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SERIES Q: SWITCHING AND SIGNALLING

Specifications of Signalling System No. 7 – ISDN user part

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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ITU-T Recommendation Q.765.4

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.

FOREWORD

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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.

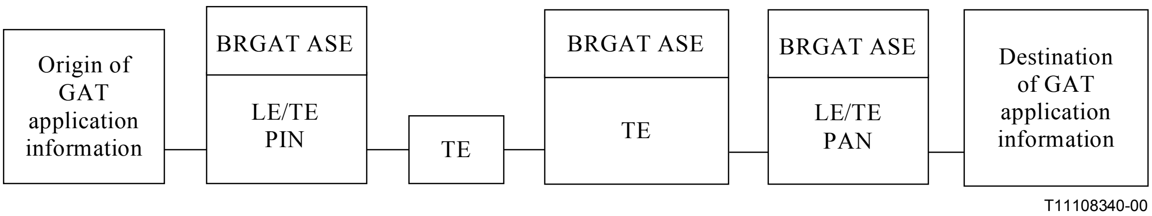

Figure 1/Q.765.4 – One example of a bearer related communication between two nodes for a GAT application and its relationship with the public NNI's PIN/PAN concept

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.

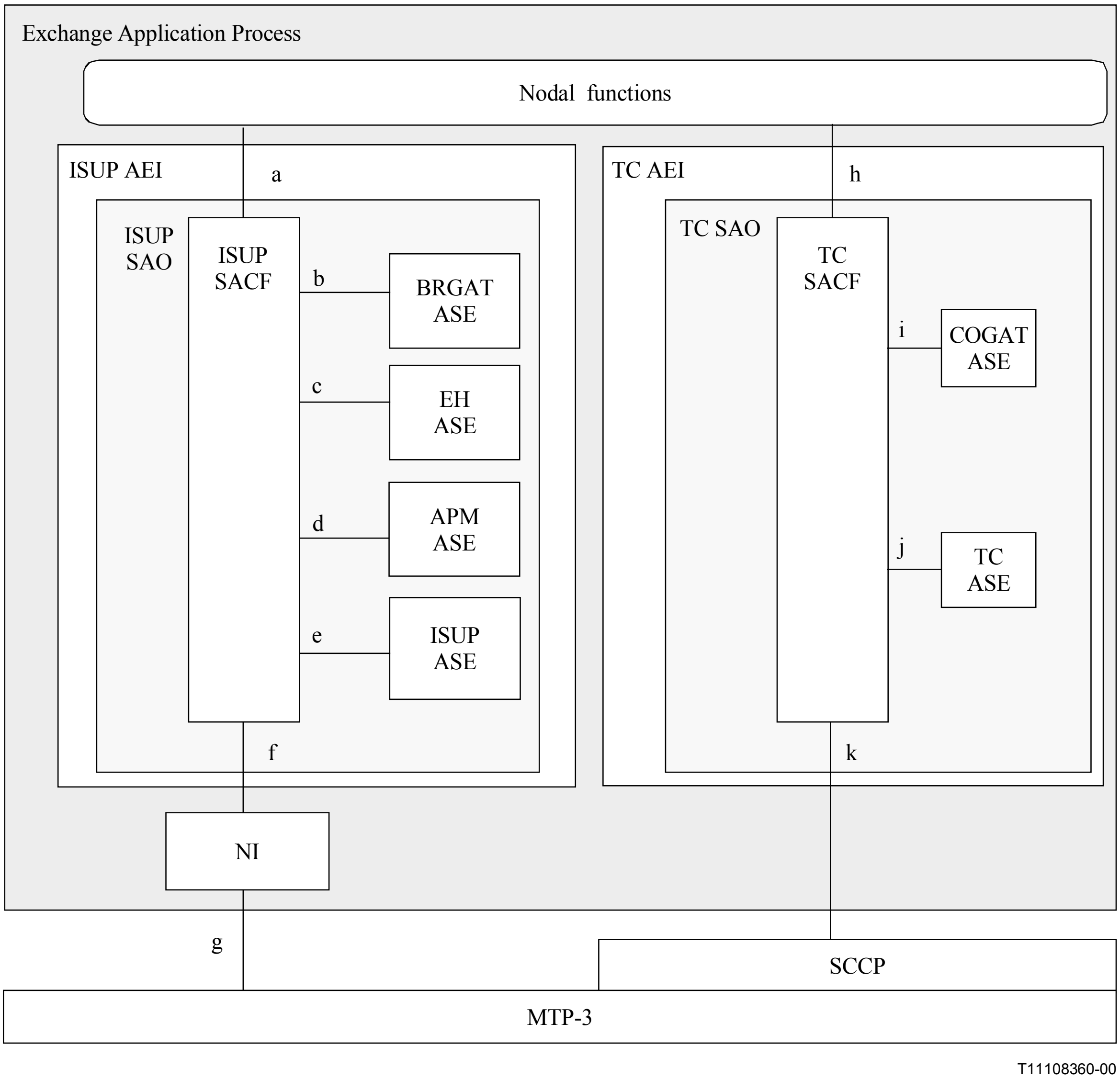

Figure 3/Q.765.4 – ISUP and connection oriented signalling specification model

With respect to Figure 3, all functions also have an interface to a "Management application", this is not defined as a formal primitive interface.

The term "Exchange Application Process" is used to describe all the Application functionality in an exchange. ISUP is a part of the Exchange Application Process. Thus the ISUP Nodal functions shown on the model are referred to as the ISUP Application Process functions in the body of this Recommendation. Similarly, the bearer unrelated Transaction Capability Nodal functions shown on the model are referred to as the TC Application Process functions in the body of this Recommendation.

The ISUP/TC AEI provides all the communication capabilities required by the ISUP/TC Nodal functions. For simplicity a ISUP/TC AEI is defined as containing just one SAO; this avoids the need to specify a Multiple Association Control Function (MACF). Thus all coordination of ISUP signalling associations are performed via the ISUP Nodal functions. Similarly, the coordination of the TC signalling associations are performed via the TC Nodal Functions.

The SACF has the responsibility of coordinating the flow of primitives between its interfaces in the appropriate manner.

The ISUP ASE is defined by [4]. The monolithic nature of these Recommendations means that both Call Control and Protocol Control functionality are defined together. It is not the intention of this Recommendation to redefine [4] in ALS format, therefore it is referenced *en bloc* within this Recommendation as the ISUP ASE. Conceptually, this should be considered to represent a logical division between the protocol control functionality within the ISUP ASE and its associated call control functionality within the application process. The modelling and interfaces with respect to this are outside the scope of this Recommendation (see [1]).

The APM ASE provides the means for the transfer of information between nodes for signalling requiring a bearer, and provides generic services to applications, while being independent of any of these. It is responsible for the enhancements to the NNI (ISUP) for the support of a mechanism which allows various applications to transport their information flows via the NNI. Its main responsibility is to provide message segmentation/reassembly in order to provide the APM-user the ability to transport up to 2048 octets of application information. It also provides an addressing mechanism to identify the final destination of APM-user information. The APM ASE is able to support multiple APM-users where each is treated independently and provided with the same level of service. It consists of two distinct sets of functions; one set used as the public addressed node (PAN) and one set used as the public initiating node (PIN) (supporting the signalling association towards to PAN). The PIN/PAN concept is explained in 6.1 of [1].

