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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE

General

Global Information Infrastructure scenario methodology

ITU-T Recommendation Y.120

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION Y.120

GLOBAL INFORMATION INFRASTRUCTURE SCENARIO METHODOLOGY

Summary

This Recommendation describes a set of graphical techniques that can be used to simply illustrate scenarios which depict a variety of interconnected network technologies, and the associated key interfaces that may be encountered in the provision of the Global Information Infrastructure (GII).

Source

ITU-T Recommendation Y.120 was prepared by ITU-T Study Group 13 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 12th of June 1998.

Keywords

Global Information Infrastructure, GII, standardization, networks, scenarios, interfaces.

FOREWORD

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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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Recommendation Y.120

GLOBAL INFORMATION INFRASTRUCTURE SCENARIO METHODOLOGY

(Geneva, 1998)

1 Introduction

This Recommendation describes a set of techniques that can be used to graphically illustrate configurations of a variety of network technologies and user appliance that may be expected to be encountered in the context of the Global Information Infrastructure (GII). The term "scenario" has been adopted to denote a combined graphical and textual representation of such a configuration.

1.1 The need

In some cases the GII will comprise components from different industry sectors, i.e. telecommunications, information technology and entertainment. The boundaries of service provision are no longer distinct, and the convergence between the industry sectors is occurring, and more diverse service delivery technologies are emerging. Because of the different backgrounds of the participants, a mutually understood methodology is required in order that scenarios can be developed and analyzed in a consistent fashion.

The provision of various services by a variety of service providers, over a variety of network technologies, from different industry sectors, makes provision of end-to-end service a significant system integration issue. In order to understand the related standards issues, it is necessary to understand the interdependencies amongst all components in the system as well as those between immediately adjacent components at a single interface. This need can only be met by examining the interplay and inter-relationships amongst all components within a given scenario. The task can be made more manageable if a number of interacting components can be depicted in a single diagram.

NOTE – It is not envisaged that all situations can be fitted into a single diagram. Clearly, some step-wise refinement will be necessary in the most complex cases. However, the principle holds true for each level of abstraction in cases where a number of different levels of abstraction are required.

1.2 The purpose

The purpose of a scenario is to enable specific arrangements of certain GII components to be illustrated. Interesting cases occur when technologies from different industries come together and/or where services traditionally offered by particular providers over particular technologies are offered by non-traditional providers over non-traditional technologies. Examples of this are telephone service over cable TV network or video services over local loop networks. Other interesting cases involve the interconnection of technologies not previously interconnected and/or the non-traditional use of certain appliances.

Thus, the primary purpose of a scenario is:

a) identification of points that form key interconnection interfaces, access interfaces or appliance interfaces in a configuration involving a set of providers of services, networks and appliances;

b) identification of the set of standards that could be applied at each key interface point;

c) identification of the key standards development organizations SDOs and/or industry consortia that might desire to be involved in the standards-related system integration issues.

Associated with the above, related purposes include means to:

d) facilitate classification of interfaces by type;

e) facilitate identification of services that can be carried across interfaces;

f) facilitate classification of services by type;

g) facilitate identification of end points for service delivery;

h) accommodate a profile of all protocols involved, either directly or indirectly, at a given interface;

i) document other related issues.

The scope of application of the methodology described in this Recommendation is not restricted to the provision of traditional voice, data, video services or network technologies. It is expected that this Recommendation will be used to describe a variety of situations, such as transaction processing, distributed computing, imaging, etc.

2 Scope

This Recommendation provides the tools for the development of scenarios which involve multiple networks, multiple industries and multiple Standards Development Organizations (SDOs) or standards-related industry organizations.

This Recommendation provides a method and a set of conventions for the production of scenarios, involving particular combinations of network technology, server technology and appliance technologies that are deployed in the provision of a specific service (or set of services).

Generally, scenarios will:

a) provide a means of checking for completeness of a solution;

b) facilitate the development of common solutions;

c) facilitate comparison amongst solutions;

d) provide a catalogue of standardized solutions to avoid unnecessary reinvention;

e) help to identify gaps in the standard repertoire;

f) identify joint interests amongst Standards Development Organizations (SDOs) and areas where collaboration is required;

g) facilitate the investigation of inter-relationships between all elements depicted in a given scenario.

Additionally, since it is envisaged that this Recommendation will be used during the cross industry, multi-SDO collaborative process, a guide for its application is also provided.

