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I.329/Q.1203
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SERIES I: INTEGRATED SERVICES DIGITAL NETWORK

Overall network aspects and functions – Reference models

SERIES Q: SWITCHING AND SIGNALLING

Intelligent Network

Intelligent Network – Global functional plane architecture

ITU-T Recommendation I.329/Q.1203

(Previously CCITT Recommendation)

ITU-T I-SERIES RECOMMENDATIONS

INTEGRATED SERVICES DIGITAL NETWORK

For further details, please refer to ITU-T List of Recommendations.

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	**Q.1200–Q.1999**
BROADBAND ISDN	Q.2000–Q.2999

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ITU-T RECOMMENDATION I.329/Q.1203

INTELLIGENT NETWORK – GLOBAL FUNCTIONAL PLANE ARCHITECTURE

Summary

The Intelligent Network Conceptual Model (INCM) is an architectural concept for the creation and provisioning of telecommunication services. This Recommendation provides the generic architectural characteristics of the global functional plane. The global functional plane, as defined in Recommendation Q.1201 [1], is viewed as the proper location for the modular functionality from which services are to be constructed.

The global functional plane models network functionality from a global point of view. In the GFP, the IN-structured network is said to be viewed as a single entity in the GFP. In this plane, services and service features are redefined in terms of the broad network functions required to support them. These functions are neither service nor Service Feature (SF) specific and are referred to as Service Independent Building Blocks (SIB).

This Recommendation defines:

- the generic IN GFP model for all IN capability sets;
- the definition of service independent building blocks, including the specialized SIBs (e.g. basic call process);
- the use of global service logic to model services and service features.

Companion Recommendations include the Q.120x and Q.12x3 Recommendations.

Source

ITU-T Recommendation I.329/Q.1203 was revised by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 12th of September 1997.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. 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, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

INTELLIGENT NETWORK – GLOBAL FUNCTIONAL PLANE ARCHITECTURE

(revised in 1997)

1 General

The concepts for the Intelligent Network (IN) are embodied in the IN Conceptual Model (INCM) as described in associated Recommendations I.312/Q.1201 and I.328/Q.1202. This clause describes the Global Functional Plane (GFP) of the INCM with respect to the composition of the plane, and its relationship to adjacent planes. This plane is viewed as the proper location for the modular functionality from which services are to be constructed.

The global functional plane models network functionality from a global point of view. In the GFP, the IN-structured network is said to be viewed as a single entity in the GFP. In this plane, services and service features are redefined in terms of the broad network functions required to support them. These functions are neither service nor Service Feature (SF)-specific and are referred to as Service Independent Building Blocks (SIB). Due to the global nature of SIBs, the multinetworks nature of services/service features is not visible in the GFP.

The global functional plane is located between the service plane and the distributed functional plane as illustrated in Figure 1. Services identified in the service plane are decomposed into their service features then mapped onto one or more SIBs in the GFP. Each SIB is similarly mapped onto one or more functional entities in the distributed functional plane.

Contained in the global functional plane are (refer to Figure 1):

- Basic Call Process (BCP) SIB which identifies the normal call process from which IN services are launched, including Points of Initiation (POI) and Points of Return (POR) which provide the interface from the BCP to global service logic;
- SIBs which are standard reusable network-wide capabilities used to realize services and SFs;
- Global Service Logic (GSL) which described how SIBs are chained together to describe service features. The GSL also describes interaction between the BCP and the SIB chains.

2 Scope of IN global functional plane architecture

The following additional GFP requirements have been identified for the IN studies:

- Interaction of GSL with the BCP SIB(s).
- Granularity of SIBs. The lowest granularity level of a SIB contains only that functionality needed to describe the network capability it defines. By combining the functionality of a number of SIBs one may create SIBs of a higher granularity. The ideal granularity for SIBs is determined by:
  - the service requirements;
  - the reusability requirements.

  The granularity of SIBs is achieved by the recursive use of SIBs. The lowest granularity level SIBs are subject to standardization in the Q.12x3 Recommendations. The higher granularity SIBs are not required to be standardized and therefore no stage 2 descriptions are needed for these higher level granularity SIBs.
- Data modelling: A formal description of SIB data is required, in order to be unambiguous, concise and precise. The use of formal data description provides for a smooth mapping to the lower planes. In order to be in line with these planes the use of ASN.1 should be considered.