The EH ASE provides a compatibility mechanism for the case where various levels of application (context) support exists within network nodes as well as APM reassembly error handling. The EH ASE is responsible for the procedures related to the reception of an Application Transport parameter referencing an unidentified context identifier and the corresponding handling of a notification that a particular context identifier is not supported at a remote node (see [1]). It is also responsible for the handling of APM reassembly error cases.

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).

The TC ASE provides the means for the transfer of information between nodes for signalling without a bearer, and provides generic services to applications, while being independent of any of these. The TC ASE is defined in [12] to [16].

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).

To handle any particular ISUP/TC function the Exchange Application Process creates an instance of the required ISUP/TC Nodal functions. The AP will create instances, as required, of the ISUP/TC AEI. The Network Interface (NI) function exists to distribute messages received from the MTP-3 to the appropriate instance of the ISUP AEI. There is only one instance of the NI in an exchange. The NI is described in detail in [1]. Messages are distributed to the appropriate TC AEI based on the SSN and the TC dialogue ID.

The SCCP interface is described in [6] to [11].

The SAO contained in the ISUP AE is one of the following types:

a) Public Initiating node

   This contains:

   - Outgoing ISUP ASE, Initiating APM ASE, Initiating EH ASE, Outgoing BRGAT ASE and ISUP SACF.

b) Public addressed node

   This contains:

   - Incoming ISUP ASE, Addressed APM ASE, Addressed EH ASE, Incoming BRGAT ASE and ISUP SACF.

The SAO contained in the TC AE for Connection Oriented bearer unrelated signalling is one of the following types:

a) Public Initiating node

   This contains:

   - Outgoing COGAT ASE, TC ASE and TC SACF.

b) Public addressed node

   This contains:

   - Incoming COGAT ASE, TC ASE and TC SACF.

6.2.3 Dynamic primitive flows

6.2.3.1 Bearer related signalling flows

Figures 4 and 5 illustrate dynamic primitive flows for the GAT information flow support over the NNI (ISUP) for the case that a call control message is coincident with the application information flow. Figure 4 shows the case when a message is being sent, Figure 5 shows the case where a message is being received.

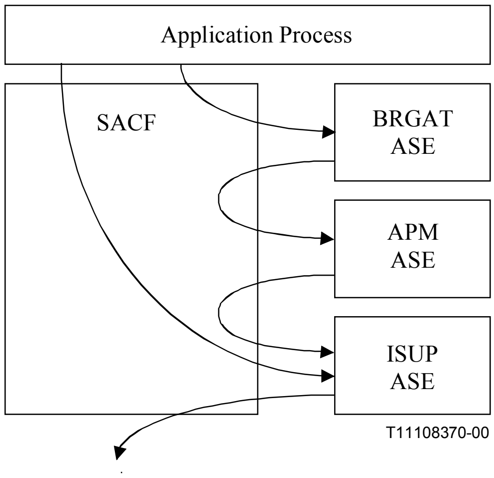

Figure 4/Q.765.4 – Primitive flows for outgoing messages coincident with a call control message

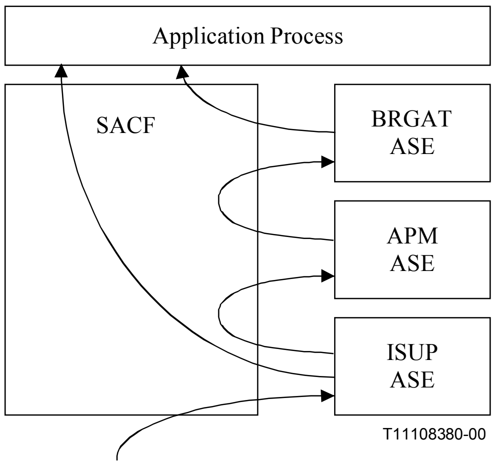

Figure 5/Q.765.4 – Primitive flows for incoming messages coincident with a call control message

Figures 6 and 7 illustrate the dynamic primitive flows for the NNI support of the GAT protocol where no call control messages are sent coincidently. That is, the APM ASE initiates a primitive towards the ISUP ASE which in turn sends an APM message which will provide a mechanism for supporting the information flow.

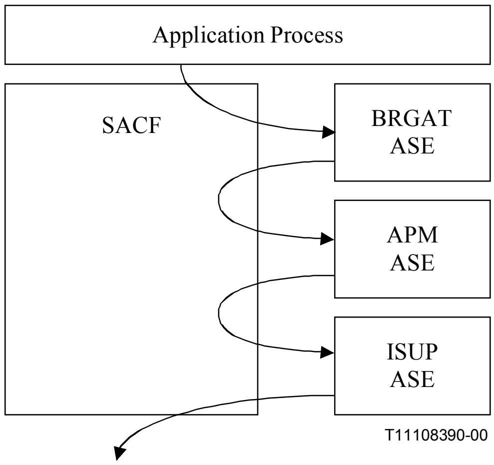

Figure 6/Q.765.4 – Primitive flows for outgoing messages with no coincident call control message

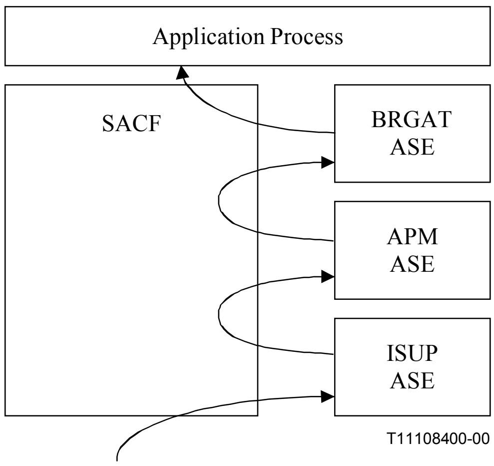

Figure 7/Q.765.4 – Primitive flows for incoming messages with no coincident call control message

6.2.3.2 Bearer unrelated signalling flows

Figures 8 and 9 illustrate the dynamic primitive flows for the GAT information flow without a bearer being supported over the NNI (TC). Figure 8 shows the case when a message is being sent, Figure 9 shows the case where a message is being received.

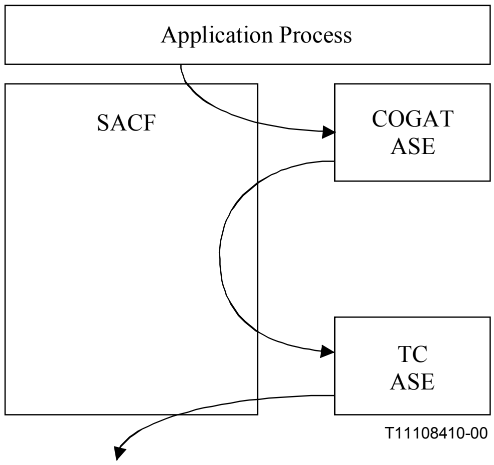

Figure 8/Q.765.4 – Primitive flows for outgoing messages

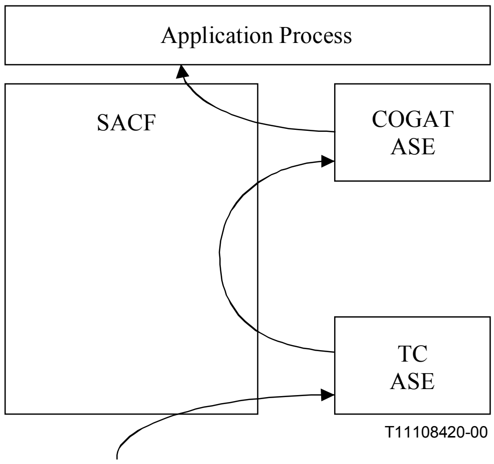

Figure 9/Q.765.4 – Primitive flows for incoming messages

7 Application Process functions

7.1 General

The modelling of the Application Process (AP) is outside the scope of this Recommendation; however, in order to appreciate the role of the AP for the purposes of this Recommendation, it can be considered to consist of three different types of functionality that are relevant to the support of GAT over the public network nodal interface. These are Public network Application Transport Mechanism (as defined in [1] and ISUP basic call [4]) and the Generic Addressing and Transport (GAT) applications for the support of the GAT protocol functionality, as defined in this Recommendation.