NOTE – It is envisaged that this Recommendation would be worked on in collaboration with other SDOs and or industry organizations, and mutually adopted for the purposes of joint scenario development.

3 Normative references

For further study.

4 Terms and definitions

This Recommendation defines the following terms:

4.1 Access-Network Interface (ANI): An interface between a local switching network and an access network.

4.2 appliance: Appliance is the generic term used to describe the terminal device employed by the service application. Examples of appliance are telephones, TV sets, computers, etc.

4.3 adaptation interface (AI): The interface between an Adaptation Unit and an Appliance.

4.4 adaptation unit (AU): The unit, or function, which converts from the native On-Premise Interface (OPI) to another interface more suitable for the given appliance.

4.5 drop-distribution interface (DI): The interface between a local distribution network and the final drop network to the customer premise.

4.6 GII element: Element is the generic term used to describe any GII component, e.g. network, switch, application server, appliance, etc.

4.7 network-to-network interface type A (NNI-A): The interface between a long distance backbone switching network and a local switching network.

4.8 network-to-network interface type B (NNI-B): The interface between a long distance backbone switching network and a peer long distance switching backbone network.

4.9 premise-attachment interface (PAI): An interface between the external network and the internal customer premise network or equipment.

4.10 on-premise interface (OPI): The interface between the on-premise network or equipment and the appliances.

4.11 qualifier: A set of protocol descriptors.

5 Abbreviations

This Recommendation uses the following abbreviations:

AI	Adaptation Interface
ANI	Access-Network Interface
AU	Adaptation Unit
DI	Drop-Distribution Interface
GII	Global Information Infrastructure
NIU	Network Interface Unit
NNI-A	Network-to-Network Interface Type A
NNI-B	Network-to-Network Interface Type B
NT	Network Terminating Unit
PSTN	Public Switched Telephone Network

OPI On-Premise Interface

PAI Premise-Attachment Interface

6 Building a scenario

A scenario is a graphic representation of a particular set and/or of GII elements involved in the delivery of a particular service. A simple example of a scenario could be the provision of voice-band service over some combination of PSTN and cable TV network components, and customer's telephone and data terminal equipment.

In the case of the GII, it is envisaged that a typical scenario will involve a number of networks and appliances. The networks and appliances will, in general, be under different jurisdictions as far as industries and their respective SDOs are concerned. For example, it may be envisaged that the telecommunications, information and entertainment sectors could be involved in a given scenario.

The primary goal in building a scenario is to show the interplay of the various sectors and to provide a "picture" of the interfaces between, and commonality amongst the various sectors involved. It is envisaged that scenarios would form the basis for collaboration and act as a repository for mutually agreed solutions.

7 Principles of description

The following principles shall be used in developing a scenario. The principles are intended to be as informal and as self-explanatory as possible. The prime purpose of the principles is to achieve sufficient consistency amongst scenario developers without overburdening them with formal descriptive requirements.

7.1 Generic elements

Each scenario is a primarily a reference configuration. As such it illustrates a set of technology elements, interfaces, and services.

7.2 Interface denotation

The interface symbol, shown in Figure 1 shall be used to denote an interface and/or reference point between two GII elements.

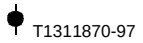

Figure 1/Y.120 – Interface Symbol

A Type and a Qualifier (or set of Qualifiers) will be associated with each instance of the interface symbol in a particular scenario. Where space permits, Types and Qualifiers will be positioned close to the symbol, or alternatively a reference will be placed close to the symbol and the Types and Qualifiers will be listed against the appropriate reference.

Examples of Basic (interface) Types include:

AI Adaptation Interface

ANI Access-Network Interface

DI Drop-Distribution Interface

NNI-A Network-to-Network Interface Type A

NNI-B Network-to-Network Interface Type B

OPI On-Premise Interface

PAI Premise-Attachment Interface

Types and Qualifiers are further described in clause 8.

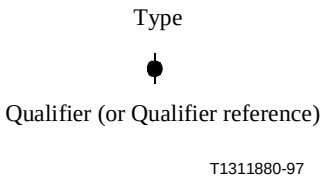

Figure 2/Y.120 – Interface symbol with Type and Qualifier

In the simplest case of interconnection between only two elements, the interface symbol with its Type and Qualifier(s) will completely describe all the protocols operating over the interface between the two elements.

7.3 Element representation

7.3.1 Networks

Individual networks shall be represented by a graphical ellipse, as shown in Figure 3.

