



Dialogic[®] SS7 Protocols

TUP Programmer's Manual

April 2009

U09SSS

www.dialogic.com

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Revision History

| Issue | Date | Description |
|-------|-----------|--|
| 1 | 10-Jul-95 | Initial version. |
| 2 | 02-Aug-95 | Values for primitive and parameter types corrected. |
| 3 | 10-Dec-97 | Details of multiple TUP instance operation. Details of multiple host operation. Call clearing modified to support the Application controlled release mechanism as default. Use of the most significant bit of the call reference to indicate an outgoing call removed. Initial support for French TUP added. |
| 4 | 27-Jan-98 | Full support for French TUP (SSUTR2) added. |
| 5 | 30-Jun-98 | Description of new Application Controlled Release mechanism added. New parameters added to Backward information request, Backward information indication, Backward information response, Backward information confirmation. Set Trace Mask request, Trace Event indication, End Circuit Group request, Read Circuit Group Circuit Status request messages added. Minor editorial corrections. |
| 6 | 11-Mar-99 | Addition of Circuit Seized Indication primitive for use with incoming continuity test calls. MPM message added. New parameter suspend/resume indicator added. Read Revision Request message documentation added. Addition of User Service Information and Access Transport parameters. MTP messages in Appendix 1 removed. Minor editorial corrections. |
| 7 | 09-Jul-01 | Addition of Circuit Seized Request for use with outgoing continuity test calls. New module and group options added. Addition of selective tracing mechanism. |
| 8 | 16-Jul-03 | Branding changed: references to Septel and System7 removed. |
| 9 | 12-May-04 | New messages Change Circuit Group Configuration Request, Read Circuit Group Data Request and Read Circuit Group Identity Request added. Options TUPF_24PC, TUPF_PC_SIZE and TUPGOP_24PC updated. Added Option TUPF_16CID. |
| 10 | 02-Apr-09 | Branding changed, new format applied. |

Note: The current version of this guide can be found at:
<http://www.dialogic.com/support/helpweb/signaling>

1 Introduction

The TUP module is a portable software implementation of the Signaling System Number 7, Telephone User Part (TUP). This is the Programmer's Manual, intended for users who choose to develop their own application programs that will interface with and use the functionality provided by the TUP module.

In addition to supporting TUP functionality as specified by ITU recommendations, the module can be configured to support French SSUTR2 and Chinese GF001-9001 TUP operation.

The module uses the services provided by the Message Transfer Part (MTP) to exchange signaling messages with remote signaling points. It supports a number of both way telephony circuits. The circuits can be divided into a number of circuit groups, and each group may be assigned different attributes allowing the user considerable flexibility in configuring the module.

The TUP module is event driven and uses standard structured message types. It is intended to be used in conjunction with the MTP module, either on Dialogic® hardware platforms or on user supplied hardware. However, the software is portable and the well-defined message structure and the independent nature of the module allow the TUP module to be used with alternative MTP implementations if required.

This manual provides an overview of the internal operation of the TUP module, defines the structure of all messages that can be sent to, or issued by, the module and also describes all the configuration parameters.

1.1 Abbreviations

| | |
|--------|--|
| ITU | The International Telecommunication Union (Previously CCITT) |
| DPC | Destination Point Code |
| MCI | Malicious Call Identification |
| MTP | Message Transfer Part |
| OPC | Originating Point Code |
| SIO | Service Information Octet |
| SIF | Signaling Information Field |
| SS7 | Signaling System Number 7 |
| SSF | Sub-Service Field |
| SSUTR2 | Sous-Système Utilisateur Téléphonie R2 (French TUP) |
| TUP | Telephony User Part |

1.2 Related Documentation

- [1] ITU recommendations Q.721 - Q.725 (TUP)
- [2] French SSUTR2 (Système de signalisation par canal sémaphore CCITT o.7) Specification VN4, VN5 & VN6
- [3] China TUP Specification GF001-9001
- [4] Dialogic® DSI Software Environment Programmer's Manual
- [5] Dialogic® DSI MTP3 Programmer's Manual

