Y1	Y1	P	P
D3	Provision of call charging information in real time	P	P	P	P	P
D4	Exchange of charge detail record information in real time	P	P	P	P	Y1
D5	Billing and Accounting mechanisms between SP and PNO	Void	Void	Void	Void	Void
E1	Event traceability requested by the SP	G	G	G	G	G
E2	Event traceability requested by the PTN	G	G	G	G	G
E3	Traffic control capabilities controlled by the SP	G	G	G	G	G
E4	Traffic control capabilities controlled by the PTN	G	G	G	G	G
E5	Avoidance of the cyclical routeing of a call	N/a	N/a	N/a	P	N/A
E6	Avoidance of the cyclical routeing of signalling or user messages	G	G	G	G	G
F1	Reporting of network events for measuring the quality of service	G	G	G	G	G
F2	Reporting of network events for the purpose of fault diagnostics	G	G	G	G	G
F3	Request for event monitoring and subsequent reporting	Y1	Y1	Y1	Y1	Y1
F4	Electronic ordering of network management functions	G	G	G	G	P

11   Management Plane requirements to support services.

The Service Provider Access Requirements were analysed to determine what management plane facilities are needed, if any, in order to enable their support and provision . This work on Service Provider Access Management Requirements for Open Network Access was undertaken co-operatively between TC SPAN and TC TMN and is contained in EG 201 965 [11].

11.1   Relationship between Management Plane, Control Plane, and User Plane

This is discussed in some detail in EG 201 722 [2], clause 8.5. An overview is presented below:

The management plane is a plane providing layer management and plane management functions in order to manage the functions of the control and user plane and their functional layers.

The requirements that the SPs have to the PTNs can be split into three categories:

- Control Plane functions of call control and service control of traffic in a PTN by the SP. The abovementioned CP functions can be provided by the control interface(s) located between the SP's equipment and PTN. For many applications, the SP-controlled voice traffic will not exit the PTN to the SP, but will be directed by the SP towards its intended destination.

- User Plane functions of transferring voice traffic between the SP's equipment and PTN. The abovementioned User Plane functions can be provided by the existing UNIs or NNIs.

- Management Plane functions to manage the functions of the control and user plane.

11.2   Management Plane categories:

The Management Plane requirements can be split into:

- Traffic Related Capabilities (e.g. setting switch triggers, datafill, etc), necessary in order to enable from an operational perspective one or more of the Service Provider Access Requirements.

- Performance Management Capabilities - e.g. monitoring performance of SP/PTN links, link reconfiguration, etc.

- Electronic Bonding/Ordering.

Table 15: Management requirements cross reference to EG 201 965 [11]

No.	Requirement	Reference	Capability		
			Traffic Related	Performance Management	Electronic Bonding/ Ordering
A1	Reception of the calling line identity - Application of the CLIR supplementary service	[1] 5.2.1, [3] 5.2.2			
A2	Presentation of the complete CLI information to the PTN	[1] 5.2.2			
A3	Addition or substitution of a calling line identity	[1] 5.2.3			
A4	Provision of CLI information to an SP-initiated call	[1] 5.2.4			
A5	Relaying of the malicious call identification data of a received call	[1] 5.2.5, [3] 5.2.1			
A6	Network Location Determination	[2] 5.1.1			
A7	Geographic Location Determination	[2] 5.1.2			
A8	Determination of the terminal capabilities of the SP's service user	[2] 5.2.1			
B1	Return speech path connection from the terminating PTN to the calling party	[1] 5.3.1			
B2	Routeing of an originating or incoming call from the PTN to the SP	[1] 5.3.2			

