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Draft TCR-TR: "Guidelines for Standards on IN CS-1"

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Introduction

The purpose of the Intelligent Network (IN) Capability Set Number 1 (CS-1) Guidelines and Workplan is to aid the members of ETSI STCs concerned in their deliberations. It proposes guidelines for the development of the first group of Intelligent Network Capability Set TC-TRs + ETSs.

In anticipation that CCITT draft Recommendations will be readied for 1992, a proposed work plan containing critical milestones and dates has been developed. The events noted in the work plan (see Figure 1) have been identified as crucial to the availability of CS-1 TC-TRs + ETSs in 1992.

Relationship with ETSI TC-TR "IN Framework", CCITT IN Baseline Documents, other CCITT documents dealing with IN and other ETSI TC-TRs on CS-1 are shown in Figure 2.

In particular, this document details some aspects of TC-TR "IN Framework" as far CS-1 is concerned. An overview of ETSI IN documents and their associated responsibilities can be found in ANNEX A (normative).

The proposed ETSI document structure for IN CS-1 aligns with that of CCITT, as described in CCITT draft Recommendation Q.1200.

1. CS-1 Work Plan

1.1 Objective

The IN CS-1 work plan provides an overview of ETSI activities in relation to the development and production of ETSI ETSs for approval at TC level in 1992. The current view is shown in Figure 1.

1.2 Relationship with Other ETSI Studies

NA6 identified relationship with the following ETSI STCs for CS-1:

— NA1: Service descriptions and service description methodology for the IN;

— NA2: Numbering, addressing and routing in the IN;

— NA4: IN architecture/reference configurations, OA&M/TMN aspects, service and network management;

— NA7: Universal Personal Telecommunications;

— SPS3: Requirements for / specifications of switching system functionalities;

— other groups such as SPS1 and SPS2.

1.3 Specific European Requirements for CS-1

Specific European requirements for CS-1 have not yet been identified.

1.4 Milestones

The milestones and their deliverables are shown in Figure 1. This workplan shows the important milestones for NA6 as well as for SPS3 for the completion of CS-1.

Generally NA6 and SPS3 are concentrating their efforts on analysing the CCITT output and creating contributions reflecting the ETSI positions towards CCITT.

In line with the decision in NA May '91 the TR1 and TR2 will become TC-TRs.

Some remarks:

1. It should be determined at a later time whether the TC-TRs should be turned into ETSs or TRs. This should happen when the CCITT has approved the corresponding Q- Recommendations;
2. The protocol standards will be contained in an ETS that aligns with CCITT Q.1218 (see ANNEX A (normative));

3. In order to align with CCITT it was agreed to base TC-TR1 and TC-TR2 on the Q-Recommendations as shown in ANNEX A (normative).

1.5 Assumptions

a. The detailed technical work on SIBs and interfaces is constrained by agreed IN CS-1 guidelines;

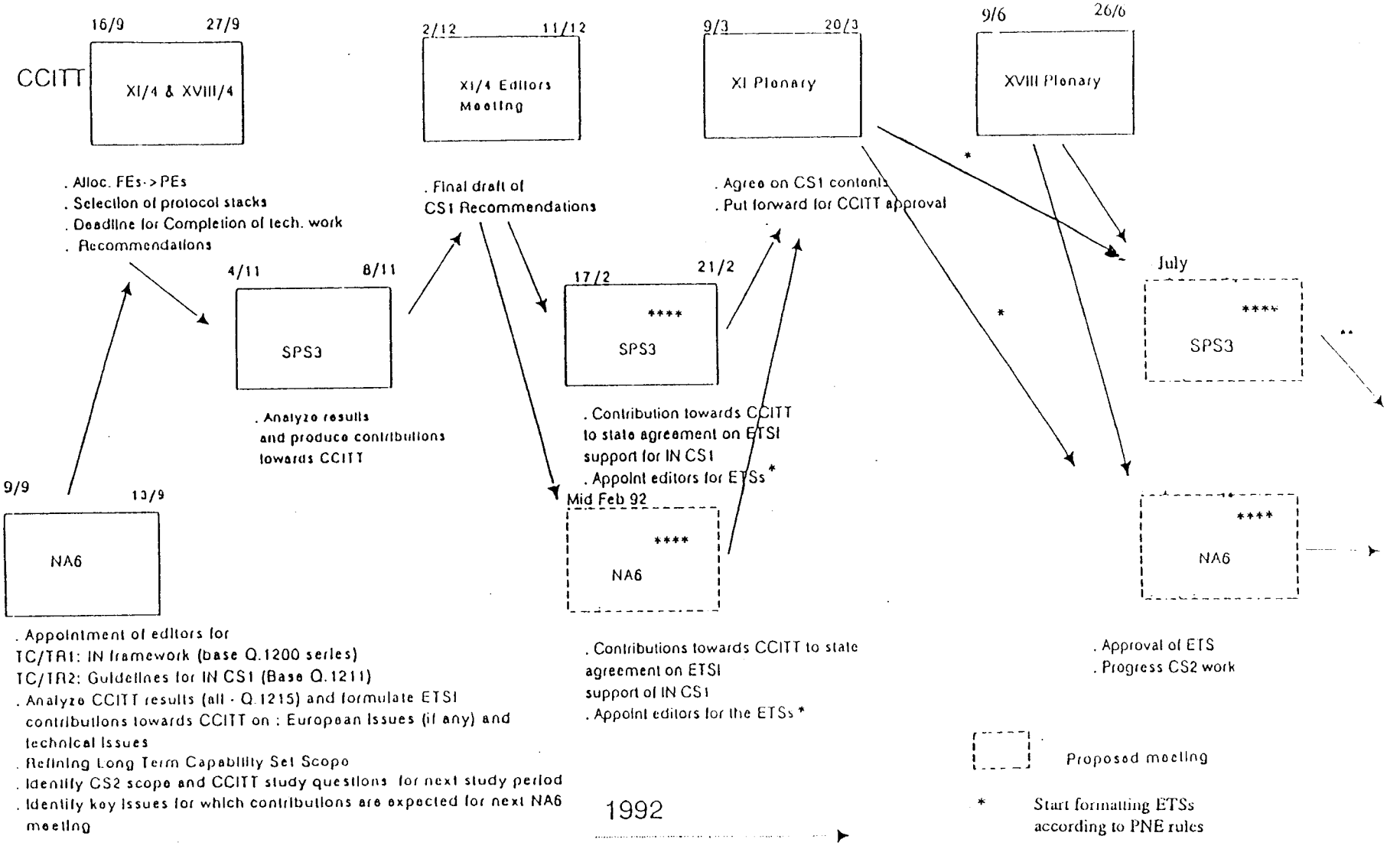
b. Appropriate expertise (delegates) is available as required to meet each milestone, in particular the work on protocol aspects is very critical;

c. In order to accelerate the process of producing and approving the IN CS-1 ETSs it is assumed that the following meetings are arranged:

NA6:
Pull forward the meeting scheduled for 23-27 March '92 to February '92. At this meeting editors for the ETSs should be appointed. Following NA6 meeting to be scheduled for 27 April - 1 May '92 immediately following the CCITT SG XVIII/4 meeting.

SPS3: Arrange a meeting in the May '92 timeframe (possibly at same time as NA6 meeting).

ETSI OVERALL Workplan



Note: The CS1 studies as indicated in this workplan may be supplemented by studies on Long Term Architecture and CS2

FIGURE 1 - ETSI Overall IN CS-1 Workplan 1991

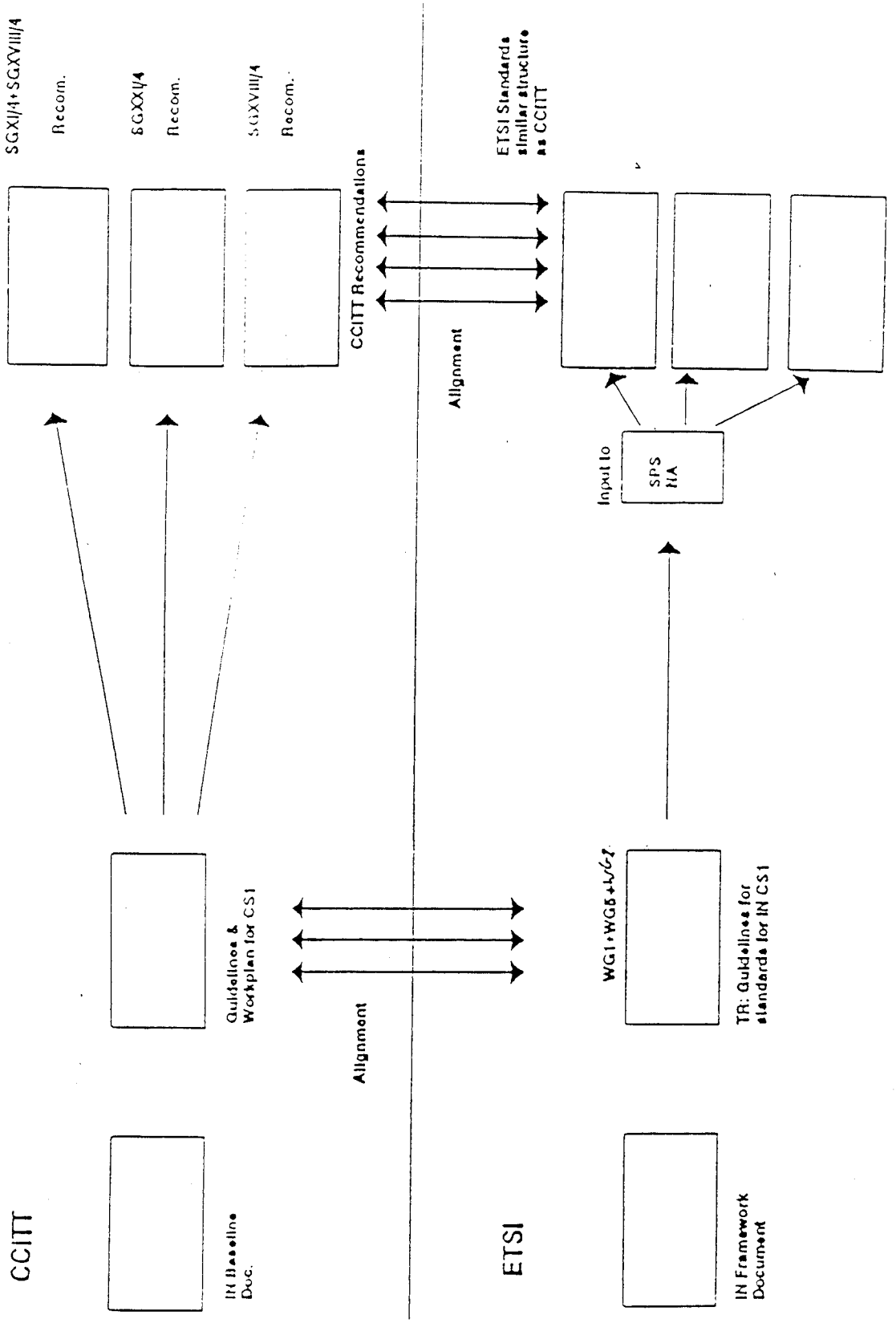


FIGURE 2 - Relationship between ETSI and CCITT Document Structure for IN

2. Description of CS-1

2.1 Introduction

Intelligent Network Capability Set - 1 is the first standardised stage of the Intelligent Network (IN) as an architectural concept for the creation and provision of telecommunications services. This chapter gives an introduction to Capability Set - 1 (CS-1) by providing an overview and definition of CS-1 and describing its main characteristics and overall capabilities.

2.2 Phased Standardisation

The Intelligent Network (IN) is an architectural concept for creation and provisioning of new services which is characterised by:

a. extensive use of information processing techniques;

b. efficient use of network resources;

c. modularisation and reusability of network functions;

d. integrated service creation and implementation by means of modularised, reusable network functions;

e. flexible allocation of network functions to physical entities;

f. portability of network functions among physical entities;

g. standardised communications between network functions via service independent interfaces as a network option;

h. service subscriber's control of some subscriber-specific service attributes;

i. service user control of some user-specific attributes;

j. standardised management of service logic.