The aspect of the Application Process that this Recommendation introduces is the required coordination between the public network Application Process and GAT-Control (for the support of GAT information flows) Application Process functionality in order to provide the appropriate transportation of GAT information flow via:

- the combination of public ISUP basic call and the Application Transport Mechanism;
- using transaction capability mechanisms.

The GAT-Control functionality is described in [2]. In order to show the relationship between the GAT Application Process and the GAT-Control, this Recommendation describes the mapping of primitives between the GAT-Control primitives and the SACF interface a primitives. The description of either the Public Network or the GAT-Control Application Processes are outside the scope of this Recommendation.

The definition of the primitive interface at the Application Process/SACF for the public Application Transport Mechanism is outside the scope of this Recommendation.

7.2 GAT Application Process functions – Connection with call (bearer related)

7.2.1 Introduction

The function of the Public NNI support of the GAT aspect of the Application Process (AP) is to coordinate between the GAT-Control Application Process and the public network Application Process.

It is not the intention of this Recommendation to redefine the GAT-Control functionality, therefore the call control defined in [2] applies. The purpose of this Recommendation is to describe how, together with the ISUP basic call and APM, the services expected by the GAT-Control are fulfilled.

It is not the intention of this Recommendation to model the AP, however, to illustrate the relationship between this Recommendation and the GAT-Control functionality described in [2], Figure 10 can be used.

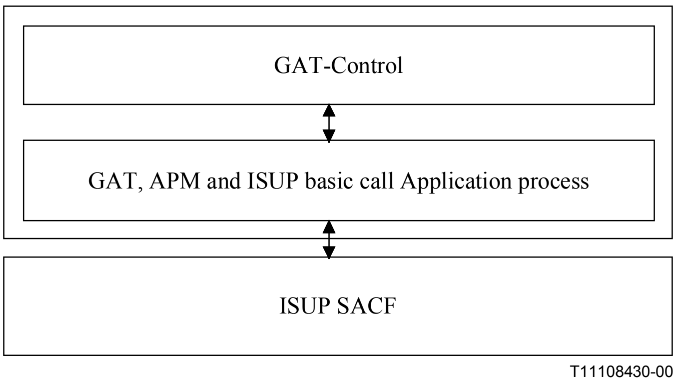

Figure 10/Q.765.4 – Relationship between GAT-Control primitive interfaces and ISUP SACF primitive interface

7.2.2 Primitive interface

The primitive interface (interface a in Figure 3) between the AP and the ISUP SACF consists of primitives required to support the public network basic call functionality, and those to support the GAT functionality. The primitives related to the public network basic call functionality are outside the scope of this Recommendation although references are made to them through functional inferences within the text. The public basic call Recommendation is not described using ALS concepts hence the need for functional references to the basic call functionality rather than specific references to primitives. The primitives related to the GAT functionality are described in this Recommendation. (See Table 1.)

Table 1/Q.765.4 – Primitives between AP and ISUP SACF (GAT Support)

Primitive name	Types	Direction (Note)
GAT_Data	Indication/Request	→/←
GAT_Error	Indication	→
NOTE – Primitive flow from SACF to AP: → Primitive flow from AP to SACF: ←		

7.2.3 Procedures

7.2.3.1 GAT Information flows

Table 2 describes how the GAT-Control information flows are mapped across primitives on the AP/SACF interface.

Table 2/Q.765.4 – Mapping between GAT-Control primitives defined in [2] and AP/ISUP SACF

Primitives to/from GAT-Control Interface ([2])		Flow	ISUP Messages	Primitives to/from AP/SACF Interface (BRGAT ASE)
Transport_Setup	REQ IND RES CONF	→ ← → ←	IAM IAM ACM/CPG/CON/ANM ACM/CPG/CON/ANM	+GAT_DATA.Req +GAT_DATA.Ind +GAT_DATA.Req +GAT_DATA.Ind
Transport_Data	REQ IND	→ ←	APM APM	+GAT_DATA.Req +GAT_DATA.Ind
Transport_Release	REQ IND	→ ←	PRI/REL PRI/REL	+GAT_DATA.Req (PRI only) +GAT_DATA.Ind (PRI only)
Transport_Reject	REQ IND	→ ←	ACM/CPG/CON/ANM/APM/PRI ACM/CPG/CON/ANM/APM/PRI	+GAT_DATA.Req +GAT_DATA.Ind

7.2.3.2 Application Transport Instruction Indicators

The Application Transport Instruction Indicators (ATII) are required to be sent in conjunction with GAT information in order to handle error cases such as unidentified context and addressing errors at an end exchange or reassembly errors. They are to be set according to the particular needs of the application. That is, if the requested functionality is essential to the call, then the ATII should be set to release the call. Alternatively, if actions are required to be performed to smoothly handle a case where communication is not successful but the call is to continue, then a notification should be requested. If there is no real need to indicate an unsuccessful communication with the PAN, then no actions need to be requested in the ATII.

7.2.3.3 Handling of address information

Upon receipt of a request from the GAT-Control logic that GAT information has to be sent, the GAT Application process shall determine on the analysis of the NFE whether the addressing of the final node to which the GAT SDU shall be delivered is implicit or explicit.

If the addressing is implicit (the destination entity is set to "AnyNode" without any destination entity address or the NFE is absent), then the originating address and destination address are absent in the GAT_Data request primitive sent to the SACF.

Otherwise, the originating address and destination address shall be included in the GAT_Data request primitive sent to the ISUP SACF. The originating address contains the address of this node (address of the PIN). The destination address shall contain the address of the PAN which is a public network address that is either:

- the public address of the node identified in the destination entity address of the NFE, in case this node is in the public SS7 network;
- or the public address of the end node within the SS7 network in case the node identified in the destination entity address of the NFE is beyond the public SS7 network.

7.2.4 Exceptional procedures

On reception of a GAT_Error primitive containing an error notification indicating "unidentified context", the GAT-Control entity and the management function shall be notified.

On reception of a GAT_Error indication primitive containing an error notification indicating "reassembly error", the management function shall be notified.

On reception of a GAT_Error indication primitive containing an error notification indicating "unrecognized information", then a call will either be allowed to proceed if possible, or the call shall be released.

7.2.5 Primitive contents

Tables 3 and 4 contain the list of parameters in the primitives.

Table 3 shows the contents of the GAT_Data primitive sent in conjunction with ISUP messages.

Mandatory/Optional (M/O) indications are provided.

