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SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – ISDN user part

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### **Signalling system No. 7 – Application transport mechanism: Support of the generic addressing and transport protocol**

ITU-T Recommendation Q.765.4

(Formerly CCITT Recommendation)

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### **Signalling system No. 7 – Application transport mechanism: Support of the generic addressing and transport protocol**

#### **Summary**

This Recommendation describes the extensions required for the support of the Generic Addressing and Transport protocol (GAT) mechanism over the public Network Nodal Interface (NNI). This application makes use of the Application Transport Mechanism (APM) described in ITU-T Q.765 (2000) for bearer related signalling, and the Transaction Capability (TC) for signalling involving no bearer. This Recommendation specifies the respective users (i.e. APM-user, TC-user) to support signalling applications using the Generic Addressing and Transport protocol as defined in ITU-T Q.860.

#### **Source**

ITU-T Recommendation Q.765.4 was prepared by ITU-T Study Group 11 (1997-2000) and approved under the WTSC Resolution 1 procedure on 15 June 2000.

#### **Keywords**

APM, GAT, ISUP, SS7, TCAP.

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## ITU-T Recommendation Q.765.4

### Signalling system No. 7 – Application transport mechanism: Support of the generic addressing and transport protocol

#### 1 Scope

This Recommendation describes the extensions required for the support of the Generic Addressing and Transport protocol (GAT) mechanism over the public Network Nodal Interface (NNI). This application makes use of the Application Transport Mechanism (APM) described in ITU-T Q.765 (2000) for bearer-related signalling, and the Transaction Capability (TC) for signalling involving no bearer. This Recommendation specifies the respective users (i.e. APM-user, TC-user) to support signalling applications using the Generic Addressing and Transport protocol as defined in ITU-T Q.860.

#### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference 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] ITU-T Q.765 (2000), *Signalling System No. 7 – Application transport mechanism.*
- [2] ITU-T Q.860 (2000), *Integrated services digital network (ISDN) and broadband integrated services digital network (B-ISDN) generic addressing and transport (GAT) protocol.*
- [3] ITU-T Q.763 (1999), *Signalling System No. 7 – ISDN User Part formats and codes.*
- [4] ITU-T Q.764 (1999), *Signalling System No. 7 – ISDN User Part signalling procedures.*
- [5] ITU-T Q.1400 (1993), *Architecture framework for the development of signalling and OA&M protocols using OSI concepts.*
- [6] ITU-T Q.711 (1996), *Functional description of the Signalling Connection Control Part.*
- [7] ITU-T Q.712 (1996), *Definition and function of signalling connection control part messages.*
- [8] ITU-T Q.713 (1996), *Signalling Connection Control Part formats and codes.*
- [9] ITU-T Q.714 (1996), *Signalling connection control part procedures.*
- [10] ITU-T Q.715 (1996), *Signalling connection control part user guide.*
- [11] ITU-T Q.716 (1993), *Signalling System No. 7 – Signalling connection control part (SCCP) performance.*
- [12] ITU-T Q.771 (1997), *Functional description of transaction capabilities.*
- [13] ITU-T Q.772 (1997), *Transaction capabilities information element definitions.*
- [14] ITU-T Q.773 (1997), *Transaction capabilities formats and encoding.*
- [15] ITU-T Q.774 (1997), *Transaction capabilities procedures.*
- [16] ITU-T Q.775 (1997), *Guidelines for using transaction capabilities.*

- [17] ITU-T X.680 (1997) | ISO/IEC 8824-1:1998, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.
- [18] ITU-T Q.850 (1998), *Usage of cause and location in the digital subscriber Signalling System No.1 and the Signalling System No.7 ISDN user part*.

### 3 Definitions

This Recommendation defines the following terms:

**3.1 BRGAT ASE:** The BRGAT ASE is a user of the services offered by the APM ASE. It is responsible for preparing the GAT signalling information in a form that can be transported by the public application transport mechanism (APM).

**3.2 COGAT ASE:** The COGAT ASE is a user of the services offered by the TC ASE. It consists of two distinct sets of functions related to the Public Addressed Node (PAN) and Public Initiating Node (PIN) of Connection Oriented bearer unrelated signalling (TC dialogue).