The implementation of the IN architecture will facilitate the rapid introduction of new services. Its architecture can be applied to various types of telecommunications networks, which include: Public Switched Telecommunications Network (PSTN), Public Switched Packet Data Network (PSPDN), mobile, and Integrated Services Digital Networks (N- and B-ISDN).

The ultimate IN is an evolving target, therefore in order to take full advantage of the technological possibilities at a given point in time it is necessary to define specific phases in the evolution to a target architecture. This phased approach is shown in Figure 3.

2.3 General Description and Scope of CS-1

CS-1 defines an initial subset of IN capabilities that meet the following general criteria:

a. CS-1 is a subset of the target intelligent network architecture;

b. CS-1 is a set of definitions of capabilities that is of direct use to both manufacturers and network operators;

c. CS-1 provides network capabilities to support services either defined or in the process of being defined by CCITT and ETSI (e.g., Universal Personal Telecommunications Service, Freephone, and Virtual Private Network services such as Private Numbering Plan). CS-1 also provides capabilities to support the introduction of services which may neither be standardised by CCITT and ETSI, nor be part of the proposed set of benchmark services;

d. CS-1 is the first standardised stage of evolution based upon the existing technology base and on evolvability requirements addressed in section 2.3.1

The CS-1 architecture may be supported over PSTN, ISDN, and mobile networks.

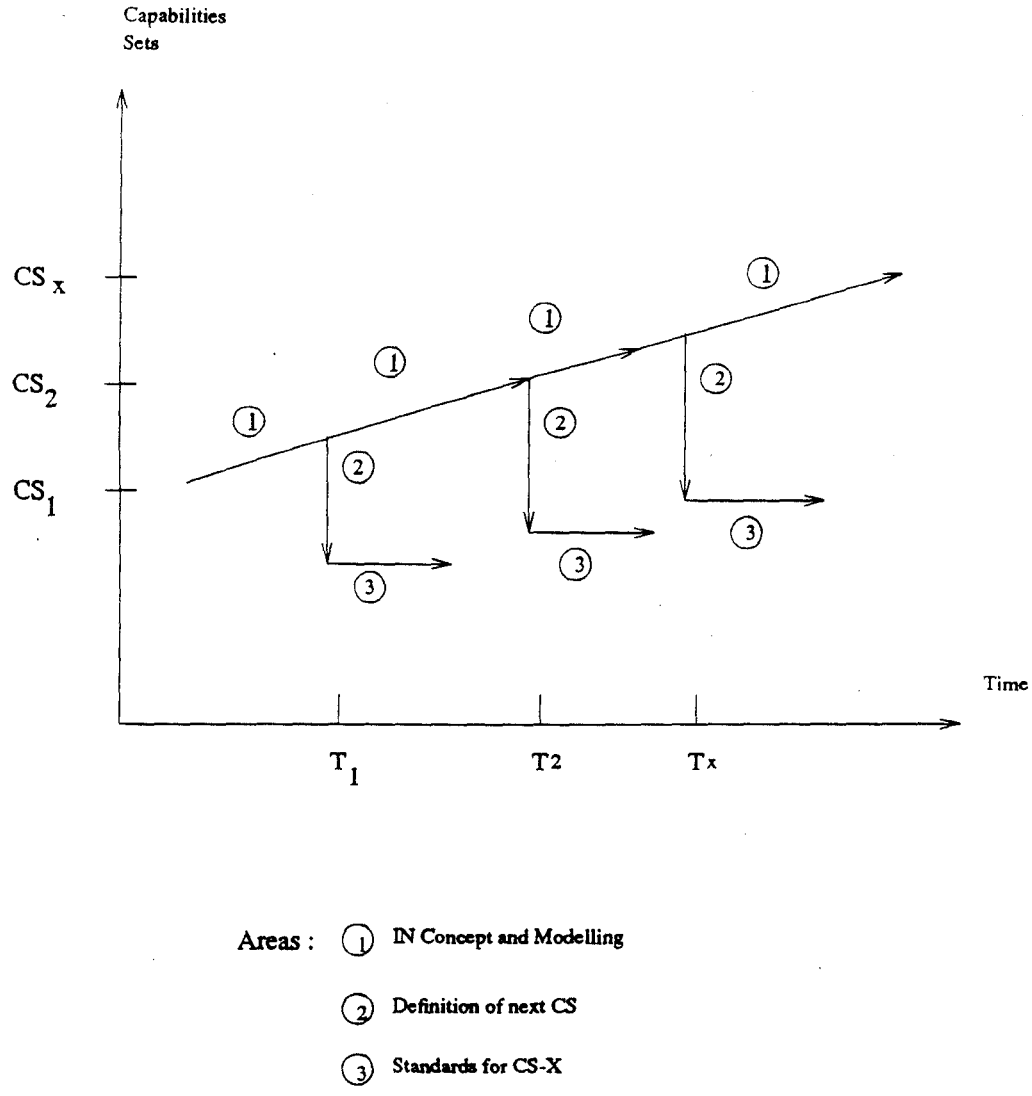


FIGURE 3 - Sequencing of Capability Sets

2.3.1 Evolution from CS-1

The CS-1 architecture takes into account the evolution requirement, i.e., it supports the CS-1 benchmark services but its functionalities are designed to evolve towards the future Capability Sets (CS-2 and beyond). Therefore, the CS-1 capabilities are defined without any assumptions that are known to limit their ability to evolve into future capability sets.

2.4 Overview of Planned CS-1 ETSs

See Document Structure for ETSI Standards on IN (ANNEX A (normative)) for all planned TRs and ETSs.

2.5 Service Aspects

Although, by nature, the IN is a service independent architecture, it is relevant to describe the general CS-1 service capabilities. The services and service features that are to be supported by CS-1 are fundamental to the CS-1 Service Independent Building Blocks (SIBs), call processing model and service control principles.

2.5.1 Type A and Type B services

The CS-1 services and service features fall into the category of "single ended", "single point of control" services referred to as Type A, otherwise the services are referred to as Type B. The following definitions apply:

A *single-ended* service feature applies to one and only one party in a call and is orthogonal at both the service and topology levels to any other parties that may be participating in the call. Orthogonality allows another instance of the same or a different single-ended service feature to apply to another party in the same call as long as the service feature instances do not have feature interaction problems with each other.

Single point of control describes a control relationship where the same aspects of a call are influenced by one and only one Service Control Function at any point in time (see also section 2.6.2.1).

CS-1 standards do not encompass "Type B" services for the following reasons:

a. *Operational Complexity*
In Type B services, several IN subscribers may be associated within a single call. During the call, subscribers may be added or dropped. These associations take place physically in the switches involved in the call (SSF/CCF functions) under the control of an SCF. The SCF will need rules to handle feature arbitration between subscribers involved in the call (e.g. incompatible screening lists). This may have to involve real-time consultations between the SCFs that "represent" the various parties involved in the call. Rules will also be required to handle topological decisions (e.g. which physical switches should be chosen to "join" groups of subscribers scattered around a network?).

b. *Implementation Complexity*
Type B service involve manipulation of switch connection resources by service logic located in an SCF. This means that an "abstracted" view of the switch's connection resources must be made available to external service logic. Models have been formulated to accommodate appropriate "abstracted" views, but to date these are theoretical proposals. A very large investment in switch software re-design may be required to realise such models. In contrast, the switch software modifications to accommodate Type A services are relatively modest in scope and are well understood.

c. *Control Complexity*
Type A services are characterised by a relatively simple control relationship between SSF and SCF. The SSF is a "client" for service-related information provided by the SCF, however, the switch retains connection control at all times. This simple control relationship is an opportunity for achievable standards in the context of CS-1.

In contrast, the control relationship between SCF and SSF in Type B services requires the sharing of connection control between the switch and external service logic. The information flows need to be rich in parameters to manage what is essentially a peer-peer, distributed processing relationship.

Attempting to standardise this control relationship within CS-1 would take considerable time and resources, and could therefore seriously jeopardise the target of standardisation within the available time.

As there are considerable differences in operational, implementation, and control complexity between Type A and Type B services, CS-1 is targeted to support Type A services only.

Tables 2 and 3 contain the Benchmark Sets of CS-1 services and service features. The benchmark sets can be used to identify and verify the service-independent capabilities of CS-1. The relationship and mapping between these CS-1 services and service features is shown in ANNEX B (informative).

ANNEX C (informative) provides short prose descriptions of targeted services and service features. These were used to develop the current Q.121x series Recommendations (and corresponding ETSs) as CS-1 is intended to support evolutionary new services. The descriptions provided for the targeted services and service features are for the above-mentioned purposes only and are not to be used by service designers for service creation.

Definitions of "service" and "service feature":
A *service* is a stand-alone commercial offering, characterised by one or more core service features, and can be optionally enhanced by other service features.
A *service feature* is a specific aspect of a service that can also be used in conjunction with other services/service features as part of a commercial offering. It is either a core part of a service or an optional part offered as an enhancement to a service.

TABLE 2 - Benchmark Set of CS-1 Services

	Abbreviated Dialing	ABD
	Account Card Calling	ACC
	Automatic Alternative Billing	AAB
	Call Distribution	CD
	Call Forwarding	CF
	Call Rerouting Distribution	CRD
*	Completion of Call to Busy Subscriber	CCBS
*	Conference Calling	CON
	Credit Card Calling	CCC
	Destination Call Routing	DCR
	Follow-Me-Diversion	FMD
	Freephone	FPH
	Malicious Call Identification	MCI
	Mass Calling	MAS
	Originating Call Screening	OCS
	Premium Rate	PRM
	Security Screening	SEC
	Selective Call Forward on Busy/Don't Answer	SCF
	Split Charging	SPL
	Televoting	VOT
	Terminating Call Screening	TCS
	Universal Access Number	UAN
	Universal Personal Telecommunications	UPT
	User-Defined Routing	UDR
	Virtual Private Network	VPN

Note 1: ACC and CCC will use "virtual cards".

Note 2: Above service names apply to the benchmark service descriptions (see ANNEX C (informative)), and not to the user-network interface descriptions provided by CCITT SGI and ETSI NA1.

Note 3: Network implementation aspects may be important for some services.

* : These services and service features might be partially supported in CS-1, because they require, beyond Type A capabilities, additional Type B capabilities. Parts of these service and service features are considered in CS-1 as long as these parts belong to Type A and do not impose capabilities additional to those required for other services and service features in the list.

TABLE 3 - Benchmark Set of CS-1 Service Features

	Abbreviated Dialling	ABD
	Attendant	ATT
	Authentication	AUTC
	Authorisation Code	AUTZ
*	Automatic Call Back	ACB
	Call Distribution	CD
	Call Forwarding	CF
	Call Forwarding on BY/DA	CFC
	Call Gapping	GAP
*	Call Hold with Announcement	CHA
	Call Limiter	LIM
	Call Logging	LOG
	Call Queueing	QUE
*	Call Transfer	TRA
*	Call Waiting	CW
	Closed User Group	CUG
*	Consultation Calling	COC
	Customer Profile Management	CPM
	Customised Recorded Announcement	CRA
	Customised Ringing	CRG
	Destinating User Prompter	DUP
	Follow-Me Diversion	FMD
	Mass Calling	MAS
*	Meet-Me Conference	MMC
*	Multi-Way Calling	MWC
	Off Net Access	OFA
	Off Net Calling	ONC
	One Number	ONE
	Origin Dependent Routing	ODR
	Originating Call Screening	OCS
	Originating User Prompter	OUP
	Personal Numbering	PN
	Premium Charging	PRMC
	Private Numbering Plan	PNP
	Reverse Charging	REVC
	Split Charging	SPLC
	Terminating Call Screening	TCS
	Time Dependent Routing	TDR

Note 1: Above service feature names apply to the benchmark service descriptions (see ANNEX C (informative)), and not to the user-network interface descriptions provided by CCITT SGI and ETSI NA1.