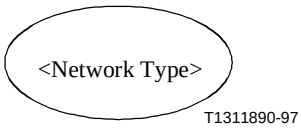

Figure 3/Y.120 – Network representation

7.3.2 Appliances and functional units

Appliances and/or other functional units shall be represented by boxes, as shown in Figure 4.

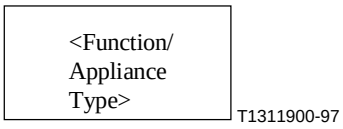

Figure 4/Y.120 – Representation of function or appliance

NOTE – In the case of an appliance, suitable appliance-like icons may also be used.

7.4 An Example configuration of generic elements

An example of a generic reference architecture to be used for the development of scenarios and identification of key interface points may be based upon the example generic reference architecture shown in Figure 5. This figure is based on the telecommunications industry point of view.

It is envisaged that a typical scenario will involve, but is not limited to, one or more than one of each the following elements:

a) a backbone switching network;

b) a local switching network;

c) a local distribution network;

d) a final distribution or drop network;

e) a premise network or equipment;

f) an appliance.

NOTE – Additional elements to those listed above may be required.

Additionally, the scenario will be set in the context of provision of a specific service or set of services e.g. for provision of traditional analogue telephony service or particular video service. The title of the scenario will designate the services being provided (see clause 9).

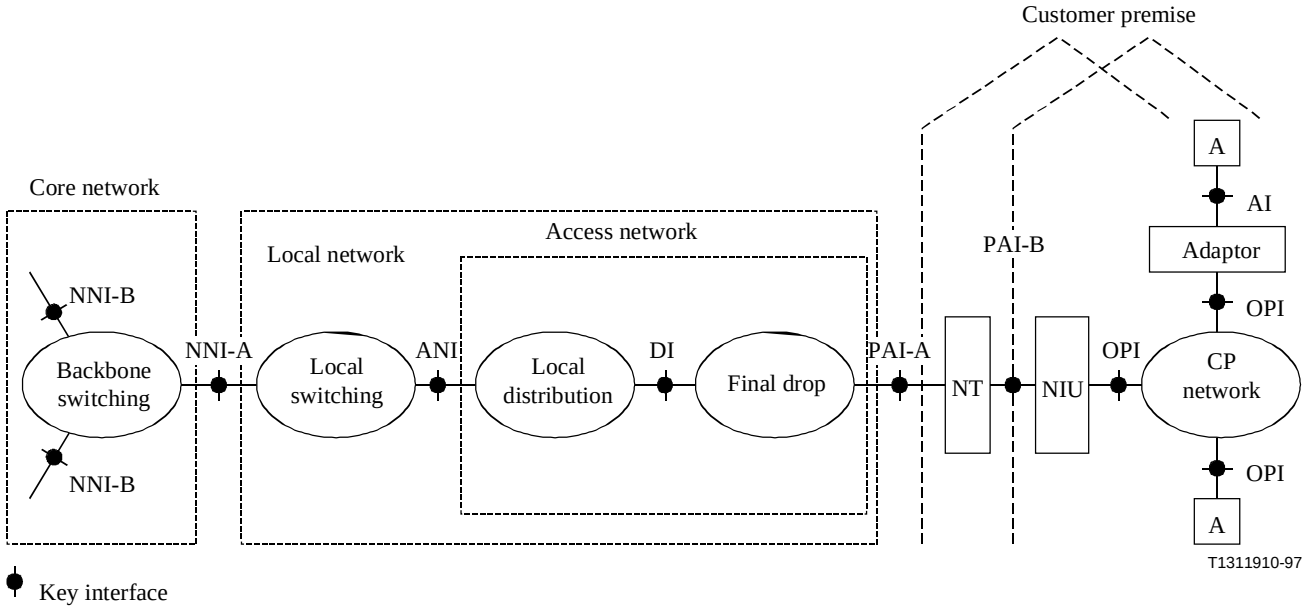

Figure 5/Y.120 – An example of a scenario using generic elements

7.5 Indirect connections or associations

In more complicated cases, it will be necessary for the purposes of clarity to separate the protocol(s) directly involved with operation of the interface from those operating transparently over the interface for action by other remote elements. For example, in the case of an intermediate interface, many of the protocols may be transparent to the intermediate interface and only applicable to other interfaces elsewhere.

In this case, the protocol directly related shall be indicated for the interface and for those indirectly related shall be shown by a "logical" connection (association) between the elements directly involved. The logical connection will be depicted by a dashed line. Figure 6 illustrates an example of this.