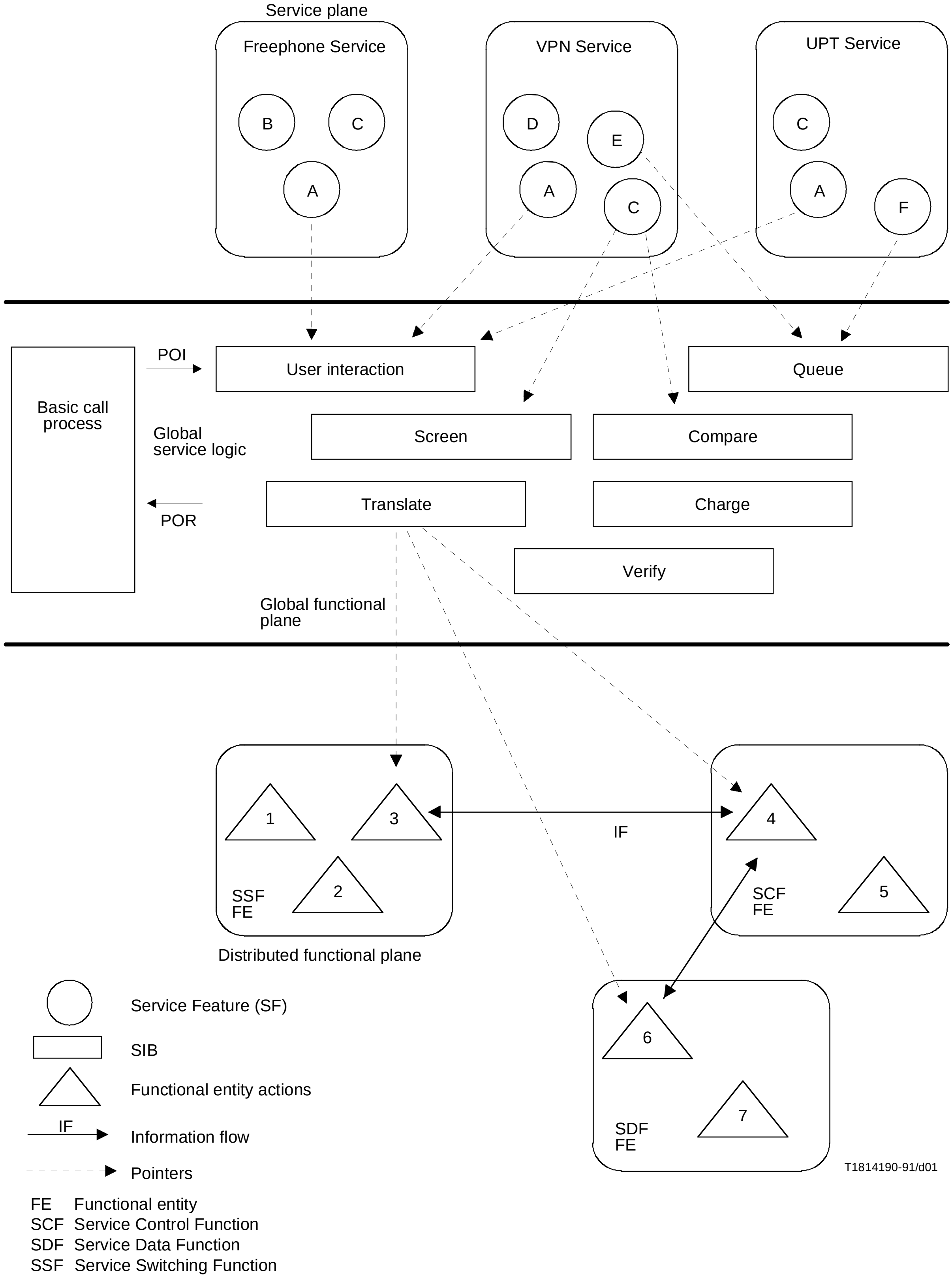

Figure 1/Q.1203 – Service decomposition

- Modelling of service interaction.
- Parallel execution of SIBs: Parallel execution of SIBs is required in order to cater for activity during for example user interaction, queuing, statistics, etc.

3 References

The following ITU-T Recommendations and other references contain provisions which, through references in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] CCITT Recommendation I.312/Q.1201 (1992), *Principles of IN network architecture*.

[2] ITU-T Recommendation I.328/Q.1202 (1997), *Intelligent network – Service plane architecture*.

[3] ITU-T Recommendation Q.1213 (1995), *Global functional plane for intelligent network CS-1*.

[4] ITU-T Recommendation Q.1223 (1997), *Global functional plane for Intelligent Network Capability Set 2*.