* : These services and service features might be partially supported in CS-1, because they require, beyond Type A capabilities, additional Type B capabilities. Parts of these service and service features are considered in CS-1 as long as these parts belong to Type A and do not impose capabilities additional to those required for other services and service features in the list.

2.5.2 Network support of CS-1 services

The services are to be supported over various networks. For IN CS-1 applications the following networks are considered:

i. PSTN

ii. ISDN (Public and Private Networks)

iii. PLMN

2.6 Network Aspects

This section provides an overview of the CS-1 network functions, and sets guidelines for the control architecture of CS-1. It also describes how the issues of feature interaction and service-feature consistency are handled in CS-1.

Figure 4 summarises the CS-1 network functions and their functional relationships.

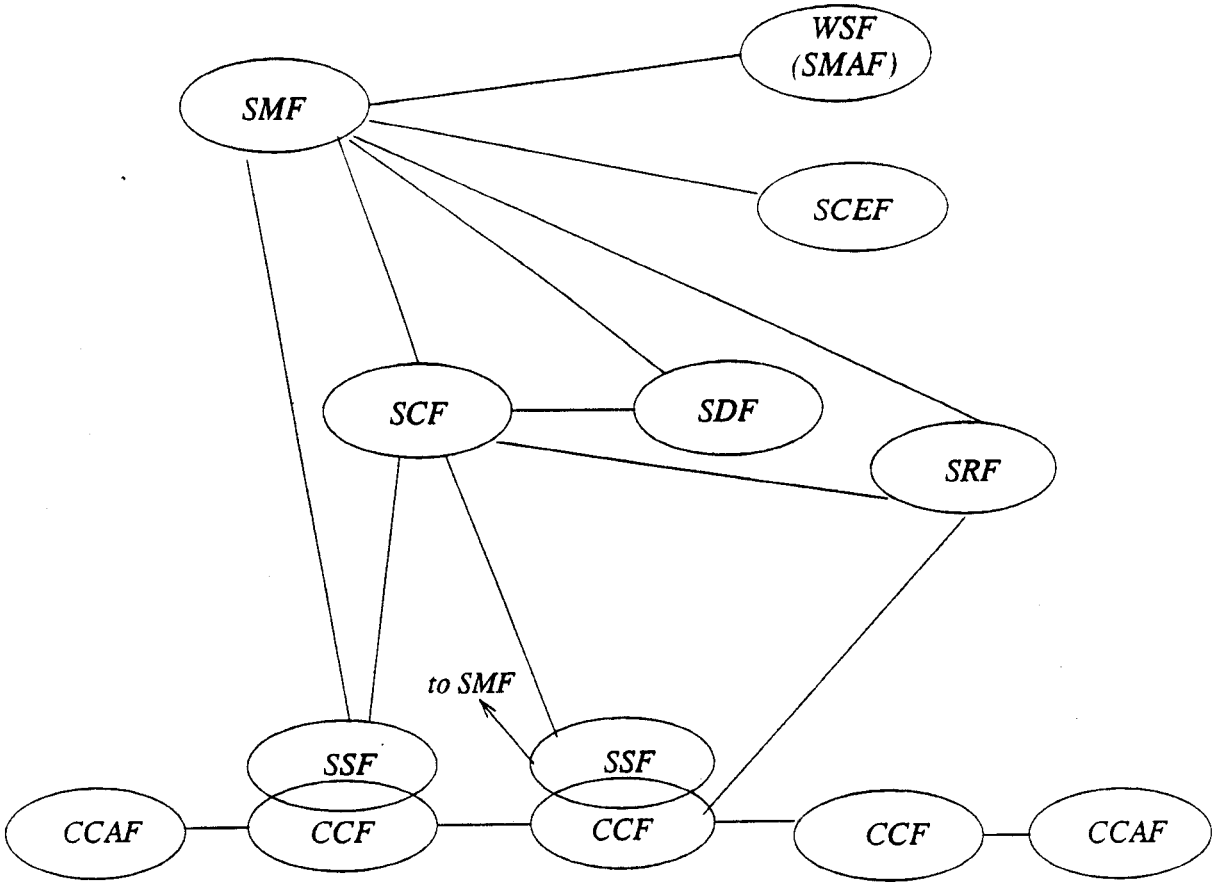


FIGURE 4/Q.1211 - Functions and Functional Relationships for CS-1

2.6.1 Network Functions

The network functions are described here.

Call Control Related Functions

SSF - Service Switching Function: This function interfaces with CCF and SCF. It allows the CCF to be directed by the SCF.

SRF - Specialised Resources Function: This function provides a category of resources for access by other network entities. Examples of resources include DTMF sending and receiving, protocol conversion, speech recognition, synthesised speech provision, etc.

CCF - Call Control Function: This function refers to call and connection handling in the classical sense (e.g., that of an exchange).

CCAF - Call Control Agent Function: This function provides the user access to the network.

Service Control Related Functions

SCF - Service Control Function: This function contains the IN service logic and handles service related processing activity.

SDF - Service Data Function: This function handles access to service-related data and network data and provides consistency checks on data. It hides from the SCF the real data implementation and provides a logical data view to SCF.

Management Related Functions

SCEF - Service Creation Environment Function: This function allows an intelligent network service to be defined, developed, tested and input to the SMF. The output of this function involves service logic and service data templates.

SMAF - Service Management Access Function: This function provides an interface (e.g., screen presentation, ...) to the SMF. It is also referred to as the Work Station Function (WSF).

SMF - Service Management Function: This function involves service management control, service provision control and service deployment control.

2.6.2 Control Architecture Principles

As stated in section 2.5 (Service Aspects), the service scope of CS-1 shall be restricted to single-ended, single- point-of-control services. This section identifies principles for the control architecture of CS-1, in the context of this service scope.

This section is organised around three control aspects:

— service invocation and control,

— end-user interaction with the SRF, and

— service management.

2.6.2.1 Service Invocation and Control

This control aspect involves the CCF, SSF and SCF. It will be illustrated by considering an originating CS-1 call.

A CS-1 service request from a calling party will typically consist of an off-hook, and/or an appropriate sequence of dialled digits. The CCF has no CS-1 service "knowledge", but is programmed to recognise that a CS-1 service request has taken place. It temporarily suspends call processing on behalf of the calling party, and passes appropriate call state information to the SSF.

The SSF is tightly coupled to the CCF, and, in CS- 1, it is expected that these two functions will constitute a single-vendor package. The role of the SSF is to interpret the service request and call state information, build a standardised query, and send the query via a standard protocol to the SCF.

SCF receives and decodes the query, and interprets it in the context of a CS-1 supported service. It formulates, encodes and sends a standardised response to the SSF. The formulation of the response may involve complex service logic leading to translations, the invocation of a prompt and collect sequence with the calling party (see also section 2.6.2.2 below), or a query to a separate SDF.

The SSF receives, decodes and interprets the SCF's response. It then provides explicit instructions to the CCF on how to complete the call set-up process on behalf of the end-user.

The following points capture key principles for CS-1:

1. The CCF retains ultimate responsibility for integrity of, and control of the local connection at all times.

2. The SSF to SCF relationship is, by definition, service-independent. Therefore the CCF and SSF should never contain service logic specific to CS-1 supported services.

3. In the event of SCF malfunction, or time-out in the SCF to SSF response, the SSF/CCF combination should be capable of reverting to a default call completion sequence, with appropriate announcement(s) to the calling and/or called party.

4. The SSF should never have to interact with more than one SCF at any given time in order to complete a sequence of query/response interactions on behalf of a calling or called party. In other words, the SCF should be a "single point of contact" for the SSF at any given time.

5. Call hand-offs (transfer of responsibility) between SCFs, and between SSFs are permitted in CS-1. However, the hand-off must be explicit, and must not violate principle 4.

2.6.2.2 End-user (Calling or Called Party) Interaction with the SRF

As part of the process of formulating a response to the SSF, the SCF may need to enter into a dialogue with the calling or called party. This would typically take the form of a prompt and collect sequence.

The SCF in CS-1 does not have the physical means to enter into this dialogue directly. Instead, it instructs the SRF to carry out a prompt and collect sequence with the calling or called party on its behalf.

In this typical scenario, the SCF would instruct the SSF to connect the end-user to an appropriate physical resource (e.g., a voice announcement system) within the SRF. It would also instruct the SRF on the particular prompt and collect sequence required. The SCF would then temporarily suspend processing of the call.

The SRF would activate the prompt and collect sequence, and enter into a dialogue with the calling or called party. The response, (e.g., a personal identification number) would be encoded and returned to the SCF, and the voice connection to the SRF would be dropped. The SCF would then resume its service control sequence as outlined in 2.6.2.1.

The following points capture key principles for CS-1:

6. The SCF has full IN-supported service control of instruction formulation and sequencing with respect to the SRF and SSF.

7. As a corollary to principle 6, there shall be no direct service control interaction between the SSF and SRF for CS-1 based services. The SSF and SRF have a peer-peer relationship for the control of CS-1 based services, and both are subsidiary to the SCF.

8. The SCF will require the capability of suspending processing of a CS-1 based service on behalf of a calling or called party, and then resuming on behalf of the same party at a later time.

2.6.2.3 Service Management

The control aspects covered in 2.6.2.1 and 2.6.2.2 address the real-time interactions between CS-1 functions on behalf of a particular calling or called party. In contrast, the service management aspect primarily addresses the network operator's interaction with the SSF, SCF, SDF, and SRF. This interaction normally takes place outside the context of a particular call or service invocation.

However, CS-1 must neither exclude nor constrain the capability of service customers to interact directly with customer-specific service management information (e.g., a personal service profile).

The following points capture key principles for CS-1:

9. The SMF, SCEF, and SMAF (also referred to as WSF) may be used to add, change or delete CS-1 based service related information or resources in the SSF, SCF, SDF, and SRF. Such changes should not interfere with CS-1 based service invocations or calls that are already in progress.

10. The network operator may, at its discretion, give the service customer the ability to add, change, or delete appropriate customer-specific information. The mechanisms and safeguards that are put into place by the network operator for this interaction may take advantage of CS-1 functions and capabilities .

2.6.3 Feature Interactions

The constraints placed on the CS-1 architecture have been put in place primarily to minimise and control feature interactions within single domains of responsibility.

The single-endedness of CS-1 based services means that all aspects of a call are under the control of one CCF/SSF and one SCF at any point in time, (principle 4). The SSF is therefore responsible for the handling of interactions between CS-1 based SSF/CCF capabilities, and non-IN features already embedded in CCF software.

The SSF/CCF functionality is expected to be implemented through a closely-coupled, single vendor approach in CS-1. Therefore, this feature interaction problem will be constrained within single-vendor domains in CS-1, and will not require multi-vendor standards.

2.6.4 Consistency Among CS-1 Supported Service Features

The ultimate responsibility for consistency of operations within a set of CS-1 based service features lies with the network operator. However, the software and data structures of the SCF, SDF, SMF and the tools provided by the SCEF, may be designed to aid the network operator in fulfilling this responsibility.

These are new areas for the telecommunications industry and CS-1 ETSs (and Recommendations) should not seek to control or constrain market-driven implementations of SMF, SMAF, or SCEF.

2.7 Functional Relationships and Interfaces

2.7.1 Reference Points and Identifiers for Functional Relationships

Figure 5 identifies the thirteen distinct functional relationships (presented in Figure 4) as reference points:

A. CCAF - CCF;

B. CCF - CCF;

C. CCF - SRF;

D. SSF - SCF;

E. SCF - SRF;

F. SCF - SDF;

G. SMF - SCF;

H. SMF - SDF;

I. SMF - SRF;

J. SMF - SMAF;

K. SMF - SCEF;

L. SMF - SSF; and

M. SSF - CCF.

(Five more functional relationships are related to network inter-working, and they are introduced and discussed at the end of section 2.7.)