Table 3/Q.765.4 – Contents of the GAT_Data Ind/Req primitive

Parameter	Mandatory/Optional
ATII	M
Originating Address (Note 1)	O
Destination Address (Note 1)	O
GAT PDU (Note 2)	M
NOTE 1 – When explicit addressing is used, the Originating Address parameter and the Destination Address parameter are present. When implicit addressing is used, the Originating Address parameter and the Destination Address parameter are absent. NOTE 2 – The GAT PDU is coded as described in [2]. It contains three fields: the NFE (optional), the Service Indicator (mandatory) and the GAT SDU (mandatory).	

Table 4/Q.765.4 – Contents of the GAT_Error Ind primitive

Parameter	Mandatory/Optional
Error Notification	M

7.3 GAT Application Process functions – Connection without call (bearer unrelated)

7.3.1 Introduction

The function of the Public NNI support of the GAT aspect of the Application Process (AP) is to coordinate between the GAT-Control Application Process and the public network Application Process.

It is not the intention of this Recommendation to redefine the GAT-Control functionality. The purpose of this Recommendation is to describe how, through the use of TC and SCCP, the services expected by GAT-Control are fulfilled.

It is not the intention of this Recommendation to model the AP; however, to illustrate the relationship between this Recommendation and the GAT-Control functionality described in [2], Figure 11 can be used.

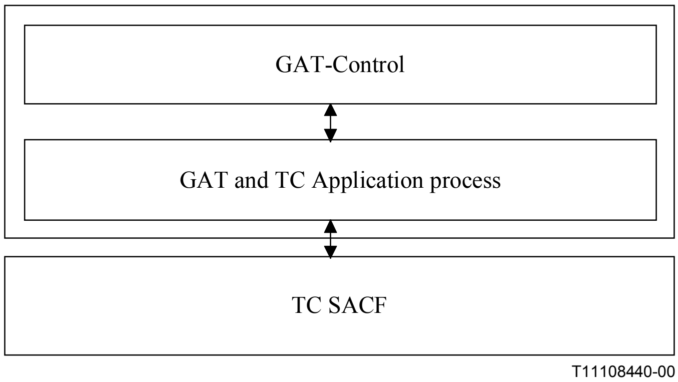

Figure 11/Q.765.4 – Relationship between GAT-Control primitive interfaces and TC SACF primitive interface

Connectionless signalling is not supported by this Recommendation.

7.3.2 Primitive interface (AP-TC SACF)

The GAT-Control application uses the services provided by the TC SACF primitive interface (interface h in Figure 3) as listed in Table 5.

Table 5/Q.765.4 – Primitives between AP and TC SACF

Primitive name	**Types**	**Direction** (Note)
GAT_SETUP	Indication/Request/Response/Confirmation	➔/🡐/🡐/➔
GAT_REJECT	Indication/Request	➔/🡐
GAT_RELEASE	Indication/Request	➔/🡐
GAT_DATA	Indication/Request	➔/🡐
NOTE – Primitive flow from SACF to AP: ➔ Primitive flow from AP to SACF: 🡐		

7.3.3 Connection Oriented signalling procedures

7.3.3.1 GAT Information flows

The protocol control procedures that describe the mapping of the Generic Functional Transport (GFT) primitives to transaction (TC) operations over the public NNI are described here with reference to [2]. The procedural aspects of the GAT-Control functionality are outside the scope of this Recommendation. In order to describe the relationship between the primitives on the GAT-Control interface to the operations used over TC, this Recommendation defines the mapping between the primitives referred to in [2] and the suitable AP/TC SACF interface primitives. See Table 6.

Primitives related to the GAT-Control application functionality are outside the scope of this Recommendation (see [2]).

Table 6/Q.765.4 – Mapping between primitives used in [2] and AP/TC SACF primitives

Primitives used at GAT/PC interface as defined in [2]		Flow	TC messages	Primitives used on AP/TC SACF interface
Transport_Setup	REQ IND	→ ←	TC-BEGIN TC-BEGIN	+GAT_SETUP.Req +GAT_SETUP.Ind
Transport_Setup	RES CONF	→ ←	TC-CONTINUE TC-CONTINUE	+GAT_SETUP.Resp +GAT_ SETUP.Conf
Transport_Reject	REQ IND	→ ←	TC-CONTINUE/TC-END TC-CONTINUE/TC-END	+GAT_REJECT.Req +GAT_REJECT.Ind
Transport_Release	REQ IND	→ ←	TC-END TC-END	+GAT_RELEASE.Req +GAT_RELEASE.Ind
Transport_Data	REQ IND	→ ←	TC-CONTINUE TC-CONTINUE	+GAT_DATA.Req +GAT_DATA.Ind

7.3.3.2 Handling of address information

Only explicit addressing can be used in the bearer unrelated case.

Upon receipt of a request from the GAT-Control logic that GAT information has to be sent, the GAT Application process shall derive the Destination Address from the information received in the NFE.

The Destination Address shall be included in the primitive sent to the TC SACF. The Destination Address shall contain the address of the PAN which is a public network address that is either:

- the public address of the node identified in the destination entity address of the NFE, in case this node is in the public SS7 network;
- or the public address of the end node within the SS7 network in case the node identified in the destination entity address of the NFE is beyond the public SS7 network.

The originating address consisting in the address of this node (address of the PIN) is handled at the SCCP level, see 13.4.

7.3.4 Primitive contents

Tables 7 to 11 contain the list of parameters in the primitive.

Mandatory/Optional (M/O) indications are provided, as well as a reference for a detailed description of the parameters.

Table 7/Q.765.4 – Contents of the GAT_SETUP Ind/Req

Parameter	Mandatory/Optional
Destination Address	M
GATPDU	M

Table 8/Q.765.4 – Contents of the GAT_SETUP Res/Conf primitive

Parameter	Mandatory/Optional
GATPDU	O

Table 9/Q.765.4 – Contents of the GAT_RELEASE Ind/Req primitive

Parameter	Mandatory/Optional
GATPDU	O
Cause	M

Table 10/Q.765.4 – Contents of the GAT_DATA Ind/Req primitive

Parameter	Mandatory/Optional
GATPDU	M

Table 11/Q.765.4 – Contents of the GAT_REJECT Ind/Req primitive

Parameter	Mandatory/Optional
Cause	M
GATPDU	O

8 Single Association Control Function (SACF) – ISUP SACF

8.1 Introduction

The main objective of ISUP SACF is to receive/deliver primitives from/to the appropriate entity and to perform a distribution function where appropriate for the ISUP AEI. The flow of information is from the AP (interface a) towards NI (interface f) or vice versa, therefore the SACF is also responsible to ensure that when multiple primitives are generated by the ASEs towards the AP, that they are delivered across the interface together to ensure the correct associations are maintained. The SACF described here only defines the mapping and functions related to the NNI support of the GAT application aspect of the model. The SACF functionality related to the public APM functionality is outside the scope of this Recommendation. The mapping of primitives in Tables 12, 15 and 16 are in [1] and are included here for informative purposes only.

The interfaces referenced herein are illustrated in 6.2, Figure 3.

The primitives on the interface between SACF and the AP, interface a, are defined in 7.2.2.

The parameters in these primitives are listed in Tables 3 and 4.

The primitives on the interface between SACF and BRGAT ASE, interface b, are defined in 10.1.

The parameters in these primitives are listed in Tables 20 and 21.

The primitives on the interface between SACF and EH ASE, interface c, can be found in [1] and are therefore outside the scope of this Recommendation.