## 4 Abbreviations

This Recommendation uses the following abbreviations:

|       |                                                      |
|-------|------------------------------------------------------|
| AE    | Application Entity                                   |
| AEI   | Application Entity Instance                          |
| ALS   | Application Layer Structure                          |
| AP    | Application Process                                  |
| APM   | Application Transport Mechanism                      |
| ASE   | Application Service Element                          |
| ATII  | Application Transport Instruction Indicators         |
| BRGAT | Bearer Related Generic Addressing and Transport      |
| COGAT | Connection Oriented Generic Addressing and Transport |
| EH    | Errors Handling                                      |
| GAT   | Generic Addressing and Transport                     |
| ISDN  | Integrated Services Digital Network                  |
| ISUP  | ISDN User Part                                       |
| LE    | Local Exchange                                       |
| M/O   | Mandatory/Optional                                   |
| MACF  | Multiple Association Control Function                |
| MTP-3 | Message Transfer Part                                |
| NFE   | Network Facility Extension                           |
| NI    | Network Interface                                    |
| NNI   | Network Nodal Interface                              |
| OSI   | Open Systems Interconnection                         |
| PAN   | Public Addressed Node                                |
| PIN   | Public Initiating Node                               |

|      |                                         |
|------|-----------------------------------------|
| SACF | Single Association Control Function     |
| SAO  | Single Association Object               |
| SCCP | Signalling Connection Control Part      |
| SDU  | Service Data Unit                       |
| SS7  | Signalling System No. 7                 |
| SSN  | Service Subsystem Number                |
| TC   | Transaction Capability                  |
| TCAP | Transaction Capability Application Part |
| TE   | Transit Exchange                        |

## 5 Recommendation structure

The description of the ISDN User Part and the TC-user procedures in this Recommendation are structured according to the model described in 6.2. The description is thus divided into two main parts:

- protocol functions;
- non-protocol functions, i.e. exchange nodal functions; this is referred to as the "Application Process".

This Recommendation describes only the part of the total Application Process and Protocol functions in the exchange that relates to NNI enhancements for the support of the Generic Addressing and Transport protocol.

The protocol functions are subdivided into two areas: signalling associations with a bearer (ISUP), and signalling associations without a bearer (Connection Oriented TC-user). For calls with a bearer, it describes the use of the services provided by the APM [1]. For signalling requiring no bearer, it describes the services provided by TCAP.

The signalling association with a bearer is subdivided into three parts: Bearer Related Generic Addressing and Transport protocol Applications (BRGAT ASE), Application Transport Mechanism (APM ASE) and ISUP Basic Call (ISUP ASE). These are coordinated by the Single Association Coordination Function (SACF).

The Connection Oriented signalling association without a bearer is subdivided into two parts: Connection Oriented GAT (COGAT ASE), and Transaction Capability (TC ASE). These are coordinated by the Single Association Coordination Function (SACF).

The Application Process (AP) contains all Call Control functions; however, this Recommendation will only describe the enhancements required to support the Generic Addressing and Transport protocol. The Application Process relevant to GAT-Control can be found in other Recommendations [2], as can that for the ISUP basic call [4].

The service primitive technique, used to define the ASEs and the SACF specific to the application's signalling needs is a way of describing how the services offered by an ASE or SACF – the provider of (a set of) service(s) – can be accessed by the user of the service(s) – the SACF or the Application Process (AP), respectively.

The service primitive interface is a conceptual interface and is not a testable or accessible interface. It is a descriptive tool. The use of service primitives at an interface does not imply any particular implementation of that interface, nor does it imply that an implementation must conform to that particular service primitive interface to provide the stated service. All conformance to the ISUP specifications is based on the external behaviour at a node, i.e. on the generation of the correct

message structure (as specified in [3])/operation structure (as specified in this Recommendation) and in the proper sequence (as specified in [4] and in this Recommendation).

The structure and examples of its usage are illustrated diagrammatically in 6.2.

The relationship between the GAT functionality and the Application Transport Mechanism services provided by the public NNI is described as a network model in 6.1. The APM ASE provides the enhancements to the ISUP capabilities such that the services available to the APM-user (GAT application in this context) for a signalling association requiring a bearer are similar to those offered by TCAP where no bearer is required.

## 6 Modelling

The models described in this clause introduce concepts and terminology used in this specification of the GAT application's use of the capability of the Application Transport Mechanism (APM) for bearer related signalling and the use of Transaction Capability (TC) for bearer unrelated signalling.

### 6.1 Network model

This clause illustrates the relationship between the GAT application and the APM implemented across the public network.

Figure 1 provides an example of a call from an initiating application to an addressed application via a public transit network.