2.7.2 Control Classes

The first six functional relationships of the above subsection (i.e., A, B, C, D, E, and F) require control capabilities. Four groupings of control capabilities, called control classes have been identified:

1) Connection-Control Capabilities: the capabilities to establish, provide surveillance, and clear the bearer connections (e.g., voice paths through the network);

2) Call-Control (Non-IN Service-Control) Capabilities: the capabilities to invoke the user and provide the end-to-end control required for the non-IN delivery of supplementary services. The non-IN delivery does not involve the structured separation of the CCF, SSF, and SCF;

3) IN Service-Control Capabilities: the capabilities that involve the structured separation of the SSF from SCF; and

4) Management-Related Control Capabilities.

The management-related control capabilities are not specified in the CS-1 Recommendations (and corresponding ETSs).

2.7.3 Reference Point Identifiers and Control Relationships

The functional relationship at a reference point may provide for one or more control classes. Each combination of a functional relationship and a control class is referred to as a control relationship and is identified by an `<alpha>.<numeric>` string, where `<alpha>` identifies the functional relationship and `<numeric>` identifies the control class. For example, D.3 is the SSF-SCF control relationship for the IN Service Control.

2.7.4 CS-1 Non-IN Connection and Call Control

For the CS-1 IN-structured network, the control relationships can be realised through existing standard interfaces as follows:

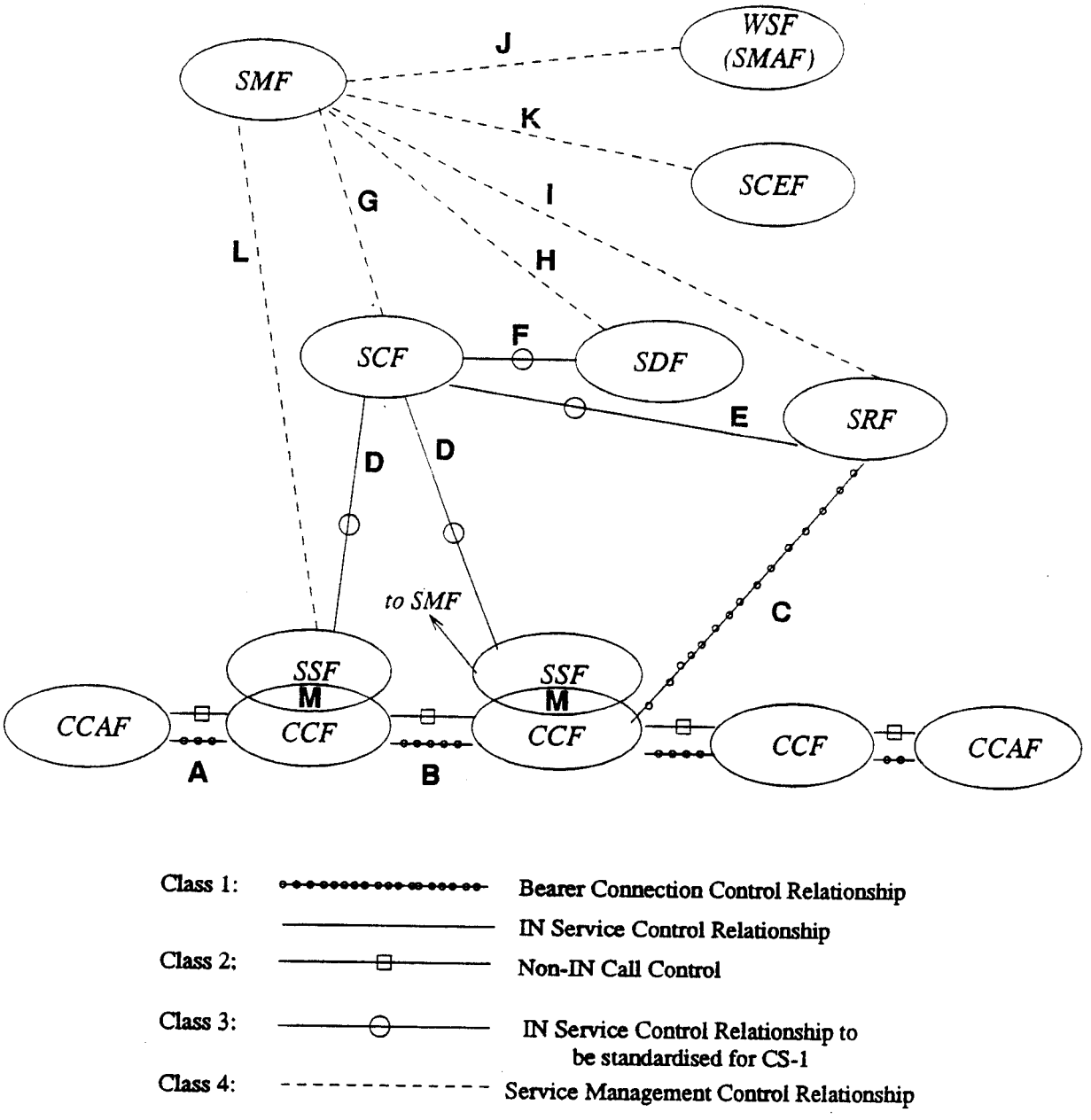


FIGURE 5 - Functional Relationships and Reference Points for CS-1

A.1 - DSS1/Q.931;

A.2 - DSS1/Q.932;

B.1 and B.2 - SS7/ISUP; and

C.1 - DSS1/Q.931; SS7.

The functional relationship at reference point M is, by its nature, non-standard; however, the CS-1 BCM/BCSM studies assure that the present digital switching technology can isolate the SSF from the CCF

and gain access to the extended service control offered by the SCF.

2.7.5 CS-1 IN Service Control

CS-1 specifies three new functional relationships at reference points D, E, and F. The physical aspects of the realisation of each functional relationships (e.g., the transport mechanism for carrying the control) do not imply a direct physical interface between the involved network functions. Indeed, the interconnection between two network functions may be provided through an SS7 Network. In addition, for CS-1, the messages relevant to the reference point E may pass through a separate physical entity containing the SSF.

To this end, the CS-1 standardisation defines the IN Application Service Elements (ASEs) independent of the underlying protocol stack; the definition of ASEs aligns with IS 9545.

The CS-1 IN standardisation recommends that the IN ASEs be used with existing standardised protocol stacks. For the three new control relationships (at D,E and F), the existing standard protocol stacks include the following:

D.3 - SS7/TCAP, DSS1/Q.932;

E.3 - SS7/TCAP, DSS1/Q.932; and

F.3 - SS7/TCAP, DSS1/Q.932.

The ASEs at reference points D, E, and F are defined separately, yet based on a common structure, helps to develop a modular and flexible IN Application Protocol (INAP). The INAP, in turn, facilitates flexible packaging of the SSF, SCF, SDF, and SRF into a variety of different physical entities.

While CS-1 supports a rich range of IN capabilities, its flexibility allows network operators to select only those that meet their individual service plans; a network operator may use only a subset of CS-1. For this reason, the CS-1 INAP supports the selection of different subsets of capabilities.

The number, nature, and content of the ASEs have been determined based on the decomposition of standardised SIBs. This process has also considered the services outlined in Section 2.5.

As depicted in Figure 6, the definition of INAP ASEs, reflects the capabilities that can be differentially applied to separate classes of Type A services. These classes are as follows:

1) The class that includes the services that benefit from IN service control in call set-up and tear-down phases;

2) The class that includes the services that require mid-call control; and

3) The class that includes the services that require topology manipulation.

The substantial benefits from the standardised structural separation of SCF/SDF/SRF from SSF are as follows:

- This separation allows for the multi-vendor SSF and SCF implementations;
- This separation allows for the multi-vendor SRF implementations; and
- This separation allows for network inter-working of the SCF and SDF implementations (e.g., the access of an SCF entity to an SDF entity in another network).

2.7.6 Service Management for CS-1

The management-related functional relationships at reference points G, H, I, J, K, and L remain to be specified in subsequent IN capability sets. For CS-1, it is expected that market forces will result in customer-responsive non-standard solutions for the associated interfaces, and that multi-vendor objectives of IN will be met in subsequent Capability Sets.

2.7.7 Network Inter-working in CS-1

Network inter-working is a process, in which several networks cooperate to provide a service. The need for inter-working capabilities arises when customers wish to access the services that cannot be provided by one network alone. A typical example of such a situation is when the data needed by a service (e.g., UPT or

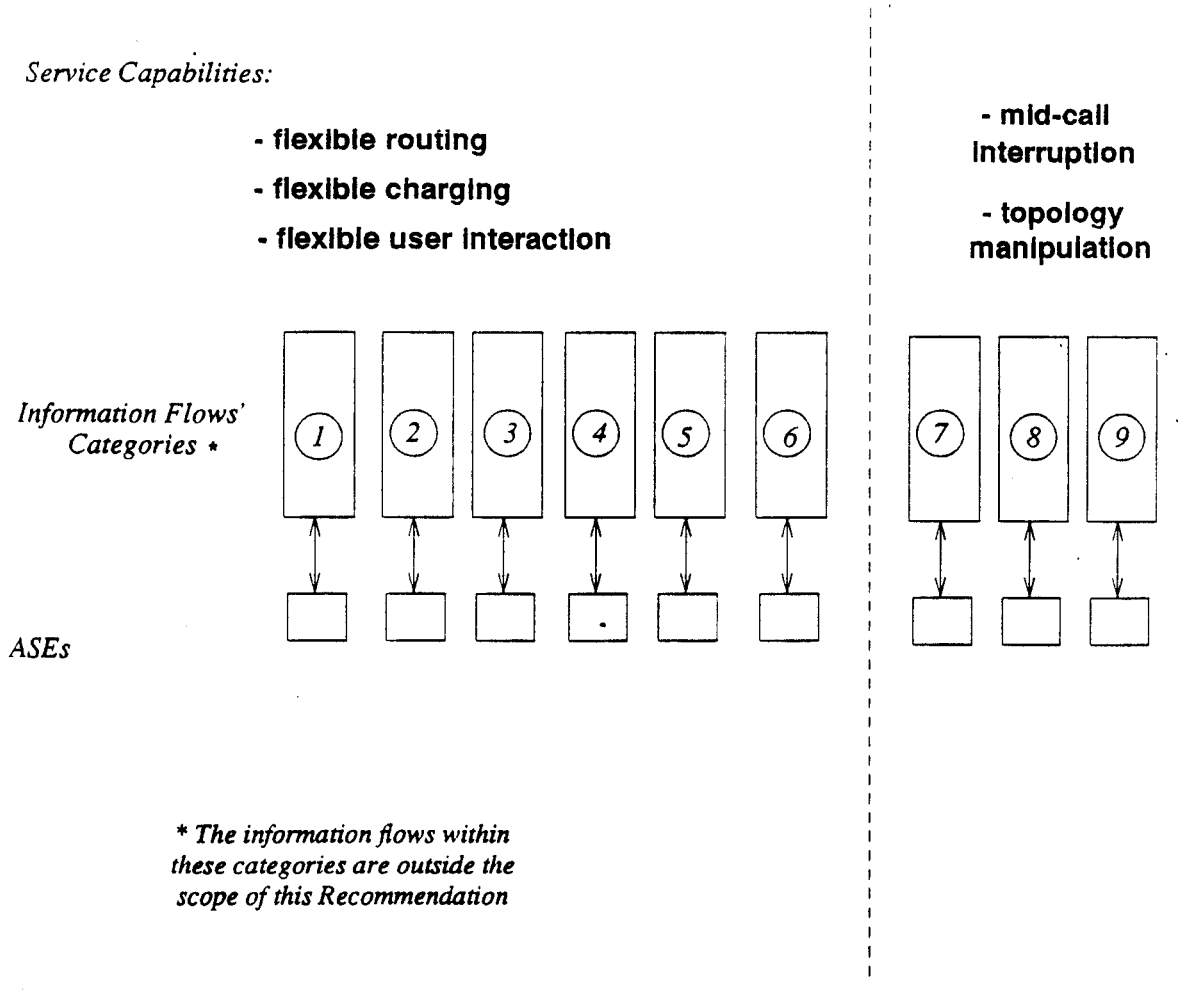


FIGURE 6 - Categorisation of Information Flows

VPN) reside in a network that is different from the one in which the call has originated.