[5] CCITT Recommendation I.130 (1988), *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN*.

[6] ITU-T Recommendation Z.100 (1993), *CCITT Specification and Description Language (SDL)*.

4 Global functional plane modelling

By definition, SIBs, including the BCP SIB, are service independent and cannot contain knowledge of subsequent SIBs. Therefore, Global Service Logic (GSL) is the only element in the GFP which is specifically service dependent.

In order to chain SIBs together, knowledge of the connection pattern, decision options, and data required by SIBs must be available. Therefore, the pattern of how SIBs are chained together must be maintained within the GFP, and described in the GSL. The GSL describes subsequential SIB chaining, potential branching, and where branches rejoin.

When an IN-supported service is to be invoked, its GSL is launched at the Point of Initiation (POI), e.g. by a triggering mechanism from the BCP.

At the end of the chain of SIBs, the GSL also describes the returning point e.g. by indicating the specific Point of Return (POR) to the BCP.

For a given service/SF, at least one POI is required. However, depending upon the logic required to support the service/SF, multiple PORs may be defined.

The process of how the GSL is described through the service creation environment using the application programming interface is an area for further study.

5 Service independent building blocks

5.1 Definition of a SIB

A SIB is a standard reusable network-wide capability residing in the global functional plane used to create service features. SIBs are of a global nature and their detailed realization is not considered at this level but can be found in the Distributed Functional Plane (DFP) and the physical plane. The SIBs are reusable and can be chained together in various combinations to realize services and SFs in the service plane. SIBs are defined to be independent of the specific service and technology for which or on which they will be realized.

5.2 Characteristics of a SIB

SIBs are the building blocks to be used in the GFP. Individual SIBs must be defined using a standard methodology to allow:

- multi-vendor IN products to identically support them;
- service designers to have a common understanding of each SIB.

SIBs have the following characteristics:

- The definition of each SIB is independent of any specific distributed functional and physical plane architecture (network implementation independent).
- Each SIB should have a unified and stable interface.
- Interaction among FEs in the DFP is not visible to the SIBs in the GFP.
- All Service Features (SFs) are described by one SIB or a chain of SIBs.
- All SFs can be defined by a finite number of SIBs.
- SIBs are realized in the DFP by functional entity actions which may reside in one or more functional entities (FEs).
- A SIB has one logical starting point and one or more logical end points.
- Data required by each SIB is defined by service support data parameters and call instance data parameters.
- SIBs are global in nature and their location need not be considered as the whole network is regarded as a single entity in the GFP.
- SIBs are reusable. They are without modification for other services.

5.3 Data parameters for SIBs

By definition, SIBs are independent of the service/SF they are used to represent. They have no knowledge about previous or subsequent SIBs which are used to describe the service feature.

In order to describe service features with these generic SIBs, some elements of service dependence is needed. Service dependence can be described using data parameters which enable a SIB to be tailored to perform the desired functionality. Data parameters are specified independently for each SIB and are made available to the SIB through global service logic.

Data parameters consist of input and output parameters. Types of data parameters can be enhanced for future IN capability sets.

5.4 Method to describe SIBs

The SIBs provide the modularity within the global functional plane that is required by the definition and objectives of the IN concept. In order to effectively progress such studies, a method is required to characterize and technically describe the SIBs.

Techniques analogous to those used in the 3-stage service definition methodology (see Recommendation I.130), i.e. prose description, static description, and dynamic description, are appropriate.

The procedure outlined in Figure 2 can be used to determine if new SIBs are required to support new services.

5.5 Flowchart analysis

The starting point for the determination of SIBs is services. In the service plane of the IN Conceptual Model (INCM), services are decomposed into their Service Features (SF), which are the features that comprise the service. Full service descriptions must be available for the new service being analyzed prior to identifying SIBs.