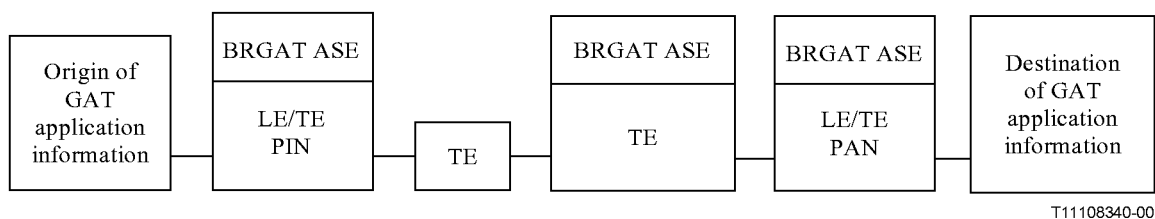


**Figure 1/Q.765.4 – One example of a bearer related communication between two nodes for a GAT application and its relationship with the public NNI's PIN/PAN concept**

The Public Initiating Node (PIN) and Public Addressed Node (PAN) concept is introduced in [1] to assist in the description of the APM. The PIN represents the point in the network where an APM-user, in this case BRGAT, wishes to initiate communication towards a peer APM-user located at an addressed location (PAN) in the network.

The PIN/PAN relationship for the GAT application is either established at call set-up or at any other phase of the call following the principle described in [1].

At any phase of the call, the APM addressing mechanism is used to specify the location of the PAN. Either the initiating APM-user (BRGAT ASE in this context) supplies the address of the node where the Application information shall be delivered (explicit addressing), or no address is provided by the initiating application (implicit addressing), in which case the PAN is the next node supporting the APM-user (BRGAT ASE in this context).

In case of explicit addressing, intermediate public nodes with the ability to support the GAT functionality may be passed, in which case the APM ASE forwards the application information based on the address information associated to it.

The public basic call mechanism is employed to provide an association between the PIN and the PAN. In routing through the public network, the call may pass through intermediate public nodes (TE) without the ability to support the GAT functionality. In that case, the node will behave as a normal intermediate public node.

Figure 2 provides an example of a bearer unrelated configuration with an initiating application sending GAT information to an addressed application.



**Figure 2/Q.765.4 – One example of a bearer unrelated communication between two nodes for a GAT application and its relationship with the public NNI's PIN/PAN concept**

In this configuration, the Public Initiating Node (PIN) represents the point in the network where a TC-user, in this case COGAT, wishes to initiate communication towards a peer TC-user located at an addressed location (PAN) in the network.

## 6.2 Specification model

### 6.2.1 Introduction

The model used to structure the description of ISUP and TC-USER application procedures is based on the OSI Application Layer Structure (ALS) model (see [5]). This clause presents the model and gives a general description of its operation. This clause shows the generalized model for the "Exchange Application Process" for the support of the Generic Addressing and Transport Protocol mechanism over the network nodal interface (NNI). It shows how the application makes use of the Application Transport Mechanism (APM) which is described in detail in [1].