General requirements for network inter-working capabilities are presented in section 2.2.6 of TC-TR1 (and corresponding draft Recommendation Q.1201).

Although the involved networks may have different access types (i.e, PSTN, ISDN, etc.), as well as different levels of IN structure, the services should be provided to customers in a consistent way, regardless of such differences.

Similarly to Figure 5 that depicts the functional relationships and their associated reference points between the IN functions within one network, Figure 7 depicts possible functional relationships between the IN functions that are located in two different networks:

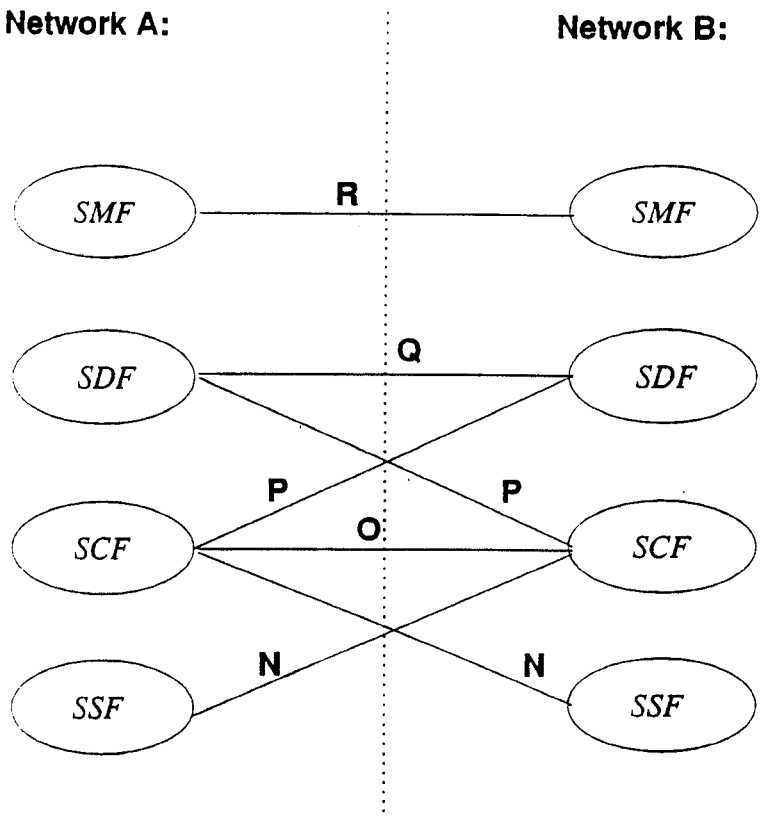


FIGURE 7 - Possible Network Interworking Functional Relationships

N. SSF - SCF;

O. SCF - SCF;

P. SCF - SDF;

Q. SDF - SDF; and

R. SMF - SMF.

As far as the CS-1 is concerned, the following observations take place:

1. Because it has been decided (cf. section 2.2.6 of TC-TR1 /draft Recommendation Q.1201, which bases this decision on the necessity to maintain the network security and network integrity) interworking between the SSF in one network and the SCF in another one is not a CS-1 requirement, the functional relationship at reference point N is out of the scope of CS-1;

2. Because of the CS-1 requirement for a single point of control, there is no control relationship between two SCFs, and therefore the functional relationship at reference point O is out of the scope

of CS-1:

3. Because in several IN services (e.g., UPT and VPN), the SCF performs translation and validation via information exchange with the SDF, the functional relationship at reference point P is within the scope of CS-1;

4. Because the function of the SDF-to-SDF relationship is to hide the distributed nature of the IN database from the SCF, it is not related to IN Service Control, and, therefore, the functional relationship at reference point Q is out of the scope of the CS-1 IN Specification; and

5. Because the SMF-to-SMF relationship is related to Service Management (i.e., TMN), the functional relationship at reference point R is out of the scope of the CS-1 IN Specification.

The preceding analysis explains the CS-1 IN Network Inter-working effort has concentrated on developing information flows and relevant application layer protocol for the functional relationship at reference point P. Where possible, the CS-1 Recommendations (and corresponding ETSs) identify the requirements for the services to be specified in other standards activities (relative to the functional relationship at reference points Q and R). Wherever possible, the CS-1 Recommendations (and corresponding ETSs) identify alternative interfaces (e.g., SCCP-GTT, X.500, or CMISE) for these domains.

2.7.8 Summary of CS-1 Control Relationships

The following Table 4 summarises the CS-1 control relationships:

CCAF									
CCF	A1,2	**B1,2**							
SSF		(M3)*							
SRF		C1							
SDF					(Q3)				
SCF			D3	E3	F3 **P3**	(O3)			
SCEF									
SMAF									
SMF			(L3)	(I3)	(H3)	(G3)	(K3)	(J3)	(R3)
	CCAF	CCF	SSF	SRF	SDF	SCF	SCEF	SMAF	SMF

Legend:

(...): not standardised for CS-1

**: vendor-specific relationship*

▭ *: used for network inter-working*

empty space: no relationship

TABLE 4 - Summary of CS-1 Control Relationships

ANNEX A (normative): Proposed Document Structure for ETSI Standards on IN

A: Overview of ETSI IN documents and their associated responsibilities

The following table shows the ETSI documents, their delivery dates. responsible ETSI STC, type and delivery date.

Type	Corresponding CCITT Number	Title	Resp.	Date
TC-TR1	Q.1201	Principles of IN Architecture	NA6	Oct.'91
TC-TR1	Q.1202	IN Service Plane Architecture	NA6	Oct.'91
TC-TR1	Q.1203	IN Global Fct.Plane Arch.	NA6	Oct.'91
TC-TR1	Q.1204	IN Distributed Fct.Plane Arch.	NA6	Oct.'91
TC-TR1	Q.1205	IN Physical Plane Arch.	NA6	Oct.'91
*	Q.1208	IN Interface Req. - General	SPS3	-
**	Q.1209	IN Users Guide	NA6	-
TC-TR1	Q.1290	Vocabulary of Terms	NA6	Oct.'91
TC-TR2	Q.1211	Introduction to IN CS-1 *****	NA6	Oct.'91
ETS	Q.1213	Global Fct.Plane for IN CS-1	NA6	Jul.'92
ETS	Q.1214	Distributed Fct.Plane for IN CS-1	NA6***	Jul.'92
ETS	Q.1215	Physical Plane for IN CS-1	SPS3	Jul.'92
ETS	Q.1218	IN Interface Recommendations	SPS3	Jul.'92
****	Q.1219	IN Users Guide for CS-1	****	-

* if this TC-TR is turned into ETS it should be approved by SPS3

** probably will not be produced in CS-1 timeframe

*** input is needed from SPS3 on technical issues

**** this document does not seem appropriate for an ETS since it contains explanatory text

***** this includes the overview and relationship with other ETSI STCs as well as the CS-1 work plan

B: Structure of individual ETSs

Note: For a more detailed structure the reader is referred to draft CCITT Recommendation Q.1200

ETS = Q.1213 Global Functional Plane for IN CS-1

1 General

2 CS-1 Service Independent Building Blocks (SIBs)

3 Basic Call Process

4 Global Service Logic

5 Mapping of the Service Plane to the Global Functional Plane

ETS = Q.1214 Distributed Functional Plane for IN CS-1

1 General

2 Scope of IN Distributed Functional Plane for CS-1

3 Distributed Functional Plane Model for CS-1

4 Functional Entity Modelling for Service Execution

5 Relationships between Functional Entities

6 Mapping Requirements

7 Mapping the Distributed Functional Plane to the Physical Plane

ETS = Q.1215 Physical Plane for IN CS-1

1 General

2 Requirements and Assumptions

3 Physical Entities

4 Mapping Requirements

5 Mapping the Distributed Functional Plane to the Physical Plane

ETS = Q.1218 IN Interface Recommendations

0 Introduction

1 Services Provided by INAP

2 Abstract Syntax of the IN CS-1 Application Protocol

3 Procedures

ANNEX B (informative): Relationship and Mapping between CS-1 Services and Service Features

TABLE B/1 - Mapping between Services and Service Features (first half)

SERVICES	SERVICE FEATURES (first half)																		
	ABD	ATTC	AUTZ	AUT	ACB	CD	CF	CFC	GAP	CHA	LIM	LOG	QUE	TRA	CW	CUG	COC	CPM	CRA
ABD	C											O						O	
ACC	C		C									O							
AAB	O		C									O						O	
CD						C						O						O	
CF							C					O						O	
CRD								O			O	O	O					O	O
CCBS					C							O			O				
CON												O					O	O	
CCC	O		C									O							
DCR						C						O						O	
FMD												O						O	
FPH				O		O		O	O		O	O	O					O	O
MCI												C							
MAS						O			O		O	O	O					O	O
OCS												O						O	
PRM						O		O	O		O	O	O					O	O
SEC				C								O						O	
SCF								C				O						O	
SPL						O		O	O		O	O	O					O	O
VOT						O			O		O	O	O					O	O
TCS												O						O	
UAN						O		O	O		O	O	O					O	O
UPT			C									O						C	O
UDR												O						O	
VPN	O	O	O	O		O				O		O	O	O		O	O	O	O

Legend:

C = Core: The particular service feature is fundamental to the service, i.e., in the absence of this service feature the name of the service does not make sense as a commercial offering to the service subscriber.

O = Optional: The service feature is not core, i.e., also without this service feature the name of the service would still make sense as a commercial offering to the service subscriber. Therefore, the service feature can be regarded an optional enhancement to the service.

TABLE B/2 - Mapping between Services and Service Features (second half)

SERVICES	SERVICE FEATURES (second half)																		
	CRG	DUP	FMD	MAS	MMC	MWC	OFA	ONC	ONE	ODR	OCS	OUP	PN	PRMC	PNP	REVC	SPLC	TCS	TDR
ABD		O																	
ACC												C							
AAB												C							
CD									C	O									O
CF																			
CRD									C										
CCBS																			
CON					O	C													
CCC												C							
DCR										O									O
FMD			C																
FPH	O	O		O					C	O	O	O				C			O
MCI											C								
MAS				C						O	O	O							O
OCS											C								
PRM	O	O							C	O	O	O		C					O
SEC																			
SCF																			
SPL	O	O							C	O	O						C		
VOT				C						O	O	O							O
TCS																		C	
UAN	O								C	O	O	O							O
UPT		O	C									O	C				C		O
UDR										O									O
VPN	O		O				O	O				O			C				O

Legend:

C = Core: The particular service feature is fundamental to the service, i.e., in the absence of this service feature the name of the service does not make sense as a commercial offering to the service subscriber.

O = Optional: The service feature is not core, i.e., also without this service feature the name of the service would still make sense as a commercial offering to the service subscriber. Therefore, the service feature can be regarded an optional enhancement to the service.

ANNEX C (informative): Short Prose Descriptions of Targeted Services and Service Features

Note: *The prose descriptions in this annex are only a compilation of available descriptions (from various sources) of targeted services and service features. These were used to develop the current Q.121x series Recommendations (and corresponding ETSs) as CS-1 is intended to support evolutionary services. The descriptions provided for the targeted services and service features are for the above-mentioned purposes only and are not to be used by service designers for service creation.*
There may be more than one prose description for each service/service feature. The descriptions are not necessarily consistent with each other.

Descriptions of Targeted Services:

- Abbreviated Dialling (ABD)

The capability is an originating line feature that allows business subscribers to dial others in their company using, e.g., only four digits even if the calling user's line and the called user's line are served by different switches. This capability extends switched based intercom calling beyond the switch boundary.

Typical scenarios might include:

1. Caller A (location A) dials extension number of caller B (location B) and the network connects the call.
2. Caller A forwards his line to Called B (different location) using B's extension number. Caller C calls A and is forwarded to B.

- Account Card Calling (ACC)

Description #1:
The Account Card Calling service allows a user to make a call from any card reading telephone and have the charges for the call automatically debited to a domestic or business account number as defined by the card content. The user is given an access code and a personal identification number (PIN). The user invokes the service by dialling the access code and on request, enters his PIN and 'wipes' the card through the reader. The system validates the information and gives the user an indication of acceptanc e. The user can then proceed in the usual manner of making a call.

