INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

Q.1205

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

(03/93)

GENERAL RECOMMENDATIONS ON TELEPHONE SWITCHING AND SIGNALLING

INTELLIGENT NETWORK

INTELLIGENT NETWORK PHYSICAL PLANE ARCHITECTURE

ITU-T Recommendation Q.1205

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation Q.1205 was prepared by the ITU-T Study Group XI (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

____

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

CONTENTS

Page

Summary ii

1 General 1

2 Requirements and assumptions 1

2.1 Requirements 1

2.2 Assumptions 2

3 Physical entities (PEs) 2

4 Mapping the distributed functional plane to the physical plane 4

4.1 Mapping of functional entities to physical entities 4

4.2 Selection of underlying protocol platforms 6

5 User interfaces 6

SUMMARY

This Recommendation describes the physical plane of the general IN architecture. The physical plane identifies different physical entities (PEs), the allocation of functional entities to PEs, and the interfaces between the PEs.

Companion Recommendations include the Q.120x- and Q.121x-Series Recommendations, especially Recommendation Q.1215 which describes the physical plane for IN capability set 1.

The text in this Recommendation is considered to be stable.

INTELLIGENT NETWORK PHYSICAL PLANE ARCHITECTURE

(Helsinki, 1993)

1 General

This Recommendation describes the physical plane of the general IN architecture. IN physical plane information specific to CS-1 is contained in Recommendation Q.1215.

The physical plane of the IN conceptual model identifies the different physical entities and the interfaces between these entities.

The physical plane architecture should be consistent with the IN conceptual model. The IN conceptual model is a tool that can be used to design the IN architecture to meet the following main objectives:

- service implementation independence;
- network implementation independence;
- vendor and technology independence.

The I.130 stage 3 service description methodology may be used (which includes the functional specification of the node and detailed description of the protocol between the nodes) in developing the physical plane architecture.

2 Requirements and assumptions

2.1 Requirements

The key requirements of the physical plane architecture are:

- the functional entities in the distributed functional plane can be mapped onto the physical entities;
- one or more functional entities may be mapped onto the same physical entity;
- one functional entity cannot be split between two physical entities (i.e. the functional entity is mapped entirely within a single physical entity);
- duplicate instances of a functional entity can be mapped to different physical entities, though not to the same physical entity;
- physical entities can be grouped to form a physical architecture;
- the physical entities may offer standard interfaces;
- vendors must be able to develop physical entities based on the mapping of functional entities and the standard interfaces;
- vendors must be able to support mature technologies and new technologies as they become available.

2.2 Assumptions

The following assumptions are made for the development of the physical plane architecture:

- the IN conceptual model is used as a tool to develop the IN physical architecture;
- existing and new technologies can be used to develop the physical entities;
- the specification of functional entities in the distributed functional plane and standard interfaces in the physical plane will make the network vendor independent and service independent;
- sufficient number of interfaces will be identified for support of services, service creation and OAM functions.

3 Physical entities (PEs)

This clause describes a selection of PEs to support the general IN. That selection is not intended to preclude or disallow the application of any other IN PE to support the general IN.

a) *Service switching point (SSP)*

In addition to providing users with access to the network (if the SSP is a local exchange) and performing any necessary switching functionality, the SSP allows access to the set of IN capabilities. The SSP contains detection capability to detect requests for IN services. It also contains capabilities to communicate with other PE(s) containing a service control function (SCF), such as a service control point (SCP), and to respond to instructions from the other PE. Functionally, an SSP contains a call control function (CCF), a service switching function (SSF), and, if the SSP is a local exchange, a call control agent function (CCAF). It also may optionally contain a service control function (SCF), and/or a specialized resource function (SRF), and/or a service data function (SDF).

b) *Service control point (SCP)*

The SCP contains the service logic programs (SLPs) that are used to provide IN services, and may optionally contain customer data. Multiple SCPs may contain the same SLPs and data to improve service reliability and to facilitate load sharing between SCPs. Functionally, an SCP contains a service control function (SCF), and may optionally contain a service data function (SDF). The SCP can access data in an SDP either directly or through a signalling network. The SDP may be in the same network as the SCP, or in another network. The SCP can be connected to SSPs, and optionally to IPs, through the signalling network. The SCP can also be connected to an IP via an SSP relay function.

c) *Service data point (SDP)*

The SDP contains data used by SLPs to provide individualized services. Functionally, an SDP contains a service data function. It can be accessed directly by an SCP and/or SMP, or through the signalling network. It can also access other SDPs in its own or other networks.

d) *Intelligent peripheral (IP)*

The IP provides special resources for customization of services, and supports flexible information interactions between a user and the network. Optionally, the switching matrix used to connect users to these resources may be accessible to external SLPs. Examples of possible special resources are (this list is not meant to be exhaustive):

- customized and concatenated voice announcements;
- synthesized voice/speech recognition devices;
- DTMF digit collection;
- audio conference bridge;
- information distribution bridge;
- tone generator;
- text to speech synthesis;
- protocol converters.