The primitives on the interface between SACF and APM ASE, interface d, can be found in [1] and are therefore outside the scope of this Recommendation.

The primitives on the interface between SACF and ISUP ASE, interface e, can be found in [1] and are therefore outside the scope of this Recommendation.

The primitives on the interface between SACF and NI, interface f, can be found in [1] and are therefore outside the scope of this Recommendation.

8.2 Information flows related to messages sent by the node

On receipt of a primitive (request) from the application process (AP) (interface a in Figure 3), the SACF issues appropriate primitive(s) to the ASEs, populating the parameters in the generated primitives from the appropriate subset of the parameters received from the AP. The SACF also performs distribution of the responding primitives received from the ASEs prior to sending the resulting primitive to NI (interface f in Figure 3).

Table 12/Q.765.4 – Mapping between BRGAT ASE and APM ASE primitives

Interface b, from BRGAT ASE	Interface d, APM ASE
APM_U_Data	APM_Data

Table 13/Q.765.4 – Mapping between AP and BRGAT ASE primitives

Interface a, from AP	Interface b, BRGAT ASE
GAT_Data	GAT_Data

8.3 Information flows related to messages received by the node

These procedures are described in [1] where the APM-user ASE corresponds with the BRGAT ASE.

Table 14/Q.765.4 – Mapping between BRGAT ASE and AP primitives

Interface b, BRGAT ASE	Interface a, from AP
GAT_Data	GAT_Data
GAT_Error	GAT_Error

Table 15/Q.765.4 – Mapping between APM ASE and BRGAT ASE primitives

Interface d, from APM ASE	Interface b, BRGAT ASE
APM_Data	APM_U_Data

Table 16/Q.765.4 – Mapping between EH ASE and BRGAT ASE primitives

Interface c, from EH ASE	Interface b, BRGAT ASE
APM_Error	APM_U_Error

9 Single Association Control Function (SACF) – TC SACF

9.1 Introduction

The main objective of TC SACF is to receive/deliver primitives from/to the appropriate entity for the TC AEI. The SACF described here only defines the mapping and functions related to the NNI support of the GAT applications aspect of the model.

Four interfaces (shown in Figure 3) are described in this Recommendation:

- AP/SACF;
- SCCP/SACF;
- COGAT/SACF;
- TC ASE/SACF.

The interfaces referenced herein are illustrated in 6.2, Figure 3. Clause 6.2.3 also provides examples of the "Dynamic primitive flows".

The primitives received from the AP, on interface h, are mapped as shown in 7.3.2 and 7.3.3. The parameters in these primitives are listed in 7.3.4.

The primitives on the interface between SACF and COGAT ASE, interface i, are listed in 11.2.

The primitives on the interface between SACF and TCAP, interface j, are listed in [12] to [16]. (See clause 12.)

The primitives on the interface between SACF and SCCP, interface k, are listed in [6] to [11]. (See clause 13.)

9.2 Information flows related to operations sent by a node

On receipt of a primitive (request or response) from the AP (interface h in Figure 3), the SACF issues appropriate primitive(s) to the ASEs, populating the parameters in the generated primitives from the appropriate subset of the parameters received from the AP. The SACF also performs the distribution of the responding primitives received from the ASEs prior to sending the succeeding primitive. With regard to the interface between SACF and TCAP, all the TC primitives exchanged between the COGAT ASE and the TCAP pass through the SACF unchanged. See Table 17.

Table 17/Q.765.4 – Mapping between AP and COGAT ASE primitives

Interface h, from AP	Interface i, COGAT ASE
GAT_Setup	GAT_Setup
GAT_Release	GAT_Release
GAT_Reject	GAT_Reject
GAT_Data	GAT_Data

9.3 Information flows related to operations received by a node

On receipt of an N_DATA indication primitive from the SCCP, the SACF analyses the User Data field of this primitive according to the rules in [8]. It then proceeds to perform the function of distribution. See Table 18.

Table 18/Q.765.4 – Mapping between COGAT ASE and AP primitives

Interface i, COGAT ASE	Interface h, from AP
GAT_Setup	GAT_Setup
GAT_Release	GAT_Release
GAT_Reject	GAT_Reject
GAT_Data	GAT_Data

10 Bearer-related GAT ASE (BRGAT ASE)

The BRGAT ASE is responsible for preparing the information in the appropriate form that can be passed to the APM for transportation.

10.1 Primitive interface

Table 19 lists the primitive interface between the BRGAT ASE and ISUP SACF (interface b in Figure 3).

Table 19/Q.765.4 – Primitives between ISUP SACF and BRGAT ASE

Primitive name	Types	Direction (Note)
APM_U_Data	Indication/Request	→/←
APM_U_Error	Indication	→
GAT_Error	Indication	→
GAT_Data	Indication/Request	→/←
NOTE – Primitive flow from SACF to BRGAT ASE: → Primitive flow from BRGAT ASE to SACF: ←		

10.2 Signalling procedures

10.2.1 Sending procedures

On reception of the GAT_Data request primitive, its contents are prepared in the appropriate format (see clause 14). The result is sent in the APM_U_Data request primitive with the Application Context Identifier value set to "GAT".

10.2.2 Receiving procedures

On reception of the APM_U_Data indication primitive, its contents are checked for correct format and coding (see clause 14). If the check is passed, the received information is transferred and sent in the GAT_Data indication primitive. If the check is failed, then the GAT_Error indication primitive is sent indicating "unrecognized information".

10.2.3 APM_U_Error Primitive

On reception of the APM_U_Error indication primitive, the contents should be passed unchanged in the GAT_Error indication primitive.

10.2.4 Signalling congestion

In order to avoid congestion in the SS7 signalling network, it is necessary that applications that contribute signalling load towards a congested destination limit their signalling trafic in a controlled manner. As the AP makes use of the ISUP ASE, the ISDN User Part signalling procedures [4] may reduce traffic towards an affected destination. As such new call attempts may temporarily be rejected.

10.3 Primitive contents

Tables 20 and 21 list the mandatory and optional contents for the BRGAT ASE service primitives. These primitives are defined in [1] and are included here for informative purposes only.

The contents of the GAT_Error and GAT_Data primitives are defined at the AP/SACF interface in 7.2.5.

Mandatory/Optional (M/O) indications are provided.

Table 20/Q.765.4 – Contents of the APM_U_Data Ind/Req primitive

Parameter	Mandatory/Optional
Application Context Identifier	M
Application Transport Instruction Indicators	M
Originating Address	O
Destination Address	O
Application Data	M

Table 21/Q.765.4 – Contents of the APM_U_Error Ind primitive

Parameter	Mandatory/Optional
Notification	M

11 Connection Oriented GAT ASE (COGAT ASE)

This COGAT ASE is responsible for the signalling aspects of the GAT application and for preparing the information in the appropriate form that can be passed to the TC for transportation.

11.1 TC-user sequence

Signalling flow for call setup and cleardown

In Figure 12, a signalling flow is given for the setup and release of a dialogue to support bearer unrelated (Connection Oriented) GAT information transfer. The GAT information is transferred over the NNI using TC messages. The following operations are defined to allow the transfer of GAT information: ***Setup, Release, GATData***. The Setup operation is of class 3 and the remaining operations are of class 4.

Two timers supervise the release of the TC dialogue. Timer T3 shall be started in the PIN on receipt of the Setup return result operation and timer T4 shall be started in the PAN on sending the Setup return result operation. Both timers are restarted on sending/receipt of an operation.