### 6.2.2 General model

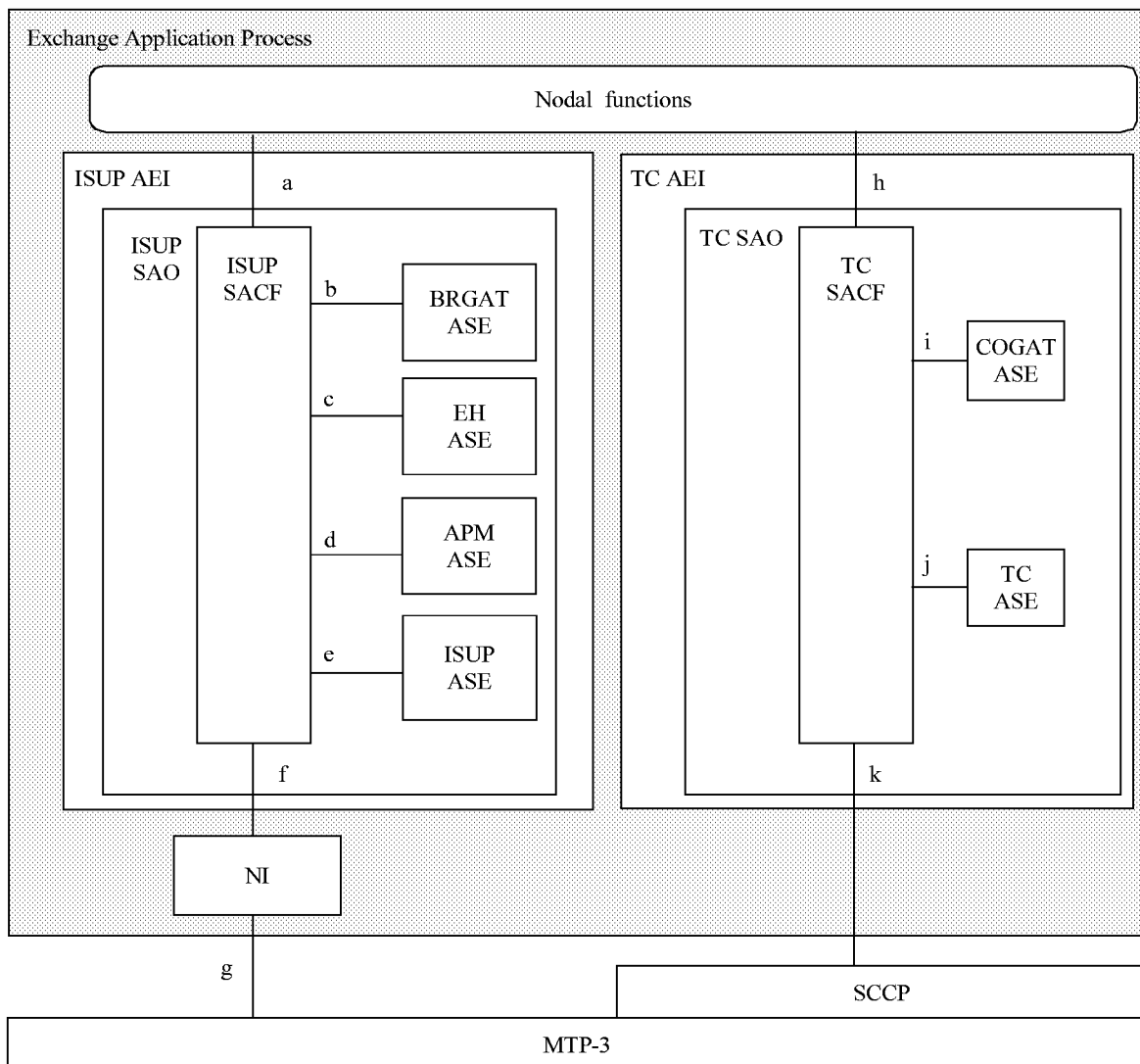
The generalized model for the bearer related (ISUP)/bearer unrelated (TC) GAT Application Process is shown in Figure 3. This figure does not represent the situation at any specific point during ISUP/TC procedures, but instead it shows the full picture of the architecture. The specific application of this model is discussed below. Figure 3 shows the primitive interfaces between the functional blocks, as used in the body of this Recommendation for calls with a bearer (ISUP)/without a bearer (TC).

The definition of the interfaces a to k are:

- Interface a between the Application Process nodal functions (AP) and the ISUP SACF for the support of the GAT over the NNI: see 7.2.2.
- Interface b to BRGAT ASE which defines the formats and codes in the Application transPort Parameter (APP) for the support of the GAT: see 10.1.
- Interface c between SACF and EH ASE representing the handling of unidentified context identifier values and error cases associated with the Application Transport mechanism: see [1].
- Interface d between SACF and APM ASE representing enhancements of the public (ISUP) functionality for providing a transportation mechanism for the support of various

applications (APM-user) over the NNI (this interface is out of the scope of this Recommendation): see [1].

- Interface e to public ISUP basic call signalling ASE (this interface is out of the scope of this Recommendation): see [1].
- Interface f between SACF and NI function (this interface is out of the scope of this Recommendation): see [1].
- Interface g to MTP-3 (this interface is out of the scope of this Recommendation): see [1].
- Interface h between TC SACF and AP: see 7.3.2.
- Interface i between TC SACF and COGAT ASE which performs the function of the protocol control for bearer unrelated Connection Oriented signalling: see 11.2.
- Interface j between TC SACF and TC ASE which provides the services defined in [12]: see 12.1.
- Interface k between TC SACF and SCCP which provides the services defined in [6]: see 13.1.



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**Figure 3/Q.765.4 – ISUP and connection oriented signalling specification model**