Description #2:
The Account Card Calling service allows subscribers to place calls from any normal access interface to any destination number and have the cost of those calls charged tot he account specified by the ACC number.

Description #3:
This service allows the caller to be automatically charged on a telephone account subscribed with the network operator, for any type of outgoing call. The caller has to dial his card number and a pin code, then the called number.

As an option, forward calls may be allowed, without dialing again card number and pin code.

- Automatic Alternative Billing (AAB)

Description #1:
The AAB service enables a user to make a call from any telephone and for the call charge to be billed to the user's account which is specific to this service, and which does not refer either to the calling line or

to the called line.

An Account Code and PIN number are allocated to a service user by service management procedure.

To invoke the service, the user dials an access code as a free call. Different access codes could be used to identify the language to be used. The user then receives announcements asking for him to dial his Account Code and PIN number. The Account Code and PIN are validated, and a check could be made for expired credit limits.

Note: Account/Credit Card Calling is similar, with the Account No. being supplied using a card wipe.

PIN = Personal Identification Number

Description #2:
This service allows a user to call another user and ask him to receive the call at his expenses. Two steps may be defined: the calling Party is welcomed to record a brief message giving the caller's name and explaining the call reason, then the called party is alerted, receives the recorded message and is asked to accept to be charged for that call.

- Call Distribution (CD)

This service allows a subscriber to have incoming calls routed to different destinations, according to an allocation law which may be real-time managed by the subscriber.

Three types of law may exist:

— circular distribution, where the calls are routed to the different locations with a uniform load,

— percentage distribution, where the calls are routed to the different locations according to a percentage,

— hierarchical distribution, where the first location to be chosen is the first met in the priority list.

Whatever the law, for each location, in case of busy, may exist the possibility of an overflow on an alternate location.

- Call Forwarding (CF)

Description #1:
Call forwarding allows the called user to forward calls to another telephone number when this service is activated. With this service, all calls destined to the subscriber's number are redirected to the new telephone number.

This service is under control of the subscriber and can be activated/deactivated by the subscriber.

When this service is activated, the subscriber's line will receive an alerting ring, "reminder ring", to indicate that the service is activated.

Description #2:
This service permits the user to have his incoming calls addressed to another number, no matter what the called party line status is. The user's originating service is unaffected, even for charging.

- Call Rerouting Distribution (CRD)

This service permits the subscriber to have his incoming calls encountering a triggering condition (busy, specified number or rings, queue overload or call limiter) rerouted according to a predefined choice: the calls may be rerouted on another destination number (including pager or vocal box), rerouted on a standard or customised announcement, or queued.

- Completion of Calls to Busy Subscriber (CCBS)

  This service allows a calling user encountering a busy destination to be informed when the busy destination becomes free, without having to make a new call attempt.

- Conference Calling (CON)

  Conference Calling allows the connection of multiple parties in a single conversation. The number of parties allowed to be connected simultaneously will vary based on transmission bridging requirements to insure quality of service.

  A. Conference Calling Add-On

     This service allows the user to reserve a conference resource for making a multi-party call, indicating the date, time and conference duration. Once the conference is active, the user controls the conference, and may add, drop, isolate, reattach or split parties.

  B. Conference Calling Meet-me

     This service allows the user to reserve a conference resource for making a multi-party call, indicating the date, time and conference duration. In due time, each participant in the conference has to dial a special number which has been attached to the booked conference, in order to access to the conference bridge.

- Credit Card Calling (CCC)

  Description #1:
  The Credit Card Calling service allows subscribers to place calls from any normal access interface to any destination number and have the cost of those calls charged to the account specified by the CCC number.

  Description #2:
  This service allows the caller to be automatically charged on a bank card account, for any type of outgoing call. The caller has to dial his card number and a pin code, then the called number.

  As an option, forward calls may be allowed, without dialing again card number and pin code.

- Destination Call Routing (DCR)

  Description #1:
  This service allows customers to specify the routing of their calls to destinations according to:

  a. Time of day, day of week etc.
  b. Area of call origination.
  c. Calling Line Identity of customer.
  d. Service attributes held against the customer.
  e. Priority (e.g. from input of a PIN).
  f. Charge rates applicable for the destinations.
  g. Proportional routing of traffic.

  Description #2:
  Destination Call Routing allows a subscriber to have incoming calls routed to different destinations, based upon the geographic locations of the calling parties. There are also optional reports which provide the subscriber with data on all their incoming calls and can include details such as date and time of call.

Typical call scenarios might include:

1. Calling User A dials subscriber's published Directory Numbers (DN) and, based upon geographic criteria, is routed to subscriber's location C.
2. Calling user B dials subscriber's published DN and, based upon geographic criteria, is routed to subscriber's location D.

- Follow-Me-Diversion (FMD)

Description #1:
Follow-Me-Diversion allows the service subscriber to remotely control the redirection (diversion) of calls from his primary telephone number to other locations. The subscriber is allowed to update the diversion location telephone number, from a standard telephone instrument, as he moves from location to location.

Description #2:
This service allows the subscriber to remote control his call forwarding capabilities, basically the number to which the calls are forwarded, from any point in the network.

Description #3:
With this service, a user may register for incoming calls to any terminal access. When registered, all incoming calls to the user will be presented to this terminal access. A registration for incoming calls will cancel any previous registration. Several users may register for incoming calls to the same terminal access simultaneously. The user may also explicitly deregister for incoming calls.

- Freephone (FPH)

Description #1:
This service allows a reverse charging, the subscriber accepting to receive calls at its expenses and being charged for the whole cost of the call.

Description #2:
Freephone allows the served user having one or several installations to be reached from all or part of the country, or internationally as appropriate, with a freephone number and to be charged for this kind of call.

- Malicious Call Identification (MCI)

Description #1:
Malicious Call Identification allows the service subscriber to control the logging (making a record) of calls that are received that are of a malicious nature.

Description #2:
This service enables a user to request that the source of an incoming call is identified and registered in the network. The following information at least is to be registered: called party number, calling party number, time and date of the request. The service may be invoked either during or after the active phase of the call, but before the called user has cleared; as an option, it may be invoked by the network on all calls that are not answered.

As an option, the holding of the connection may be provided until the intervention of the service provider.

- Mass Calling (MAS)

Description #1:
Using this service, the network operator can temporarily allocate a single directory number to the served

user. Each time a call is made to this number by an end user. the user will be played an announcement and asked to input a further digit to indicate a preference. The choice made will be recorded and a count incremented. When the service has ceased the network operator will supply details of the total "votes" cast for each preference will be supplied to the served user and the special number will be re -allocated. Calls made to this special number may be charged at varying rates.

Description #2:
Mass calling involves instantaneous, high-volume traffic which is routed to one or multiple destination(s). Calls can be routed to these destination numbers based on various conditions, such as the geographical location, time of day. The calling party will be charged for this kind of call.

- Originating Call Screening (OCS)

Description #1:
Originating calls may be controlled by the Originating Call Screening capability. This allows the subscriber to specify that outgoing calls be either restricted or allowed, according to a screening list and, optionally, by time of day control. This can be overridden on a per call basis by anyone with the proper identity code.

Typical scenarios might include:

1. Calling User A attempts to make a call. The call is screened via the screening list assigned to the originating line. The call is allowed to complete and is connected.
2. Calling User A attempts to make a call to a line with deactivated override feature. The call is screened via the screening list assigned tot he originating line. The call is not allowed to complete. Since the override option is not active, there are no override prompts.
3. Calling User A attempts to make a call to a line with an activated override feature. The call is screened via the screening list assigned to the originating line. The call is not allowed to complete. Since the override option is active, the user is prompted for the identity code and enters the proper code. The call is connected.

Description #2:
This service allows a subscriber to authorise or not outgoing calls, according to a list of authorised or restricted directions or numbers. This list may be managed by the subscriber. The user may escape to the restriction by giving a pin code.

- Premium Rate (PRM)

Description #1:
This service allows to pay back a part of the call cost to the called party, considered as an added value service provider.

Description #2:
Premium Rate allows the served user having one or several installations to be reached from all or part of the country, or internationally as appropriate, with a premium rate number. The calling party will be charged with a premium rate for this kind of call.

It is a service that can be available in the public telephone network whereby, a service provider having connections to the public network can be allocated a special telephone number by a network operator, known as a Premium Rate number.

The Provider is able to earn revenue for each call successfully made to his premium rate number. In return he provides callers with some form of information service via the call connection. Calls to the premium rate number are charged to the caller at special rates to cover the price of the call and the price of the information service. The network operator administration collects the revenue for each call and

shares it with the provider.

The geographical location of the provider is unrelated to his premium rate number i.e. he can be located anywhere in the network. The provider may specify the catchment area from which he wishes to receive calls. In the case of multi-site providers, the site to which the caller is connected can depend on the catchment area in which the call originated.

- Security Screening (SEC)

Description #1:
This capability allows security screening to be performed in the network before an end-user gains access to the subscriber's network, systems, or applications. Access Code Abuse Detection is a capability which will generate a report on the invalid access attempts: how many, over what time period, by whom, and from where. This provides and added layer or security.

The following are typical call scenarios for these capabilities:

1. Caller A dials subscriber's DN, enters correct Personal Identification Number (PIN) when prompted, clears network screening and is connected. Call data is recorded.
2. Caller B dials subscriber's DN, enters invalid PIN on first and subsequent prompts, fails network screening, and is connected to announcement. Call data is recorded and reports of invalid codes attempted are printed.
3. Caller C dials subscriber's DN, initially enters incorrect PIN, but corrects it upon re-prompt, clears network screening, and is connected. Call data is recorded along with re-prompts/re-entries.

Description #2:
This service asks the user to dial a pin code, which allows the verification of the user identity before given him access to the subscriber's network, systems or application. As an option, the invalid access attempts may be registered.

- Selective Call Forwarding on Busy/Don't Answer (SCF)

Description #1:
Selective Call Forwarding - Busy/Don't Answer (SCF-BY/DA) allows the called user to forward particular pre-selected calls if the called user is busy or does not answer with Y6 seconds or X rings. The calls will be pre-selected based upon a SCF-BY/DA list. This list will have 1-5 or 1-10 numbers with a default Call forward number for calling users not in the list. There will also be remote access and time of day indicators for this capability.

Typical scenarios may include:

1. Called User B has SCF-BY/DA assigned. Caller A dials B's number, called B does not answer the phone with Y seconds. Based upon the SCF-BY/DA list, Caller A is forwarded to User C.
2. Called User B has SCF-BY/DA assigned. Caller D dials called B's number, called B is busy with called User C. Based upon the SCF-BY/DA list. Caller D is forwarded to User E.
3. Called User B has SCF-BY/DA assigned. Caller A and Caller C dial Called B's number, Called B does not answer the phone within Y seconds. Based upon the SCF-BY/DA list entry for Caller A. Caller A is forwarded to User D. Caller C is not in list, therefore Caller C is forwarded to default User E.

Description #2:
Selective Call Forwarding

This service permits the user to have his incoming calls addressed to another number, no matter what

the called party line status is, if the calling line identity is included in, or excluded from, a screening list. The user's originating service is unaffected, even for charging.

Call Forwarding on Busy

This service permits the user to have his incoming calls addressed to another, number if they encounter a busy condition. The user's originating service is unaffected, even for charging.

Call Forwarding on Don't Answer (no reply)

This service permits the user to have his incoming calls addressed to another number, if they encounter no reply. The user's originating service is unaffected, even for charging.

- Split Charging (SPL)

Description #1:
This service allows a split charging, the calling and the called party being each charged for one part of the call.

Description #2:
This service enables a network operator to distribute the charges for a call between the two parties involved.

Description #3:
Split Charging allows the service user having one or several installations to be reached from all or part of the country, or internationally as appropriate, with a split charging number. Both the calling party and the served user will be charged with a split charging rate for this kind of call.