A class 3 operation called ***ActivityTest*** is sent to check whether the remote application is still alive. This operation shall be generated in the PIN on expiry of timer T3. Timer T2 shall supervise the receipt of the return result. On receipt of the ActivityTest operation the PAN shall restart timer T4 and on receipt of the return result the PIN shall stop timer T2 and start timer T3.

On expiry of timer T1, T2 or T4, a TC-U-ABORT shall be sent (abort the dialogue) and the management function shall be informed.

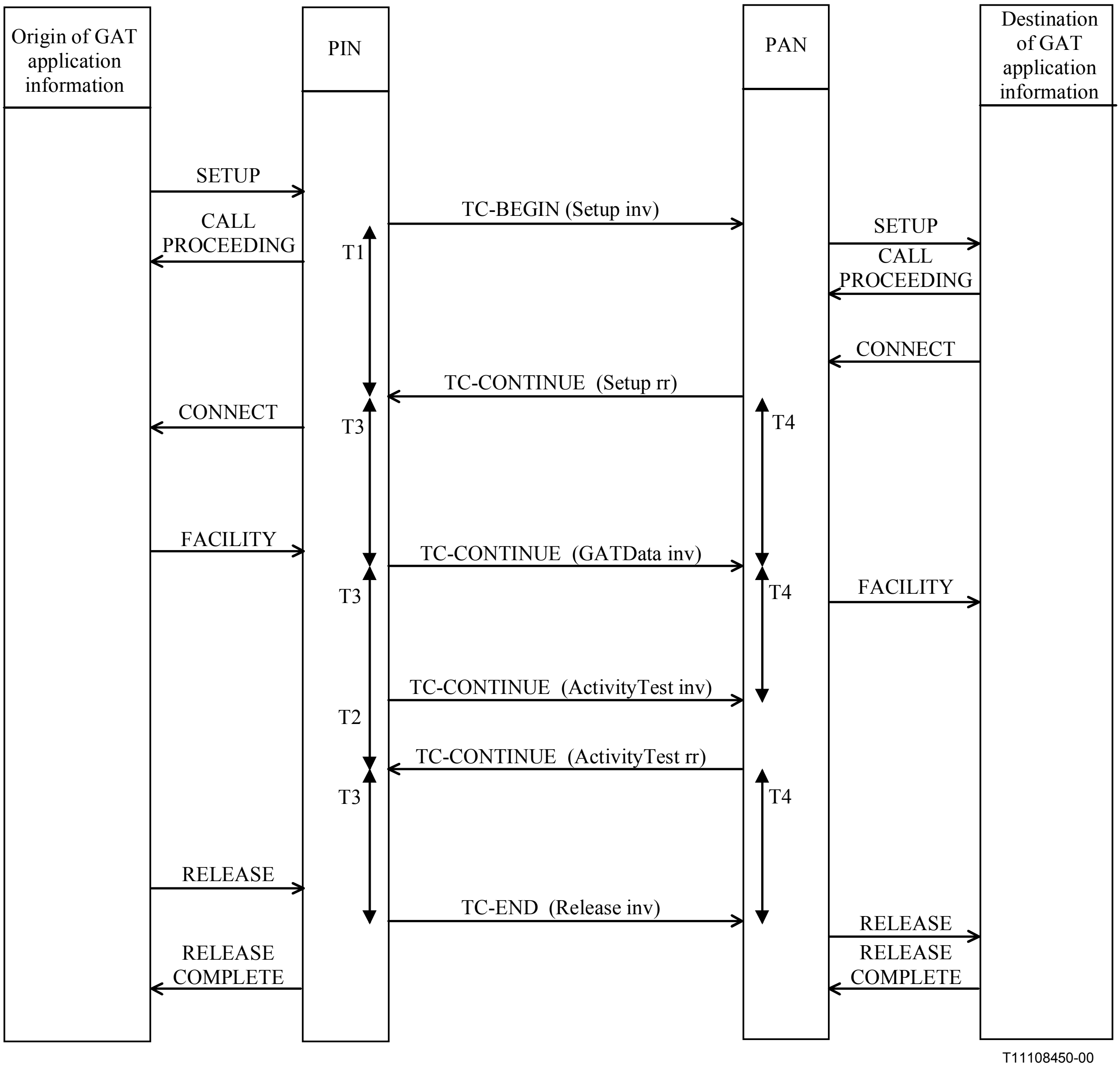

Figure 12/Q.765.4 – Example of a bearer unrelated signalling sequence

11.2 Interface COGAT ASE- SACF

Table 22 lists the primitive interface between the COGAT ASE and TC SACF (interface i in Figure 3).

Other primitives on this interface correspond to the TC-user interface as defined in [12] and [13].

Table 22/Q.765.4 – Primitives between COGAT-ASE and TC SACF (Protocol Control)

Primitive name	**Types**	**Direction** (Note)	**Corresponding operation(s)**
GAT_SETUP	Indication/Request	➔/🡐	Setup.Invoke
GAT_SETUP	Response/Confirmation	🡐/➔	Setup.ReturnResult
GAT_REJECT	Request/Indication	➔/🡐	Setup.ReturnResult
GAT_DATA	Indication/Request	➔/🡐	GATData.Invoke
GAT_RELEASE	Indication/Request	➔/🡐	Release.Invoke
NOTE – Primitive flow from SACF to COGAT ASE: ➔ Primitive flow from COGAT ASE to SACF: 🡐			

11.3 Supported operations

The ASE supports the following Operations:

- Setup (Class 3)
- GATData (Class 4)
- Release (Class 4)
- ActivityTest (Class 3)

Invocation of the above-mentioned Operations can generate the following components:

- Setup
  - Setup.Invoke
  - Setup.ReturnResult
- GATData
  - GATData.Invoke
- Release
  - Release.Invoke
- ActivityTest
  - ActivityTest.Invoke
  - ActivityTest.ReturnResult

11.4 ASE procedures

The COGAT ASE is responsible for coordinating the information received in primitives and preparing it according to the operation definition and TCAP primitive interface requirements.

11.4.1 Relationship between the COGAT-ASE and TCAP

The dialogue defined for the GAT information flows support between the peer-to-peer entities (TC-Users) is a structured dialogue. The dialogue ID parameter is used in both operation handling and transmission (dialogue) handling primitives to determine which component(s) pertain(s) to which dialogue.

Each TC-User has its own reference for a given dialogue. These references are local references and mapping of these local references into protocol references transaction ID, included in the messages, is done by TC.

All the operations below belong to the same dialogue.

Class 3 and 4 operations are used.

Each TC message conveys only a single operation.

11.4.1.1 Dialogue beginning

The PIN establishes the dialogue by using a TC-BEGIN.request primitive with TC-INVOKE.request primitive to transmit a Setup (class 3) operation invoke component to the PAN. The PAN responds by:

- Using the TC-CONTINUE.request primitive with TC-RESULT-L.request primitive to transmit a Setup.ReturnResult component, confirm the dialogue, and indicate that the Setup.request operation was successful. The Setup.ReturnResult may contain the GATTransport parameter.
- Using the TC-END.request primitive with TC-RESULT-L.request primitive to transmit a Setup.ReturnResult component, end the dialogue, and indicate that the Setup.request operation failed. The cause parameter shall be included in this case. In addition, the GATTransport may be included in the Setup.ReturnResult component.