No.	Requirement	Reference	Capability		
			Traffic Related	Performance Management	Electronic Bonding/ Ordering
B3	Indication of an originating or incoming call from the PTN to the SP	[1] 5.3.3	▓		
B4	Routeing of a terminating call from the PTN to the SP	[1] 5.3.4	▓		
B5	Indication of a terminating call from the PTN to the SP	[1] 5.3.5	▓		
B6	Reception of a notification of the cause of an unsuccessful call	[1] 5.3.6	▓		
B7	Provision of information for the destination and routeing of a call	[1] 5.3.7			
B8	Call drop-back	[1] 5.3.8			
B9	User interaction without service charging of the end user	[1] 5.3.9			
B10	Reception of the originally dialled digits by the SP	[1] 5.3.10			
B11	Reception of the originally dialled digits by the PTN	[3] 5.3.1			
B12	Disconnection of a call in progress	[1] 5.3.11	▓		
B13	Connection of a call to an interactive voice response unit in the PTN.	[1] 5.3.12	▓		
B14	Alternate routeing of calls or the indications of calls to another "point of presence" of the SP	[1] 5.3.13		▓	
B15	Alternate routeing of a call or the indication of a call to another "point of presence" of the PTN	[3] 5.3.2		▓	
B16	Indication of the disconnection of a call	[2] 5.4.1			
B17	Supervision of a dropped-back call.	[2] 5.4.5			
B18	Join operation of individual legs of a call	[2] 5.4.2			
B19	Split operation of individual legs of a cal	[2] 5.4.3			
B20	Multimedia Multiparty call control	[2] 5.4.7	▓		
B21	User Interaction for Text Delivery	[2] 5.4.8	▓		
B22	User-Plane resource negotiation and selection	[2] 5.4.9	▓		
C1	Interrogation of a network termination point for data delivery	[1] 5.4.1	▓		
C2	Overriding of the "incoming call barring" supplementary service	[1] 5.4.2	▓		
C3	Bypassing of the "call diversion'"supplementary service.	[1] 5.4.3	▓		
C4	Message waiting indication	[1] 5.4.4			
C5	Application contents screening	[3] 5.5.1			
C6	Modification of the terminal capabilities of the SP's service user	[2] 5.2.2	▓		
C7	Modification of the Personality Device/ module of the SP's service user	[2] 5.2.3	▓		
C8	Alteration of the profile of the SP's service subscriber	[2] 5.3.1	▓		
C9	Delivery of information to the SP's service user prior to alerting	[2] 5.4.4			
D1	Changes in the charging rate of a call - Dynamic	[1] 5.5.1			
D2	Charging mechanisms between SP and PTNO - Dynamic	[3] 5.5.2			
D3	Provision of call charging information in real time	[2] 5.6.1	▓		
D4	Exchange of charge detail record information in real time	[2] 5.6.2			
E1	Event traceability requested by the SP	[1] 5.6.1		▓	
E2	Event traceability requested by the PTN	[3] 5.4.1		▓	
E3	Traffic control capabilities controlled by the SP	[1] 5.6.2			
E4	Traffic control capabilities controlled by the PTN	[3] 5.4.2			
E5	Avoidance of the cyclical routeing of a call	[1] 5.6.3, [3] 5.4.3	▓		
E6	Avoidance of the cyclical routeing of signalling or user messages	[2] 5.4.6	▓		
F1	Reporting of network events for measuring the quality of service	[2] 5.5.1		▓	
F2	Reporting of network events for the purpose of fault diagnostics	[2] 5.5.2		▓	
F3	Request for event monitoring and subsequent reporting	[2] 5.5.3		▓	
F4	Electronic ordering of network management functions	[2] 5.5.4	▓		▓

12   Conclusions

From an analysis of the protocol mapping work, it is clear from the results above that the UNI circuit-related protocol can only achieve a partial subset of the requirements. However, NNI circuit-related protocols meet a more complete set of the requirements; these are the published standard interconnection protocols in current use between interconnected networks in diverse countries.

The highest level of support for the SPAR requirements is found in the non-circuit-related signalling configurations in conjunction with the management plane access, which is required to establish the pre-conditions for the monitored network events (e.g.: triggers).The features provided in the IN capability sets with the capabilities specified in CAMEL have the advantage of supporting these non-circuit-related control plane configurations. Open INAP offers the opportunity to implement these NCR interfaces without parameter options, i.e. to a tightly defined PICS proforma. The ongoing ETSI API work represents a possible path for future evolution for such access.

13   Future Work

13.1   New/Emerging Protocols

It is clear that the area of IP and Multimedia support can usefully be mapped against the current requirements, when the status of the implementation of the existing emerging standards (SIP, H.323, H.248 (see bibliography)) is more mature.

13.2   New Requirements

The current set of requirements has been defined in EG 201 722 [2], EG 201 897 [4], and EG 201 807 [3]. As further requirements emerge, a similar approach to mapping these against the current and new sets of protocols can be taken.

Annex A (informative):
Bibliography

- ETSI TCRTR 034 (Edition 2): "Business TeleCommunications (BTC); Virtual Private Networking (VPN); Services and networking aspects; Standardization requirements and work items".

- DEN/SPAN-120084: "Services and Protocols for Advanced Networks (SPAN); PICS proforma for open core INAP".

- ITU-T Recommendation H.323: "Packet-based multimedia communications systems".

- ITU-T Recommendation H.248: "Gateway control protocol".

History

Document history			
V1.1.1	August 2001	Membership Approval Procedure	MV 20011005: 2001-08-07 to 2001-10-05