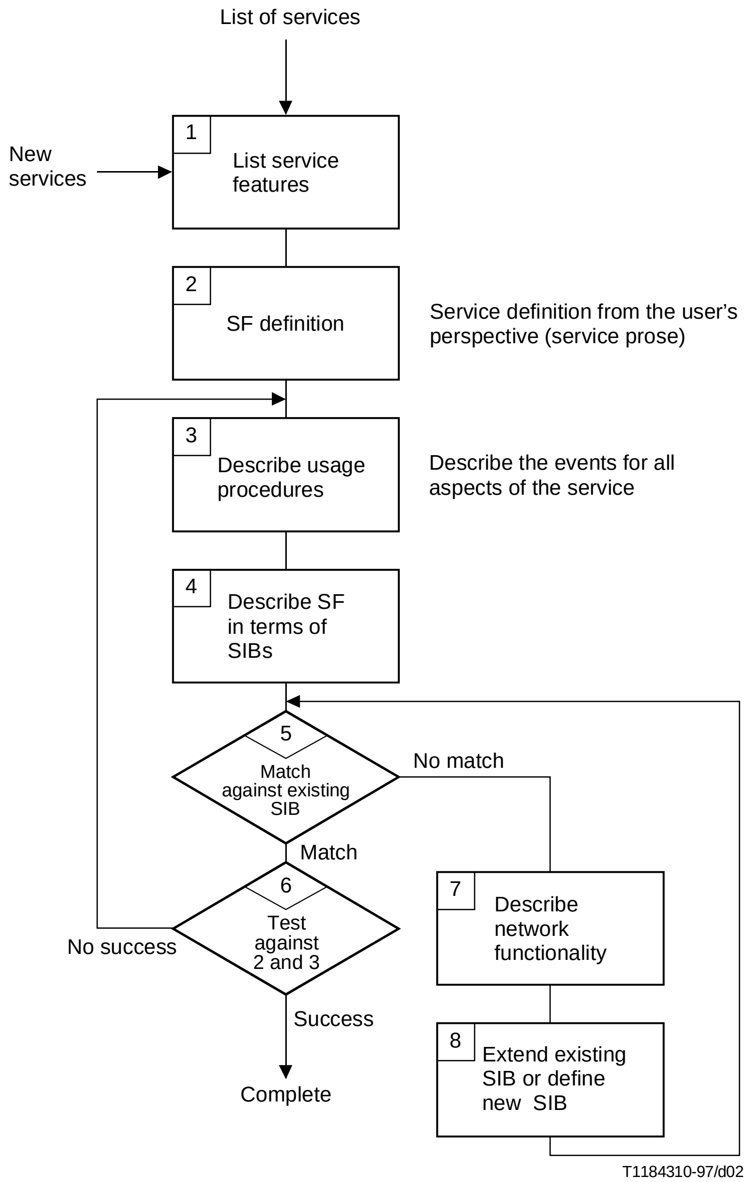

Figure 2/Q.1203 – Flowchart to identify service independent building blocks

Given that a catalogue of services, SFs, and SIBs exist, the following description explains how analysis of a new service may lead to the extension of existing SIBs or identification of new SIBs (refer to Figure 2).

1) *List service features*

Decompose the new service into its SFs.

2) *Service feature definition*

Define each SF by describing the service provided from the end user's (subscriber) perspective. This definition is referred to as the service prose. Information should be available from the stage 1 service description.

3) *Describe usage procedure*

Describe the chain of events seen by the user for this SF. This includes service subscription, activation, modification, and call scenarios for the SF.

4) *Describe service feature in terms of SIB*

Describe the SF in terms of the modular network functions represented by SIBs.

5) *Map to existing SIBs*

Compare the above [steps 3) and 4)], with the characteristic lists for established SIBs.

6) *Test against steps 2) and 3)*

Verify the robustness of the SF by analyzing the SIB representation with the SF definition and usage procedure [(from steps 2) and 3)]. Failure to pass this verification indicates that the analysis in steps 4) and 5) was incorrect or incomplete.

7) *Describe additional network functionality required*

Describe what functions must be provided by the network, in addition to those of existing SIBs, to fully support the SF.

8) *Extend existing SIB, or define new SIB*

If possible, extend the capabilities of an existing SIB (e.g. additional "type") to provide the additional functionality required to support the SF. If such extension is not possible, then define a new SIB. Complete the definition of the extended or new SIB by providing the detailed information in 3.4.

5.6 Interaction management

5.6.1 Interaction between SIBs

Interaction management in the GFP consists in the investigation whether two or more SIBs have impact on each other. It is performed by comparing the descriptions of different SIBs, using the following rules:

- Each SIB works on a set of basic properties, such as resources, data, etc.; there is only a very low probability for a SIB based on the manipulation of resources to interact with a SIB based on the manipulation of data.
- The mutual use of the same data or resources by two SIBs should be exactly identified, for it may cause problems, for instance when the order in which the SIBs could be active is not defined.
- When a new SIB is being defined, the already existing SIBs have to be taken into account to avoid two SIBs performing the same or almost the same tasks.