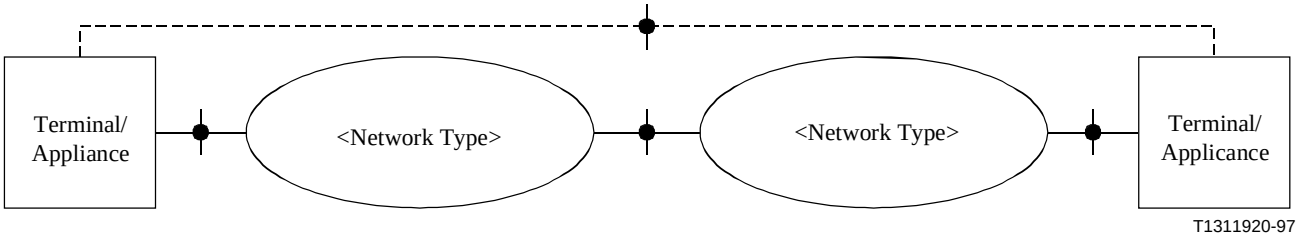

Figure 6/Y.120 – Representation of a logical connection or association

The reference architecture will permit the zeroing out of elements and/or the insertion of extra elements from the set of defined elements. For example, in any given scenario one or more of the elements could be null, and some elements may appear more than once.

7.6 Other dependencies

In a given scenario there may be a variety of dependencies. For example, a telephone call might be used to make the request for a particular movie to be down-loaded or viewed in real time over an entirely separate delivery system. Thus, control and/or management planes may be different from the data delivery planes. It may be necessary to use a given scenario more than once, to show the interplay of components in different planes of operation.

To cover these cases, scenarios should be annotated appropriately, and explanatory text provided to describe such requirements and to illustrate the interplay of the specific elements within the scenario.

7.7 Identification of information flow(s)

Within a given scenario there may be a number of possible paths for the flow of information. Different types of information may flow through different paths. Some paths may be legitimate for some purposes and not others. The use of the various paths for the various types of information needs to be identified to understand the scenario, given that a complex set of multiple paths may be depicted.

Accordingly, every scenario shall have accompanying explanatory text detailing the particular path(s) that can be taken by a particular information flow. All types of information flow shall be described, such as voice, data, management, etc.

The path of an information flow shall be described by enumerating the starting point, the end point(s), and all designated intermediate points traversed.

For example, a given scenario might have a data flow from A to C, via B, and a management information flow from A to D via E, a video flow from A to F via C, etc.

The text accompanying a scenario shall be explicit enough to prevent ambiguity. It may be necessary to indicate that some paths are not applicable for certain types of information, or are prohibited, in the particular scenario under consideration.

8 Types and Qualifiers

Every interface identification in a given configuration (scenario) shall be designated by its Basic-Type followed by its Sub-Type and possibly its Sub-Sub-Type e.g. X [Y, Z, ...], and a Qualifier or set of Qualifiers (Q1..Qn) representing the set of protocols applicable across the interface.

NOTE – The requirements for classification and identification should be met using the existing taxonomies of the particular organizations concerned. The only new requirement is to be able to unambiguously preface the standard/interface designation by the identification of the organization that produced it. For example, ITU: Q931, IETF: 793/791, ISO: 8073 would represent ISDN, TCP/IP, and OSI Transport standards respectively.

8.1 Interface classifications

The Basic-Type interface classifications include:

a) an interface between a long distance backbone network and a local switching network, designated as a Network-to-Network Interface Type A (NNI-A);

b) an interface between a long distance backbone network and a peer long distance backbone network, designated as a Network-to-Network Interface Type B (NNI-B);

c) an interface between a local switching network and an access network, designated as an Access-Network Interface (ANI);

d) an interface between a local distribution network and the final drop network to the customer premise, designated as the Drop-Distribution Interface (DI);

e) an interface between the external network and the internal customer premise network or equipment, designated the Premise-Attachment Interface (PAI);

f) an interface between the on-premise network or equipment and the appliances, designated the On-Premise Interface (OPI);

g) an interface between an appliance and an adapter which converts from the native OPI to another appliance specific interface, designated the Adaptation Interface (AI).