1.3 Feature Overview

Key features of the TUP module include:

- Implementation of ITU recommendation Q.721 - Q.724 (Blue book 1988)
- Configuration options on a per circuit group basis
- User interface common with other Dialogic® SS7 Protocols
- Message oriented interface
- Support for both en-block and overlap address signaling
- Full user control of Circuit supervisory functions - Reset, Blocking & Unblocking
- Support for incoming continuity recheck test calls
- Support for circuit group as well as individual circuit supervision messages
- Support for 14 bit and 24 bit Signaling Point Codes
- Optional support for French TUP specified by SSUTR2 VN4/VN5/VN6
- Optional support for Chinese TUP specified by GF001-9001
- Debug tracing of messages exchanged with the user and with MTP

2 General Description

2.1 Module Overview

The TUP module implements the Telephony User Part functionality as defined in ITU recommendations Q.721 - Q.724. The module interface is message based. The module reads messages from a single message input queue and sends responses and indications to the message input queues of the other modules in the system.

The application interface uses primitives based on the ITU-T ISDN User Part (ISUP) formats and codes (specified in ITU-T Recommendation Q.763), in common to other Dialogic® SS7 protocols. This allows the same user application to interface with other telephony user parts as required.

Each circuit is identified internally by a logical Circuit Identifier (**cid**). Circuit Identifiers range from 0 up to one less than the total number of circuits supported. A circuit must be assigned to a circuit group before it can be used.

Circuit groups allow a number of circuits to be configured with common attributes. They are identified by the logical Group Identifier (**gid**) which ranges from 0 to one less than the total number of circuit groups supported. The Circuit Identification Code (CIC) of the first circuit in the group and the Circuit Identifier (**cid**) that will be used for this circuit are defined for each circuit group. Further circuits may be included in the group providing that the CIC of the last circuit is no more than 31 greater than the first CIC. The circuits do not need to lie in a contiguous block. The Circuit Identifier **cid** for each additional circuit will have the same offset from the first **cid** as the CIC has from the first CIC.

All protocol primitives between the application and the TUP module use a Call Reference (**call_ref**) to identify the circuit used for the call. The call reference is identical to the Circuit Identifier (**cid**) with the exception that for messages issued by the TUP module relating to outgoing calls the most significant bit of the **call_ref** is set to one when the TUP module is configured for 32768 circuits or less, and the TUPF_16CID flag is set to 0. In all other cases (more than 32768 circuits configured, or TUPF_16CID flag set to 1), the **cid** is identical to the **call_ref**.

Note: This feature is retained for backwards compatibility; however, it is planned that the feature will be removed in a future release, in which case the **call_ref** will be identical to the **cid**. The TUP module now ignores the setting of the most significant bit of the **call_ref**, and it is recommended that existing applications which placed significance on this bit be modified to ignore it also.

2.2 Module Configuration

The user configures the module for operation in two stages. The first message sent to the module must be a global configuration message. This configures environment dependent parameters. In general, these parameters will be fixed for any single application. Optionally, a configure timers message may be sent at this stage.

Each circuit group must then be configured with a configuration message before attempting to originate or accept calls.

3 Internal Data Structures

This chapter describes the internal data structures used by the TUP module. This description is intended to assist the user in understanding the operation of the module. It is not considered necessary to acquire detailed knowledge of these structures in order to use the module.

3.1 Global Data Structure

The entire data storage used by the module is contained in a single contiguous data structure. This structure contains global configuration settings, per circuit storage, circuit group configuration data, and per-call storage all relating to operation of the TUP protocol. It also contains internal event queues, timer control structures and internal buffers for message processing.

3.2 Circuit Group Data Structure

Each circuit group has a data structure within the global data structure which contains the user supplied configuration parameters for the circuit group (e.g. Signaling Point Codes, Circuit Identification and Configuration Options). The information in the circuit group data structure applies to all circuits in the circuit group.