- Televoting (VOT)

Description #1:
This service allows the subscriber to propose a phone voting, the user being asked, either to ring a specific number according to his choice, or to ring a unique number and, after prompting, to give his choice by keyboard or by voice dialog.

Description #2:
Televoting enables subscribers to survey public opinion using the telephone network. Persons wishing to respond to an opinion poll can call advertised televoting numbers to register their votes. The charging is to the discretion of the service subscriber.

Description #3:
Using this service, the network operator can temporarily allocate directory numbers to the served user. Each time a call is made to one of the numbers by an end user, the user will be played an announcement acknowledging the call, and a count of calls made to this number will be incremented. When televoting has ceased the network operator will supply details of the total numbers of calls made to each number to the served user and the special numbers will be re-allocated. Calls made to these special numbers may be charged at varying rates.

- Terminating Call Screening (TCS)

Terminating calls may be controlled by the Terminating Call Screening capability. This allows the subscriber to specify that incoming calls be either restricted or allowed, according to a screening list and optionally, by time of day control.

Typical scenarios might include:

1. Calling User A attempts to make a call to B. The call is screened via the screening list assigned to B's line. The call is allowed to complete and is connected.

2. Calling User A attempts to make a call to B. The call is screened via the screening list to B's line. The call is not allowed to complete and is connected to an announcement.

- Universal Access Number (UAN)

Description #1:
This service allows a subscriber with several terminating lines in any number of locations or zones to be reached with a unique directory number. The subscriber may specify which incoming calls are to be routed to which terminating lines, based upon the area the call originate.

Description #2:
This service enables a service provider to publish a national number and have incoming calls routed to a number of different destinations based on the geographical location of the caller.

One typical scenario might have the published national number as a freephone number.

There should be an option to provide the service provider with subscriber data on all incoming calls such as date and time of call and the service provider's location that the call was routed to.

- Universal Personal Telecommunications (UPT)

Description #1:
UPT is a mobility service which enables subscribers to make use of telecommunication services on the basis of a unique Personal Telecommunication Number (PTN) across multiple networks at any network access. The PTN will be translated to an appropriate destination number for routing based on the capabilities subscribed to by each Service Subscriber.

Description #2:
This service provides personal mobility by enabling a user to initiate any type of service and receive any type of call on the basis of a unique and personal network-independent number, across multiple networks, at any user-network access (fixed, movable or mobile), irrespective of geographic location, limited only be terminal and network capabilities.

- User-defined Routing (UDR)

This capability allows the subscriber to specify how outgoing calls, from the subscriber's location, shall be routed, either through private, public, or virtual facilities or a mix of facilities, according to the subscriber's routing preference list. These lists will apply to individual lines or to several lines at the subscriber's location. Typical scenarios might include:

1. Calling User A dials from the subscriber's line; the subscriber's routing list specifies the call will only be routed over private facilities.

2. Calling User A dials from the subscriber's line and the subscriber's routing list allows public facilities between 16.00 and 08.00 and private facilities from 08.00 to 16.00. Time is 15.31, so call is routed only over private facilities to location. Calling user A now dials from subscriber's line at 16.08 and so call is routed over public route to the destination.

- Virtual Private Network (VPN)

Description #1:
This service permits to build a private network by using the public network resources. The subscriber's lines, connected on different network switches, constitute a virtual PABX, including a number of PABX capabilities, such as private numbering plan, call transfer, call hold, and so on.

As an option, to each private user, either a class of service or specific rights and privileges may be attributed. As another option, a private user may access his private network from any point in the network keeping, after authentication, his class of service or his specific rights and privileges.

Description #2:
This service permits the use of public network resources to provide private network capabilities without necessarily using dedicated network resources. The subscriber's lines, connected to different network switches, constitutes a virtual private network that may include private network capabilities, such as dialing restrictions, private numbering plan, hold, call transfer, and so on.

A PNP may provide a group of users the capability to place calls by using digit sequences having different structures and meaning than provided by the public numbering plan, or PNP may utilise the public numbering plan's digit sequences, structures and meaning.

Description #3:
VPN allows a subscriber to define and use a private numbering plan for communication across one or more networks between nominated user access interfaces. A PNP provides a group of users the capability to place calls by using digit sequences having different structures and meanings than provided by the public numbering plan.

Descriptions of Targeted Service Features:

- Abbreviated Dialling (ABD)

  Description #1:
  This feature allows the definition of abbreviated dialling numbers with a VPN. For the users of the VPN, the abbreviated dialling numbers are not subjected to call restrictions. e.g. a PVN user may not be allowed to access the Off-net Calling service feature but can reach an off-net number via this feature.

  Description #2:
  This feature allows the definition of abbreviated dialling digit sequences to represent the actual dialling digit sequence, i.e., a two digit sequence may represent a complete dialling sequence for a private or public numbering plan.

  Description #3:
  This service feature is an originating line feature that allows business subscribers to dial others in their company using a short numbering, even if the calling user's line and the called user's line are served by different switches.

- Attendant (ATT)

  This service feature allows VPN users to access an attendant position within the VPN for providing VPN service information (e.g. VPN numbers). The attendant(s) can be accessed by dialling a special access code.

- Authentication (AUTC)

  This service feature allows for the verification that a user is allowed to exercise certain options in a telephone network. In other words, the request made by the user is authentic and should be granted.

- Authorisation Code (AUTZ)

  This service feature allows a VPN user to override calling restrictions of the VPN station from which the call is made. Different sets of calling privileges can be assigned to different authorisation codes and a given authorisation code can be shared by multiple users.

- Automatic Call Back (ACB)

  This service feature allows the called party to automatically call back the calling party of the last call directed to the called party.

- Call Distribution (CD)

  This service feature allows the served user to specify the percentage of calls to be distributed among two or more destinations. Other criteria may also apply to the distribution of calls to each destination.

- Call Forwarding (CF)

  This service feature allows the user to have his incoming calls addressed to another number, no matter what the called party line status may be.

- Call Forwarding on Busy/Don't answer (CFC)

  This service feature allows the called user to forward particular calls if the called user is busy or does not answer within a specified number of rings.

- Call Gapping (GAP)

  Description #1:

This service feature allows the service provider to automatically restrict the number of calls to be routed to the subscriber.

Description #2:
This service feature allows to restrict the number of calls to a served user to prevent congestion of the network.

- Call Hold with Announcement (CHA)

The Call Hold with Announcement service feature allows a subscriber to place a call on hold with options to play music or customised announcements to the held party.

- Call Limiter (LIM)

Description #1:
This service feature allows a served user to specify the maximum number of simultaneous calls to a served user's destination. If the destination is busy, the call may be routed to an alternative destination.

Description #2:
This service feature enables to count the running calls to the subscriber and to reject all the new calls when a threshold of simultaneous calls is reached. As an option, this threshold may be real time managed by the subscriber.

Associated with Call Volume Distribution or Call Distribution, it allows the rerouting of the new calls.

- Call Logging (LOG)

This service feature allows for a record to be prepared each time that a call is received to a specified telephone number.

- Call Queueing (QUE)

Description #1:
This service feature allows a served user to have calls meeting busy at the scheduled destination to be placed in a queue and connected as soon as free condition is detected. Upon entering the queue, the caller hears an initial announcement informing the caller that the call will be answered when a line is available.

Description #2:
This service feature enables the subscriber, when a call encounters a terminating trigger such as a busy condition or a specified number of rings to queue that call, a specific announcement being sent to the calling party.

- Call Transfer (TRA)

The Call Transfer service feature allows a subscriber to place a call on hold and transfer the call to another location.

- Call Waiting (CW)

This service feature allows the called party to receive a notification that another party is trying to reach his number while he is busy talking to another calling party.

- Closed User Group (CUG)

This service feature allows the user to be a member of a set of VPN users who are normally authorised to make and/or receive calls only within the group. A user can belong to more than one CUG. In this way a CUG can be defined so that certain users are allowed either to make calls outside the CUG, or to

receive calls from outside the CUG, or both.

- Consultation Calling (COC)

  The Consultation Calling service feature allows a subscriber to place a call on hold, in order to initiate a new call for consultation.

- Customer Profile Management (CPM)

  This service feature allows the subscriber to real-time manage his service profile, i.e. terminating destinations, announcements to be played, call distribution, and so on.

- Customised Recorded Announcement (CRA)

  This service feature allows a call to be completed to (customised) terminating announcement instead to a subscriber line. The served user may define different announcements for unsuccessful call completions due to different reasons (e.g. caller outside business hours, all lines are busy).

- Customised ringing (CRG)

  This service feature allows the subscriber to allocate a distinctive ringing to a list of calling parties.

- Destinating User Prompter (DUP)

  This service feature enables to prompt the called party with a specific announcement. Such an announcement may ask the called party to enter an extra numbering (e.g. through DTMF) or a voice instruction that can be used by the service logic to continue to process the call.

- Follow-Me-Diversion (FMD)

  Description #1:
  This service feature allows a VPN user to change the routing number of his/her VPN code via a DTMF phone. The updated number can be another VPN code or a PSTN number.

  Description #2:
  With this service feature, a user may register for incoming calls to any terminal access. When registered, all incoming calls to the user will be presented to this terminal access. A registration for incoming calls will cancel any previous registration. Several users may register for incoming calls to the same terminal access simultaneously. The user may also explicitly deregister for incoming calls.

- Mass Calling (MAS)

  This service features allows processing of huge numbers of incoming calls, generated by broadcasted advertisings or games.

- Meet-Me-Conference (MMC)

  This service feature allows the user to reserve a conference resource for making a multi party call, indicating the date, time, and conference duration. At the specified date and time, each participant in the conference has to dial a designated number which has been assigned to the reserved conference resource, in order to has access to that resource, and therefore, the conference.

- Multiway Calling (MWC)

  This service feature allows the user to establish, multiple, simultaneous telephone calls with other parties.

- Off-Net Access (OFA)

  This service feature allows a VPN user to access his or her VPN from any non-VPN station in the

PSTN by using a Personal Identification Number (PIN). Different sets of calling privileges can be assigned to different PINs, and a given PIN can be shared by multiple users.

- Off-Net Calling (ONC)

  This service feature allows the user to call outside the VPN network. Calls from one VPN to another are also considered off-net.

- One Number (ONE)

  This feature allows subscriber with two or more terminating line in any number of locations to have a single telephone number. This allows business to advertise just one telephone number throughout their market area and to maintain their operations in different locations to maximise efficiency. The subscriber can specify which calls are to be terminated on which terminating lines based on the area the calls originate.

- Origin Dependent Routing (ODR)

  This service feature enables the subscriber to accept or reject a call, and in case of acceptance, to route this call, according to the calling party geographical location. This service feature allows the served user to specify the destination installation(s) according to the geographical area from which the call was originated.

- Originating Call Screening (OCS)

  This service feature allows the served user to bar calls from certain areas based on the District Code of the area from which the call is originated.

- Originating User Prompter (OUP)

  Description #1:
  This service feature allows a served user to provide an announcement which will request the caller to enter a digit or series of digits via a Dual-Tone Multi-Frequency (DTMF) phone or generator. The collected digits will provide additional information that can be used for direct routing or as a security check during call processing.

  Description #2:
  This service feature enables to prompt the calling party with a specific announcement. Such an announcement may ask the calling party to enter an extra numbering (e.g. through DTMF) or a voice instruction that can be used by the service logic to continue to process the call.

- Personal Numbering (PN)

  This service feature supports a (UPT) number that uniquely identifies each UPT user and is used by the caller to reach that UPT user. A UPT user may have more than one UPT number for different applications (e.g. a business UPT number for business calls and a private UPT number for private calls), however, a UPT user will have only one UPT number per charging account.

- Premium Charging (PRMC)

  This service feature allows for the pay back of the part of the cost of a call to the called party, when he is considered as a value added service provider.

- Private Numbering Plan (PNP)

  This service feature allows the subscriber to maintain a numbering plan within his private network, which is separate from the public numbering plan.
  Note: see also definition under VPN description.