The IP contains the special resource function (SRF), and optionally a service switching function/call control function (SSF/CCF). This optional SSF/CCF is used to provide external access to the connections to the resources within the IP. The IP connects to one or more SSPs, and/or to the signalling network.

An SCP can request an SSP to connect a user to a resource located in an IP that is connected to the SSP from which the service request is detected. An SCP can also request the SSP to connect a user to a resource located in an IP that is connected to another SSP.

e) *Adjunct (AD)*

The Adjunct PE is functionally equivalent to an SCP (i.e. it contains the same functional entities) but it is directly connected to an SSP. Communication between an Adjunct and an SSP is supported by a high speed interface. This arrangement may result in differing performance characteristics for an Adjunct and an SCP. The application layer messages are identical in content to those carried by the signalling network to an SCP.

An Adjunct may be connected to more than one SSP and an SSP may be connected to more than one Adjunct.

f) *Service node (SN)*

The SN can control IN services and engage in flexible information interactions with users. The SN communicates directly with one or more SSPs, each with a point-to-point signalling and transport connection. Functionally, the SN contains an SCF, SDF, SRF, and an SSF/CCF. This SSF/CCF is closely coupled to the SCF within the SN, and is not accessible by external SCFs.

In a manner similar to an Adjunct, the SCF in an SN receives messages from the SSP, executes SLPs, and sends messages to the SSP. SLPs in an SN may be developed by the same service creation environment used to develop SLPs for SCPs and Adjuncts. The SRF in an SN enables the SN to interact with users in a manner similar to an IP. An SCF can request the SSF to connect a user to a resource located in an SN that is connected to the SSP from which the service request is detected. An SCF can also request the SSP to connect a user to a resource located in an SN that is connected to another SSP.

g) *Service switching and control point (SSCP)*

The SSCP is a combined SCP and SSP in a single node. Functionally, it contains an SCF, SDF, CCAF, CCF, and SSF. The connection between the SCF/SDF functions and the CCAF/CCF/SSF functions is proprietary and closely coupled, but it provides the same service capability as an SSP and SCP separately.

This node may also contain SRF functionality, i.e. SRF as an optional functionality.

The interfaces between the SSCP and other PEs are the same as the interfaces between the SSP and other PEs, and therefore will not be explicitly stated.

h) *Service management point (SMP)*

The SMP performs service management control, service provision control, and service deployment control. Examples of functions it can perform are data base administration, network surveillance and testing, network traffic management, and network data collection. Functionally, the SMP contains the service management function (SMF) and, optionally, the service management access function (SMAF) and the service creation environment function (SCEF). The SMP can access all other PEs.

i) *Service creation environment point (SCEP)*

The SCEP is used to define, develop, and test an IN service, and to input it into the SMP. Functionally, it contains the service creation environment function (SCEF). The SCEP interacts directly with the SMP.

j) *Service management access point (SMAP)*

The SMAP provides some selected users, such as service managers or some customers, with access to the SMP. One possible use of the SMAP is to provide one single point of access for a given user to several SMPs. The SMAP functionally contains a service management access function (SMAF). The SMAP nteracts directly with the SMP.

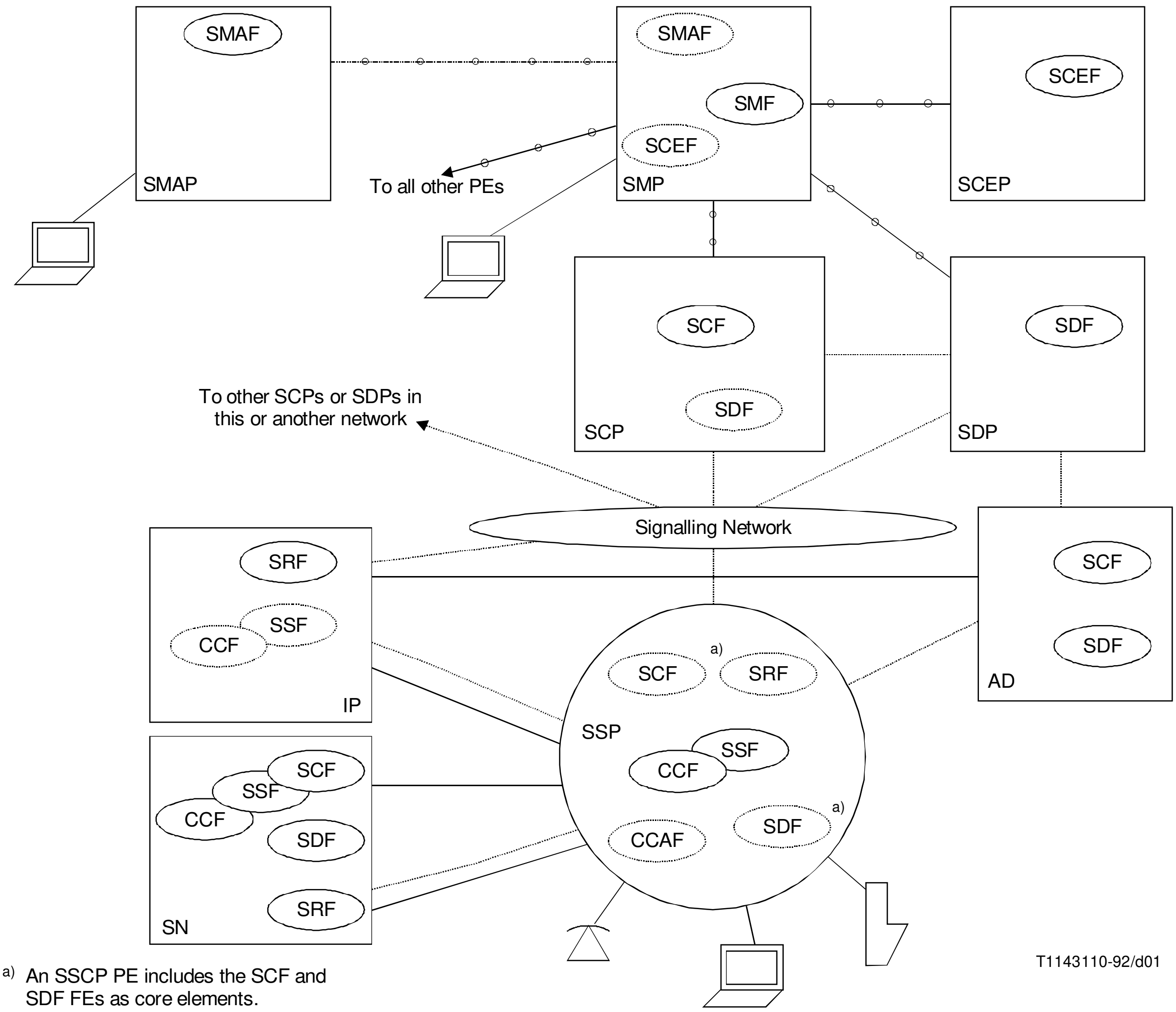
4 Mapping the distributed functional plane to the physical plane