3.3 Per Circuit Data Structure

Each circuit has a data structure within the global data structure which is used to store the current state of state machines associated with the circuit and any current call details.

4 Interface To System Services

4.1 System Functions

In addition to the primitive interface and the management interface to the TUP module (which are described in later sections) the module requires a few basic system services to be supplied by the underlying operating system. This functionality is usually supplied by the appropriate Development package.

The following functions are required for inter-task communication:

- GCT_send** Sends a message to another task.
- GCT_receive** Accept next message from input event queue, blocking the task if no message is ready.
- GCT_grab** As receive but not blocking if no message is ready.

The following functions are required for allocation of inter-task messages:

- getm** Allocate a message.
- relm** Release a message.

4.2 Timer Operation

In order to provide internal implementation of the TUP protocol timers the module needs to receive a periodic timer tick message. This is usually achieved using either the Enhanced Driver Module or the Timer module in which case the following messages are used by the TUP module:

- KEEP_TIME** Issued by TUP module to initialize the timer services
- TM_EXP** Issued by the timer module to notify of time-out.

The format of these messages is described in [Appendix B](#).

The user should note that although the timer functionality is usually provided by the supplied timer module, the timer functionality required by the TUP module is very basic (just a single message being issued on a periodic basis). In most cases, it is not difficult to implement this functionality using the users own choice of operating environment if required.

5 Interface To Message Transfer Part

The TUP module communicates with the Message Transfer Part (MTP) using the following primitives, all of which are defined in ITU Recommendation Q.704:

| | |
|------------------|---|
| MTP-TRANSFER-REQ | Transmit request to MTP. |
| MTP-TRANSFER-IND | Receive indication from MTP. |
| MTP-PAUSE | Point code unavailable indication from MTP. |
| MTP-RESUME | Point code available indication from MTP. |
| MTP-STATUS | Signaling point congested or remote user unavailable indication from MTP. |

The message format used to convey these primitives is defined in the Dialogic® DSI MTP3 Programmer's Manual.

The TUP module is usually used in conjunction with the MTP module. However, the use of primitives in accordance with Q.704 ensures that it can also be integrated with other MTP implementations as and when required.

To provide further flexibility the TUP module supports the use of either T_FRAMES and R_FRAMES or the use of MSGs for MTP-TRANSFERS between the TUP and MTP.

T_FRAMES and R_FRAMES are most useful when the TUP module is running on the same processor as the MTP3 module, whereas MSGs are generally used when TUP module is running on a different processor than the one used for the MTP.

A module configuration option (TUPF_TFRM) allows the user to select between sending T_FRAMES or sending MSGs. Receipt of both R_FRAMES and MSGs is supported in either mode.

6 Call Control Interface

The call control interface allows protocol primitive messages to be exchanged between the local user and the TUP module. All primitives at the call control interface are passed by sending messages between the modules. One message type is used to send request messages from the user to the TUP module, whereas a second message type is used to send indications in the other direction.

The message types are:

- | | |
|----------------|---|
| CAL_MSG_TX_REQ | Conveys primitive from local user to TUP. |
| CAL_MSG_RX_IND | Conveys primitive from TUP to local user. |

The basic structure of each message (irrespective of the message type) is the same. The message contains a message header, the length of the user data and the user data. The message must be contained in a single buffer that should be allocated by the sending module (using the **getm** function) and either released (using the **relm** function) or passed to another module by the receiving module. The **getm** and **relm** functions are described in section 4, [Interface To System Services](#).

6.1 Message Format

6.1.1 TUP-Transmit Request

Synopsis:

Protocol message sent from the local user to the TUP module for subsequent transmission to the network.