- Reverse Charging (REVC)

  This service feature allows the service subscriber (e.g. freephone) to accept to receive calls at its expense and will be charged for the entire cost of the call.

- Split Charging (SPLC)

  This service feature allows for the separation of charges for a specific call. The calling and called party each being charged for one part of the call.

- Terminating Call Screening (TCS)

  This service feature allows the user to screen calls based on the terminating telephone number dialled.

- Time Dependent Routing (TDR)

  Description #1:
  This service feature enables the subscriber to accept or reject a call, and in case of acceptance, to route this call, according to the time, the day in the week and the date.

  Description #2:
  This service feature allows the served user to apply different call treatments based on time of day, day of week, day of year, holiday etc.

ANNEX D (normative): CS1 Glossary

Access	A means of interaction between a user and a network
Access Channel (Q.9 - 0008)	A designated part of the information transfer capability having specified characteristics, provided at the user-network interface.
Access Function	A set of processes in a network that provide for interaction between the user and a network.
Application	An entity in a network that provides a user with a set of capabilities that have an implementation - independent specification, to control the communication processing, and storage of information and to control a user interface.
Application Entity (AE)	The aspects of an application-process pertinent to OSI.
Application Programming interface	In API's are a set of interfaces between the application environment (e.g. services and service managements). The network environment furnishes services for the application environment for creation and execution activities provided by the IN.
Application Service Element (ASE)	A part of an application-entity which provides an OSI environment capability, using underlying services where appropriate.
Architecture	.....
Association	A logical relationship between entities to perform a function
Attribute	An intrinsic property of an object.
Basic Call	A call between two users that does not include additional features (e.g. a plain telephone call).
Basic Call Model (BCM)	A description of the sequence of activities used in processing a basic call.
Basic Connection State Model (BCSM)	A high-level finite state machine model of call processing for basic call control (i.e., a two party non-IN call).
Call	The use, or possible use, of one or more connections set up between two or more users and/or service(s).
Call Control	The set of functions used to process a call (e.g. provide service features and establish, supervise, maintain and release connections).
Call control agent functional entity (CCAF)	An entity wherein the functions for providing user access to call/service processing reside.
Call control functional entity (CCF)	An entity wherein the functions for processing a particular call reside.
Call model	A representation of functions involved in processing a call.

Capability Set (CS)	A Capability Set is defined as set of IN capabilities that is to be the subject of standardization activities and for which the availability of standards recommendations will be targeted for a particular time frame. The Long Term Capability Set (LTCS) is the CS for the Target IN Architecture.
Connection	An association of transmission channels or circuits, switching and other functional units set up to provide a means for a transfer of information between two or more points in a telecommunications network.
Connection control	The set of functions used for setting up, maintaining and releasing a communication path between two or more users or a user and a network entity, e.g. dual tone multifrequency receiver.
Core Service Feature	The particular service feature which is fundamental to the service, i.e., in the absence of this service feature the service does not make sense as a commercial offering to the service subscriber.
Data	User and/or network information stored in the network used in connection with call/service processing. An instance of a data object.
Data base	A physical entity used for storing information.
Data management	Establishing, updating and administering data bases in the network.
Data object	An individually addressable unit of information specified in a data template.
Data template	A specified logical structure for a collection of data objects, including allowable ranges for their value and other data consistency specifications.
Dialog(ue)	A conversation or an exchange of information.
Distributed functional plane	The place in the Intelligent Network conceptual model containing functional entities and their relationships.
Dynamic data	Information subject to change as a result of call/service processing.
Element	An identifiable physical unit.
Elementary function	A primary or basic function that cannot be further decomposed. One of a set of functions comprising a global function.
Entity	A part, device, subsystem, functional unit, equipment or system that can be individually considered. In ISDN the term is used to refer to a particular system or sub-system such as a user terminal or a digital exchange. It is also used to refer to a set of functions of a particular system at a location, e.g., the layer 2 functions of a signalling system at an user terminal.
Event	A specific input to and/or output from a given state in a finite state machine model that causes a transition from one state to another.
Executive process	A process that controls the execution of other processes.
Feature	A reusable capability provided to a user by one or more service entities in a network.
Feature interaction	A situation that occurs when an action of one feature affects an action of capability of another.

Finite state machine (FSM)	A system having a finite number of states and specified transitions between states.
Finite state machine model	An operational model of an entity that is described by the finite set of states the entity can be in and the finite set of transitions possible from one state to another.
Freedom of Allocation	Freedom of Allocation is a characteristic of a Network Architecture, which enables migration of Functional Entity implementations from one physical location in the network to another, in such a way that the functional consistency of the network has been preserved and only the non-functional characteristics (QOS) may be affected.
Function	A set of processes defined for the purpose of achieving a specified objective.
Functional entity	An entity that comprises a specific set of functions at a given location.
Global control	Control of a process whose functions are distributed among several entities.
Global function	A set of elementary functions in the global functional plane of the Intelligent Network conceptual model required to provide a service or an aspect of a service.
Global functional plane	The plane in the Intelligent Network concept model containing all global functions and their relationships.
Information flow	An interaction between a communicating pair of functional entities is the complete set of information flows between them.
Intelligent Network (IN)	A telecommunications network architecture that provides flexibility for facilitating the introduction of new capabilities and services, including those under customer control.
Intelligent Network Application Protocol (INAP)	The new protocol to be developed for Intelligent Network applications is contained in layer 7 (application of the OSI model). It will be referred to as "INAP" (IN Application Part), in accordance with the terminology already used for other protocols (e.g. TCAP, MSAP).
IN capability set	A set of Intelligent Network capabilities that are to be the subjects of standardization activities and for which the availability of standards Recommendations will be targeted for a particular time frame.
IN conceptual model	A planning model used for defining the Intelligent Network architecture.
IN data base (INDB)	A physical entity used for information storage in the Intelligent Network.
IN data base management system (INDBMS)	A system used for establishing and/or administering information storage in the Intelligent Network.
IN Functional Architecture (INFA)	An Intelligent Network Functional Architecture is used to achieve independence of services from logical resources, and in turn logical resources from physical resources. It provides the user of the IN with a consistent view of the services independent of how the logical resources may be assigned in order to provide services.
IN service	A service provided using the capabilities of the Intelligent Network.

IN Structured Network	A network incorporating the IN concepts.
Intelligent Peripheral	A physical entity that implements the Intelligent Network specialized resource function.
Interface (Q.9 - 4001)	A shared boundary or interconnection between two entities or two devices.
Layer (Q.9 - 2160)	A conceptual region that embodies one or more functions between an upper and lower logical boundary within a hierarchy of functions.
Leg	A representation within a call processing state model representing a telecommunication path towards some addressable entity (e.g. a path towards a user, intelligent peripheral unit, etc.)
Management	The function of directing, maintaining and/or administering.
Management function	A set of processes used for the management of an entity (e.g. data base management).
Network implementation independence	Not dependent on a specific network configuration.
Network Functional Architecture (NFA)	The Network Functional Architecture consists of functional groupings of sets of functions. It maintains independence of service from logical resources, and that of logical resources from physical resources.
Network Interworking	Network interworking is a process in which several networked (IN-IN or IN-non-IN) co-operate to provide a service.
Network Management	Network Management : is an activity to support the proper operation of an IN-structured network.
Network Operator (NO)	The Network Operator has the responsibility of operating elements of the network which are used to support the service operations.
Object	An intrinsic component of an entity that is described at an appropriate level of abstraction in terms of its attributes and functions.
Optional Service Feature	This service feature is not core, i.e. also without this service feature the service would still make sense as a commercial offering to the service subscriber. Therefore, this service features can be regarded as an optional enhancement to the service.
Physical plane	The plane in the Intelligent Network conceptual model containing elements and their interfaces that implement functional entities.
Plane	A layer in the Intelligent Network conceptual model.
Point in call	A state in a basic connection state model.
Relationship (Q.65)	The complete set of information flows, where they exist, between two functional entities.
Resource	In telecommunications, any network element that can be drawn upon in providing service, e.g. a circuit, a receiver, etc.
Service	A service is a stand-alone commercial offering, characterised by one or more core service features, and can be optionally enhanced by other service features.

Service control	Direction of functions or processes used to provide a specific telecommunications service.
Service control function (SCF)	The application of service logic to control functional entities in providing Intelligent Network services.
Service control point (SCP)	An entity in the Intelligent Network that implements a service control function.
Service creation	An activity whereby the capability to provide a supplementary service is brought into being from specification to development and verification.
Service creation environment (SCEF)	The set of functions that support the service creation process, the output of which includes both service logic programs and service data.
Service creation environment point (SCEP)	A physical entity that implements the service creation environment function.
Service creation platform	A set of service independent objects or functions which allow the creation of services in an Intelligent Network.
Service creation process	The conception, design and implementation of a capability to provide a service.
Service data	Customer and/or network information required for the proper functioning of a service.
Service data function (SDF)	The set of functions that provides for the management of service data in accordance with a service data template.
Service data (SDP)	A physical entity that implements a service data function.
Service data template	A data template related to a specific service logic program.
Service entity	The smallest part of a service or feature that can be individually considered. It is composed of one or more global functions.
Service feature	A service feature is a specific aspect of a service that can also be used in conjunction with other services/service features as part of a commercial offering. It is either a core part of a service or an optional part offered as an enhancement to a service.
Service independence	Not necessarily specific to one service.
Service independent	(i) No dependent on the availability of other services or (2) Freedom to create any service desired.
Service Independent Service Block (SIB)	A reusable set of function entity actions and information flows used to provide a service feature or a part of a service feature in an Intelligent Network.
Service logic	A sequence of processes/functions used to provide a specific service.
Service logic program (SLP)	A software program containing service logic.

Service management	It is an activity to support the proper operation of a service and the administration of information relating to the user/customer and/or the network operator. Service management can support the following processes : service development, service provisioning, service control, billing and service monitoring.
Service Management Agent Function (SMAF)	This is an alternative term for Work Station Function. The SMAF may reside in an intelligent terminal or a computer. The physical entity would be connected to the physical entity where SMF resides. The purpose of SMAF is to allow the interface of this connection to be specified.
Service management function (SMF)	The set of processes that support the management of user and/or network information, including service data and service logic programs that are required for the proper operation of a service.
Service management point (SMP)	A physical entity that implements a service management function.
Service management point (SMP)	An entity usually external to the network that is used in managing customer and/or network data bases.
Service plane	The plane in the Intelligent Network conceptual model that contains services, service entities and their relationships.
Service Processing	Service Processing consists of basic call and supplementary service processing which are the serial and/or/parallel executions of network functions in a co-ordinated way, such that basic and supplementary services are provided to the customers.
Service Provider	The organization that commercially manages the service and that interfaces with Service Customers.
Service Subscriber	A Service Subscriber is an entity which receives services offered by a service provider based on a contractual relationship. It may include the role of a network user.
Service switching function (SSF)	The set of processes that provide for interaction between a call control function and a service control function.
Service switching point (SSP)	A physical entity that implements a service switching function.
Socket	A logical point of access in the Service Switching/Call Control Function through which control for a service feature can be evoked. (The Service Control Function "plugs" into the socket.)
Specialized resource function (SRF)	The set of functions that provide for the control and access to resources used in providing services in the Intelligent Network.
State (in FSM)	A description of an entity defined by the values of its object attributes at a given point in time.
State (in DSL) (Q.0 - 6942)	A condition in which the action of a process is suspended awaiting an input.
Static data	Information that remains unchanged for the duration of a call or incident of user of a service. (Usually controlled by a source external to the network).
Supplemented call	A basic call with added service features or capabilities.
Transition	In a finite state machine model, a change in the state of an entity resulting from a change in the values of its object attributes.
Trigger	A stimulus for initiating an action

Trigger Check Point

User — An entity external to the network that uses its service (s).

Vendor or implementation independent — Products from different vendors are able to work together in the same environment, and/or, physical unities serving as the same functional entity(ies) produced by different vendors' can be used interchangeably.

Work station — A physical entity that implements the work station function.

Work station function (WSF) — Processes that allow communication between humans and a system.

History

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