4.1 Mapping of functional entities to physical entities

This subclause gives a mapping of functional entities into physical entities, and describes the reference points between the PEs. In so doing, an appropriate distribution of functionality is identified, and functional interfaces suitable for standardization are highlighted. The PEs described in this subclause are for illustrative purposes only, and do not imply the only possible mapping of functionality.

This subclause describes a flexible physical architecture made up of several PEs. Each physical entity contains one or more functional entities, which define its IN functionality. PEs included in the physical architecture shown in Figure 1 are SSP, SCP, SDP, IP, AD, SN, SSCP, SMP, SCEP, and SMAP.

Typical scenarios of functional entity mapping to physical entity are shown in Table 1.



a) An SSCP PE includes the SCF and SDF FEs as core elements.

Transport

Signalling

Management, Provisioning & Control

FE

Optional FE

Functional entities (FEs)

CCF	Call control function
CCAF	Call control agent function
SCF	Service control function
SDF	Service data function
SRF	Special resource function
SSF	Service switching function
SMF	Service management function
SCEF	Service creation environment function
SMAF	Service management access function

Physical entities (PEs)

SSP	Service switching point
SCP	Service control point
SDP	Service data point
IP	Intelligent peripheral
SMP	Service management point
SCEP	Service creation environment point
AD	Adjunct
SN	Services nodes
SSCP	Service switching and control point
SMAP	Service management Access point

FIGURE 1/Q.1205

Scenarios for physical architectures

TABLE 1/Q.1205

Typical scenarios of FE to PE mapping

PEs	FEs						
	SCF	SSF/CCF	SDF	SRF	SMF	SCEF	SMAF
SSP	O	C	O	O	–	–	–
SCP	C	–	O	–	–	–	–
SDP	–	–	C	–	–	–	–
IP	–	O	–	C	–	–	–
AD	C	–	C	–	–	–	–
SN	C	C	C	C	–	–	–
SSCP	C	C	C	O	–	–	–
SMP	–	–	–	–	C	O	O
SCEP	–	–	–	–	–	C	–
SMAP	–	–	–	–	–	–	C

C Core
O Optional
– Not allowed

There is no intention that the table should disallow any other combination of functional entities that would result in a physical entity not shown in the table.

The above mappings are shown in Figure 1. Each physical entity has certain functional entities mapped into it. As indicated in the legend of the figure, transport paths, signalling paths (that carry application layer messages), and management, provisioning and control paths are differentiated.

4.2 Selection of underlying protocol platforms

Intelligent network Recommendations largely focus on the definition and specification of application layer protocol to effect the scope of IN functional relationships. For any given capability set, the appropriate underlying protocol platforms are selected from those that are currently available or planned, selecting and adapting to those whose capabilities best meet the IN signalling needs.

For a specified capability set, the underlying protocol platforms are addressed in Recommendation Q.12x5.

5 User interfaces

A user is an entity external to the IN that uses IN capabilities. IN users may employ new or existing access interfaces to invoke various IN service capabilities.

It is important to ensure that IN continues to support existing services and capabilities. In addition, restrictions imposed by individual interface technologies must be considered when deploying IN services.