Message Format:

| MESSAGE HEADER | | |
|-----------------|-----------------------------------|--|
| Field Name | Meaning | |
| type | CAL_MSG_TX_REQ (0xc700) | |
| id | call_ref | |
| src | Sending module ID | |
| dst | TUP module ID | |
| rsp_req | 0 | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | Number of bytes in parameter area | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | Primitive type octet. |
| 1 | len - 2 | Parameters in Name-Length-Data format. |
| len - 1 | 1 | Set to zero indicating end of message |

Description:

This message is used by the application to send primitives to the TUP module for transmission to the network. All parameters in the parameter area are formatted in Name-Length-Data format and are encapsulated between the Primitive type octet and the zero terminator octet. The detailed encoding of the parameter area is described in later sections.

The **id** field in the message header is the **call_ref** used to identify the circuit or call to which the message refers. Currently, when 32768 circuits or less are configured, the most significant bit of the **call_ref** is ignored by the TUP module and the remaining bits map directly to the Circuit Identifier **cid** so the valid range for **call_ref** is from 0 to one less than the number of circuits supported. If more than 32768 circuits are configured, then the **call_ref** is identical to the **cid**.

Note: Earlier revisions of the TUP module required the most significant bit of the **call_ref** to be set in all messages relating to outgoing calls.

6.1.2 TUP-Receive Indication

Synopsis:

Protocol message issued by the TUP module to the local user to indicate receipt of TUP message information.

Message Format:

| MESSAGE HEADER | | |
|----------------|-----------------------------------|--|
| Field Name | Meaning | |
| type | CAL_MSG_RX_IND (0x8701) | |
| id | call_ref | |
| src | TUP module ID | |
| dst | User module ID | |
| rsp_req | 0 | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | Number of bytes in parameter area | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | Primitive type octet. |
| 1 | len - 2 | Parameters in Name-Length-Data format. |
| len - 1 | 1 | Set to zero indicating end of message |

Description:

This message is issued by the TUP module to advise the application of messages received from the network by the TUP module. All parameters in the parameter area are formatted in Name-Length-Data format and are encapsulated between the Primitive type octet and the zero terminator octet. The detailed encoding of the parameter area is described in later sections.

The **id** field in the message header is the **call_ref** used to identify the circuit or call to which the message refers. Currently, when 32768 circuits or less are configured and the TUPF_16CID flag is set to 0, the most significant bit of the **call_ref** is set to 1 by the TUP module for all messages relating to outgoing calls and the remaining bits map directly to the Circuit Identifier **cid**. If 32768 circuits or less are configured and the TUPF_16CID flag is set to 1, or if more than 32768 circuits are configured, then the **call_ref** is identical to the **cid**. In the future **call_ref** will be made identical to the Circuit Identifier **cid**.

Note: Earlier revisions of the TUP module required the most significant bit of the **call_ref** to be set in all messages relating to outgoing calls. To allow for interworking with earlier application software which make use of this bit, the TUP

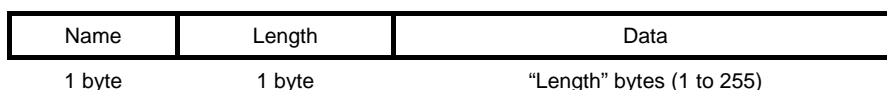
module continues to set the bit in all messages relating to outgoing calls for configurations with 32768 circuits or less, when the TUPF_16CID flag has been set to 0. It is recommended that existing applications be modified to ignore the setting of the most significant bit.

6.2 User data format for TX_REQ and RX_IND primitives

The data in the parameter area of transmit request and receive indication messages contains the primitive type and the primitive parameters. The first byte in the parameter area is the primitive type octet and the last byte is a zero byte to indicate that there are no further parameters in the parameter area. Any parameters associated with the message are placed between the primitive type octet and the final (zero) byte. The parameter area is therefore formatted as follows:



The parameters may be placed in any order. The first byte of a parameter is the parameter name, the second byte is the length of the parameter data to follow (excluding the parameter name and the length byte itself), this is followed by the parameter data. Each parameter is therefore formatted as follows:



Within each message, there are mandatory parameters which must always be present and optional parameters which may or may not be present. In some cases, optional parameters may have default values which are inserted by the TUP module if not provided by the user as described in the parameter specification.