11.4.1.2 Dialogue continuing

The continuation of the dialogue is assumed by the GATData (class 4) and ActivityTest (class 3) operations using TC-CONTINUE primitives.

11.4.1.3 Dialogue end

11.4.1.3.1 Basic end

A dialogue end is requested by either the PIN or PAN using TC_END.request primitive with TC-INVOKE.request primitive to transmit a Release operation invoke component.

11.4.1.3.2 Abnormal end

When the TC-user determines that it will abort the dialogue, it does so with the TC-U-ABORT primitive. On receipt of a TC-NOTICE or a TC-P-ABORT indication primitive, the TC dialogue shall be terminated.

11.4.2 Operations

11.4.2.1 Setup operation

On reception of the GAT_SETUP.request primitive, its contents are loaded into and sent from the PIN with the Setup.invoke operation. Timer T1 is started. On reception of the operation at the PAN, its contents are sent in a GAT_SETUP.indication primitive. In case the signalling connection request can be accepted by the AP at the PAN (the COGAT ASE receives a GAT_SETUP response), it responds towards the PIN with the Setup.ReturnResult operation and starts timer T4. On reception of the return result operation at the PIN, its contents are sent in a GAT_SETUP.conf, timer T1 is stopped, and timer T3 is started. In case the signalling connection request cannot be accepted by the AP at the PAN (the COGAT ASE receives a GAT_REJECT request), it responds towards the PIN with the Setup.ReturnResult operation. On reception of the return result operation at the PIN, its contents are sent in a GAT_REJECT indication and timer T1 is stopped.

11.4.2.2 GATData operation

The GATData operation may be sent from either PIN to PAN or vice versa after sending/receipt of the Setup.ReturnResult operation.

PIN to PAN: On reception of the GAT_DATA.request primitive, its contents are loaded into and sent from the PIN with the GATData.invoke operation. Timer T3 is restarted. On reception of the operation at the PAN, the contents are passed in the GAT_DATA.indication primitive, and timer T4 is restarted.

PAN to PIN: On reception of the GAT_DATA.request primitive, its contents are loaded into and sent from the PAN with the GATData.invoke. Timer T4 is restarted. On reception of the operation at the PIN, the contents are passed in the GAT_DATA.indication primitive, and timer T3 is restarted.

11.4.2.3 ActivityTest operation

On expiry of timer T3, the PIN sends an ActivityTest.invoke operation and starts timer T2. On reception of the operation, the PAN sends the ActivityTest.returnresult operation in response and restarts timer T4. On reception of the response at the PIN, timer T2 is stopped and timer T3 started.

11.4.2.4 Release operation

The Release operation may be sent from either PIN to PAN or vice versa.

PIN to PAN: On reception of the GAT_RELEASE.request primitive, its contents are loaded into and sent from the PIN with the Release.invoke operation. Timer T3 is stopped. On reception of the operation at the PAN, the contents are passed in the GAT_RELEASE.indication primitive, and timer T4 is stopped.

PAN to PIN: On reception of the GAT_RELEASE.request primitive, its contents are loaded into and sent from the PAN with the Release.invoke operation. Timer T4 is stopped. On reception of the operation at the PIN, the contents are passed in the GAT_RELEASE.indication primitive, and timer T3 is stopped.

11.4.2.5 Exceptional procedures

On receipt of either a TC-P-ABORT, a TC-U-ABORT, a TC-U-REJECT, a TC-L-CANCEL or a TC-NOTICE primitive, the dialogue is released with cause "normal unspecified".

11.4.3 Expiry of timers

11.4.3.1 T1

On expiry of timer T1, the dialogue shall be aborted using the TC-U-ABORT primitive and the GAT_REJECT indication primitive shall be sent to the Application Process with cause "normal unspecified".

11.4.3.2 T2

On expiry of timer T2, the dialogue shall be aborted using the TC-U-ABORT primitive and the GAT_RELEASE indication primitive shall be sent to the Application Process with cause "normal unspecified".

11.4.3.3 T3

On expiry of timer T3, the activity test procedures shall be initiated (see 11.4.2.3).

11.4.3.4 T4

On expiry of timer T4, the dialogue shall be aborted using the TC-U-ABORT primitive and the GAT_RELEASE indication primitive shall be sent to the Application Process with cause "normal unspecified".

11.4.4 Signalling congestion

In order to avoid congestion in the SS7 signalling network, it is necessary that applications that contribute signalling load towards a congested destination limit their signalling traffic in a controlled manner. As the AP makes use of the TC ASE, the COGAT ASE shall take appropriate action on receipt of a TC-NOTICE primitive indicating signalling congestion. Similar to the procedures for the ISDN User Part signalling congestion control [4], the AP should reduce the establishment of new transactions towards the affected destination.

11.5 Primitive contents

The contents of the primitives are described in 7.3.4.

11.6 Abstract syntax, general

Clause 11.8 specifies the abstract syntax for the COGAT ASE protocol using the Abstract Syntax Notation One (ASN.1) [17].

The set of values each of which is a value of the ASN.1 type TCAPMessages, MessageType as defined in [12] to [16] with the ANY DEFINED BY definitions resolved by the operations and errors definitions included in 11.8 form the abstract syntax for the COGAT ASE protocol.

The set of encoding rules which are applicable to this abstract syntax are defined by [12] to [16]. The mapping of the OPERATION and ERROR MACROs to TC components is also described in [12] to [16].

The ASN.1 data type which follows the keywords "PARAMETER" or "RESULT" (for OPERATION and ERROR) is always optional from a syntactic point of view. However, except for specific mention, it has to be considered as mandatory from a semantic point of view.

When a mandatory element is missing in any component or inner data structure, a reject component is returned (if the dialogue still exists). The problem cause to be used is "Mistyped parameter".

11.7 Subsystem number

The SSN value of 0000 1011 "ISDN supplementary services" will be used.

11.8 ASN.1 module

The following ASN.1 module specifies the protocol elements defined for the COGAT ASE. It shows the definition of the operations, errors and types required for the Connection Oriented, bearer unrelated signalling for the support of GAT information using ASN.1 as defined by [17] and using the OPERATION and ERROR macros as defined by [12] to [16].