6 Basic call process

6.1 General

The Basic Call Process (BCP) is responsible for providing basic call connectivity between parties in the network. The BCP can be viewed as a specialized SIB which then provides basic (e.g. Recommendation Q.71) call capabilities, including:

– connecting call, with appropriate disposition;

– disconnecting calls, with appropriate disposition;

– retaining CID for further processing of that call instance.

6.2 Basic call process functionality

IN-supported services/SFs are represented through the use of chains of SIBs connected to the BCP SIB. The interface points between the BCP SIB and the chains of SIBs are described as points of initiation, and points of return, with the following definitions:

i) A **point of initiation** is the BCP functional launching point for the SIB chains.

ii) A **point of return** identifies the functional point in the BCP where the SIB chains terminate.

A graphical illustration of the POI/POR/BCP functionality is shown in Figure 3. The number and location of these points must be determined by analysis of the capabilities required for future capability sets.

The need for specific POI/POR functionality is that the same chain of SIBs may represent a different service if launched from a different point in the BCP. Similarly, the same chain of SIBs launched from the same point may represent a different service if returned to the BCP at a different point.

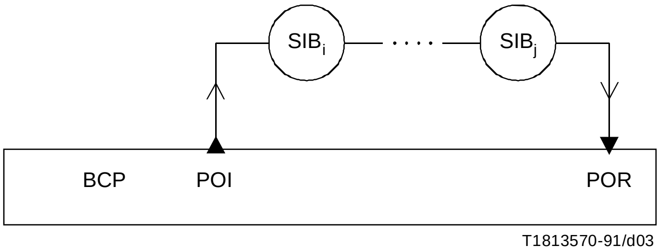

Figure 3/Q.1203 – POI/POR/BCP relationship model

7 Global service logic

This clause represents the role of the Global Service Logic (GSL) in the global functional plane.

7.1 General

The GSL can be defined as the "glue" that defines the order in which SIBs will be chained together to accomplish services. Each instance of global service logic is (potentially) unique to each individual call, but uses common elements, comprising specifically:

– interaction points;

– SIBs;

– logical connections between SIBs, and between SIBs and BCP interaction points;

– input and output data parameters.

In order to more completely demonstrate how GSL operates, a generic example of a service is illustrated in Figure 4. This diagram shows that specific SIB chains launched from a designated POI are activated in a particular order and are returned to the appropriate PORs, as required by the GSL. To avoid complexity, the SIB data parameters are not shown.

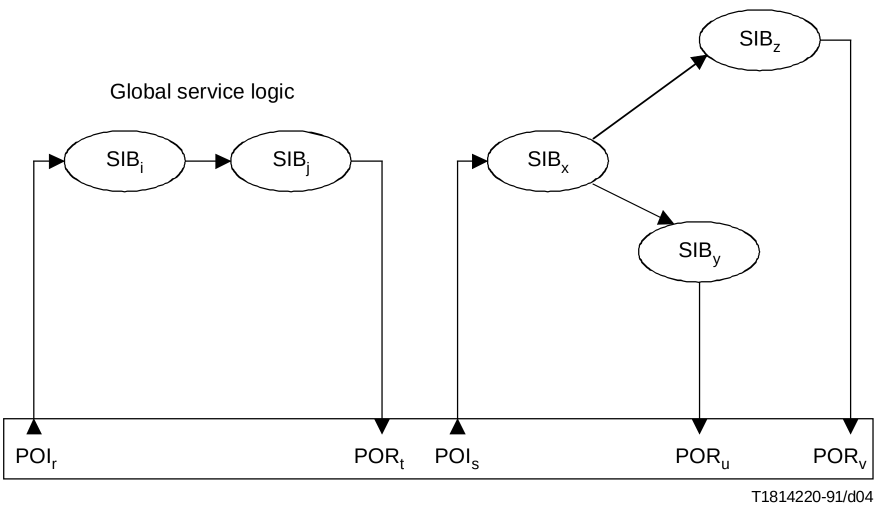

Figure 4/Q.1203 – Example of GSL

Annex A

Alphabetical list of abbreviations used in this Recommendation

BCP	Basic Call Process
CLI	Calling Line Identity
DFP	Distributed Functional Plane
FE	Functional Entity
GFP	Global Functional Plane
GSL	Global Service Logic
IF	Information Flow
IN	Intelligent Network
INCM	IN Conceptual Model
POI	Point of Initiation
POR	Point of Return
SCF	Service Control Function
SDF	Service Data Function
SDL	Specification and Description Language
SF	Service Feature
SIB	Service Independent Building Block
SSF	Service Switching Function
UPT	Universal Private Telecommunication
VPN	Virtual Private Network

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