NOTE – The term "User-Network Interface" has become ambiguous. To avoid confusion, and to make the definitional task easier, the term "Premise Attachment Interface" (PAI) is considered to be more appropriate for describing the point of demarcation between the communication "external" and "internal" to the customer premise. Similarly, On-Premise Interface (OPI) is considered more appropriate for classifying the interface associated with "native" access to the on premise network or equipment. In this latter case AI would mean "Adaptation Interface". The conversion involved could be determined by simple comparison of the preceding OPI with the AI. Thus, a given appliance could be connected at the AI level or the OPI level, depending on whether it supported the native access interface (OPI) or not.

8.2 Sub-Type classifications

Generally, these will follow the Basic Type, e.g. NNI-A [<Sub-Type>]

NOTE – The set of Sub-Types would include, for example, the current set of ISDN types. Some work is required to ensure backwards compatibility with the current ISDN elements and definitions in Recommendation I.411. The need for further Sub-Sub-Types needs further study.

8.3 Qualifiers for protocol profile designation

In the case where the Sub-Type is not sufficient to identify the set of protocols relating to the interface, the interface shall be tagged with the set of protocols applicable to the interface. These shall be denoted by a simple linear list, representing layers of protocol in a top-down fashion.

9 Service aspects

A given scenario will always have two aspects to it: aspects related to physical components, and the aspects related to the services being provided.

A given scenario will be dedicated to the provision of particular service, or set of services. Thus, each scenario will illustrate not only a particular combination of physical networks and appliances, but also the interface aspects as they relate to the service (or set of services) being provided.

A scenario might, for example, show the delivery of broadcast video and a PSTN-like analogue switched voice-band services over an interconnection of traditional telecommunications and cable-TV technologies.

Other scenarios might include, but are not limited to, the delivery of narrow-band ISDN bearer services, broadband ISDN bearer services, intelligent network services, digital video service, digital bandwidth service, etc., over a variety of combinations of local and long distance Telecommunications systems, cable-TV-like systems, shared local multimedia distribution systems, and customer premise systems and appliances.

It may be necessary to replicate a given scenario in order to show the same physical arrangement being used for the delivery of several different services or sets of services. The service delivery aspects may involve the depiction of networking and higher level (possibly virtual) interface and/or reference points and their associated service/protocol standards, in addition to the lower level and physical interface aspects.

10 Method of application

Given the scope of the GII, participants of any industry sector or standards-related organization may identify the need for the development of a particular scenario. The extent to which this development involves or includes other industry sectors or standards-related organizations will clearly depend on the nature of the scenario in question. With this in mind, the following steps are specified in a generic fashion.

10.1 Step 1 – Initial scenario need identification

The need for a particular scenario is identified at a very high level, by a participant in particular organization. This will be based on the identification of a need for some particular configuration of network and appliance components for provision of a particular service or set of services, to meet a particular application or set of applications.

10.2 Step 2 – Initial scenario development

A preliminary scenario is produced by the participant and/or the representative organization using the basic techniques specified in this Recommendation. The degree of completeness of the scenario may vary at this stage depending on the levels of expertise available and the need to involve other organizations.

At this stage a scenario might range from a simple configuration diagram showing points of expected intersection or interfaces but without any specific labelling or identification of specific types of interface, without taxonomic information or protocol information, without identified dependencies, etc. On the other hand, it is conceivable that sufficient information is available to enable a more detailed scenario to be proposed. It would be useful if, at this stage, the expected basic interplay and inter-dependency of elements (see 7.5 and 7.6) could be outlined, as this may provide a basis for identifying the need for multi-organizational collaboration.

10.3 Step 3 – Scenario socialization

The scenario produced in step 2 is distributed to all other organizations who might have an interest. Interested organizations will respond to the initiating organization, indicating levels of interest, and commitment to participation in elaboration of the scenario.

10.4 Step 4 – Collaboration amongst organizations

Subsequent to expressions of interest, a meeting of all interested parties will be called to discuss the scenario and contribute to its development as necessary. This will require agreement on who is going to own the base document, and who will organize the necessary meetings. These tasks can be assigned to a single organization, rotated amongst organizations, or shared as appropriate, as mutually agreed amongst the interested parties.

10.5 Step 5 – Iteration

One or more of the above steps will be repeated, as appropriate, until the scenario is completed to the satisfaction of all parties.

11 Examples of use

According to the GII scenario methodology described in this Recommendation, practical implementation of a GII scenario can be achieved by the participant and/or representative organization. Annex A[1] contains a number of example GII scenarios which have resulted from the application of this methodology to various implementation case studies. The reference model in Annex A[1] is also useful for further development of scenarios to clarify the allocation of functional elements and service elements.

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1 Presently at the stage of draft.

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