The formal definition of the component types to encode these operations, errors and types is provided in [12] to [16].

```
COGAT-Protocol {itu-t Recommendation q 765 4 modules(2) operations-and-errors(1) version1(1)}

DEFINITIONS IMPLICIT TAGS        ::=

BEGIN

IMPORTS
OPERATION, ERROR

                    FROM TCAP Messages {ccitt Recommendation q 773 modules(2) messages(1) version2(2)}

            GATPDU
                    FROM GAT-PDU {itu-t recommendation q 860 gat-pdu(1)} ;
=====================================================================================

-- TYPE DEFINITIONS FOR OPERATIONS
=====================================================================================

--Specification of Setup
-- =================

--Direction:   OLEX → DLEX

--Class:       3

--Timer:       T1

--Purpose:     Used for the establishment of a signalling association between a PIN and a PAN for a bearer unrelated
signalling connection.

SetUp               ::= OPERATION
            ARGUMENT
                    SetUpArg
            RESULT
                    SetUpResultArg


--Specification of Release

-- =================

--Direction:   OLEX → DLEX and DLEX → OLEX

--Class:       4

--Purpose:     Used for releasing a signalling association between a PIN and a PAN.

Release     ::= OPERATION
            ARGUMENT
                    ReleaseArg

--Specification of GATData
-- ===================

--Direction:   OLEX → DLEX and DLEX → OLEX

--Class:       4

--Purpose:     Used for transporting GAT information flows during the active phase of a signalling

connection.

GATData     ::= OPERATION
            ARGUMENT
                    GATDataArg


--Specification of ActivityTest

-- ====================

--Direction:   OLEX → DLEX
```

```
--Class:    3
--Timer:    T2
--Purpose:  Used to determine if the signalling association remains established between a PIN and a PAN.

ActivityTest        ::= OPERATION
            RESULT


================================================================================
--TYPE DEFINITIONS FOR ERRORS
================================================================================

-
================================================================================
-- TYPE DEFINITIONS FOR ARGUMENT DATA
================================================================================

SetUpArg                ::= SEQUENCE {
      destinationAddress        CalledPartyNumber,
      gATPDU                                GATPDU,
      ...
      }
SetUpResultArg          ::= SEQUENCE {
      cause                     Cause,
      gATPDU                          GATPDU,
      ...
      }
ReleaseArg              ::= SEQUENCE {
      cause                           Cause,
      gATPDU                          GATPDU,
      ...
      }

GATDataArg              ::= GATPDU
================================================================================
--TYPE DEFINITIONS FOR DATA
================================================================================
CalledPartyNumber       ::= OCTET STRING (SIZE (1..maxcdPlength))
      --The CalledPartyNumber is coded as described in Recommendation Q.763 [3].
      --The ISUP parameter name and length octets are not included.

Cause                   ::= OCTET STRING (SIZE (1..maxCauseLength))
      --The Cause is coded as described in Recommendation Q.850 [18].
      --The information element identifier and length octets are not included.
================================================================================
--DEFINITION OF RANGE CONSTANTS
================================================================================
maxCauseLength              INTEGER         ::= 30
maxLength                   INTEGER         ::= 2048
maxcdPlength                INTEGER         ::=         -- Network specific
================================================================================
--DEFINITION OF OBJECT IDENTIFIER PATH
================================================================================
COGATOID        OBJECT IDENTIFIER     ::= {itu-t Recommendation q 765 4 operations-and-errors(1)}
================================================================================
```

```
--ASSIGNMENTS FOR OPERATION VALUES
==========================================================================================
setUp           SetUp           ::= globalValue {COGATOID setUp(1)}
release         Release         ::= globalValue { COGATOID release(2)}
gatData         GATData         ::= globalValue { COGATOID gatData(3)}
activityTest    ActivityTest    ::= globalValue { COGATOID activityTest(4)}
==========================================================================================

--ASSIGNMENTS FOR ERROR VALUES
==========================================================================================
END--of COGAT-Protocol
```

12 TCAP (TC ASE)

The SACF uses the services provided by the TCAP primitive interface. The definition of TCAP is outside the scope of this Recommendation. For details refer to [12] to [16].

12.1 Interface TCAP-SACF

The primitives at this interface that support the services offered by TCAP are defined in [12] to [16].

12.2 Use of TCAP

This application uses TCAP for structured dialogues.

The peer-to-peer dialogue established by the COGAT ASE, as a TC-user, is a structured dialogue. The dialogue ID parameter is used in both operation handling and transmission (dialogue) handling primitives to determine which component(s) pertain(s) to which dialogue. Each TC-user has its own reference for a given dialogue. These references are local references and mapping of these local references into protocol references transaction ID, included in the messages, is done by TCAP. The class used by each operation is defined in the ASN.1 definition.

13 SCCP

13.1 Interface SCCP-SACF

The TC-SACF uses the services provided by the SCCP primitive interface. The definition of SCCP is outside the scope of this Recommendation. For details refer to the SCCP [6] to [11].

13.2 Use of SCCP

- SCCP Class 1 service (Sequenced Connectionless Service) is used by this application.
- The SCCP message return option will always be used.
- A minimum of 1992/93 version of SCCP to be used, but preferably 1996/97 version of SCCP [6] to [11] to be used.

13.3 Routing in the SCCP network

For routing on the international interface and for routing based on the GT translation mechanism within national networks, the coding of the called party address and the calling party address in SCCP shall comply with the following restrictions:

SSN indicator	1	(SSN for ISDN supplementary services is always included)
GT indicator	0100	(includes translation type numbering plan encoding scheme and nature of address)

Translation Type	0001 0001	(translation table)
Numbering plan	0001	(ISDN/Telephony Numbering Plan E.164)
Routing indicator	0	(Routing on global title)

Alternatively, for routing within a national network, the SCCP addressing method based on SPCs may apply. However, within large national networks, it would be advisable to use a hybrid addressing method based on SPCs for regional traffic and GT translation mechanism for long distance traffic, to keep the SS7 routing data manageable.

13.4 Number information used for routing

The exchange which initiates a dialogue using the GT translation mechanism shall give an E.164 address as GT in the SCCP calling address field which will uniquely identify it. For routing on the international interface, the number information used for GT translation shall comply to the E.164 numbering schemes for Country code and National destination code.

For the setting of the destination address, see section 7.3.3.2.

14 Formats and Codes of Application Data

The following defines the formats and codes for the support of the GAT application as an APM-user or as a TC_user.

For the support of the GAT application as an APM-user, the information structure defined here is passed as Application Data to the underlying transport mechanism (APM) in the APM_U_Data primitive. The Application Context Identifier field of the Application Transport parameter (APP) shall be coded "GAT".

For the support of the GAT application as a TC-user, the information structure defined here is passed in the GATPDU parameter in the primitives sent to the TC SACF.

In both cases, the information structure is coded identically: the encapsulated Application Information field within the APP and the GATPDU parameter are coded identically. They contain the GAT PDU as defined in [2]. It consists of the three following fields: the NFE (optional), the Service Indicator (mandatory) and the GAT SDU (mandatory).

15 Timers

This clause specifies all the Application Process and Protocol timers relevant for GAT applications. For each timer the time-out value, cause or initiation of that timer, normal termination event(s) for the timer, and actions to be performed on expiry of the timer, are given in Table 23. Furthermore, in the last column, reference is given to the relevant Application Process description, or ASE description, where a full description of the procedure is to be found.

Table 23/Q.765.4 – Timers in TC-user

Symbol	Time-out value	Cause for initiation	Normal termination	At expiry	Reference
T1	1-5 sec	Sending of SETUP.Invoke	Reception of SETUP.ReturnResult	Abort dialogue Send TC-U-ABORT Inform management function	11.4.3.1
T2	1-5 sec	Sending of ActivityTest.invoke	Reception of ActivityTest.ReturnResult	Abort dialogue Send TC-U-ABORT Inform management function	11.4.3.2
T3	10-60 min	Reception of Setup.ReturnResult GATData.Invoke ActivityTest.ReturnResult Sending of GATData.Invoke	Reception of GATData.Invoke Release.Invoke, Sending of Release.Invoke, GATData.Invoke,	Send ActivityTest.Invoke	11.4.3.3
T4	10-60 min (NOTE – T4 must be greater than T3)	Reception of GATData.Invoke Sending of Setup.ReturnResult GATData.Invoke ActivityTest.ReturnResult	Reception of ActivityTest.Invoke, Release.Invoke, GATData.Invoke Sending of GATData.Invoke Release.Invoke	Abort dialogue Send TC-U-ABORT Inform management function	11.4.3.4

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