The following call control primitives may be sent from the user application to the TUP module:

| Primitive | Mnemonic | Value (dec) | Value (hex) |
|---------------------------------------|---------------------------------|-------------|-------------|
| Alerting Request | CALPN_ALERT_REQ | 6 | 0x06 |
| Backwards Information Request | CALPN_BINFO_REQ | 3 | 0x03 |
| Backwards Information Response | CALPN_BINFO_RESP | 4 | 0x04 |
| Charging Request v[2] | CALPN_TAX_REQ | 49 | 0x31 |
| Charging Acknowledgement Request v[2] | CALPN_TXA_REQ | 202 | 0xca |
| Circuit Seized Request | CALPN_CCT_SIZE_REQ | 199 | 0xc7 |
| Collection Charging Request [2], [3] | CALPN_MPM_REQ CALPPN_ITX_REQ | 201 | 0xc9 |
| Continuity Report Request | CALPN_COT_REQ | 5 | 0x05 |
| End to End Information Request v[2] | CALPN_MCE_REQ | 200 | 0xc8 |
| Forward Information Request [1] | CALPN_FINFO_REQ | 2 | 0x02 |
| Forward Transfer Request | CALPN_FOT_REQ | 8 | 0x08 |
| Release Request | CALPN_RELEASE_REQ | 12 | 0x0c |
| Release Response | CALPN_RELEASE_RESP | 16 | 0x10 |
| Resume Request | CALPN_RESUME_REQ | 14 | 0x0e |
| Setup Request | CALPN_SETUP_REQ | 1 | 0x01 |
| Setup Response | CALPN_SETUP_RESP | 9 | 0x09 |
| Suspend Request | CALPN_SUS_REQ | 13 | 0x0d |
| Tariff Change Request v[2] | CALPN_CHT_REQ | 203 | 0xcb |
| User to User Information Request v[2] | CALPN_MUU_REQ | 45 | 0x2d |

Table 1: Call control primitives sent from user application to TUP module

Primitives marked [1] are only for use with circuit groups configured for ITU mode.

Primitives marked v[2] are only for use with circuit groups configured for SSUTR2 mode. See appendix 4 related to SSUTR2.

Primitives marked [3] are only for use with circuit groups configured for China mode. See appendix 3.

Primitives marked v[2], [3] are for use with circuit groups configured only for SSUTR2 or China TUP mode.

All other primitives may be used for any version of TUP.

The following primitives are issued by the TUP module to the user application:

| Primitive | Mnemonic | Value (dec) | Value (hex) |
|--|---------------------------------|-------------|-------------|
| Alerting Indication | CALPN_ALERT_IND | 6 | 0x06 |
| Backward Information Indication | CALPN_BINFO_IND | 3 | 0x03 |
| Backward Information Confirmation | CALPN_BINFO_CONF | 4 | 0x04 |
| Calling Party Clear Indication [3] | CALPN_CCL_IND | 204 | 0xcc |
| Charging Indication [2] | CALPN_TAX_IND | 49 | 0x31 |
| Charging Acknowledgement Indication v[2] | CALPN_TXA_IND | 202 | 0xca |
| Circuit Seized Indication | CALPN_CCT_SZD_IND | 199 | 0xc7 |
| Collection Charging Indication v[2] [3] | CALPN_ITX_IND CALPPN_MPM_IND | 201 | 0xc9 |
| Continuity Report Indication | CALPN_COT_IND | 5 | 0x05 |
| End to End Information Indication v[2] | CALPN_MCE_IND | 200 | 0xc8 |
| Forward Information Indication [1] | CALPN_FINFO_IND | 2 | 0x02 |
| Forward transfer Indication | CALPN_FOT_IND | 8 | 0x08 |
| Release Indication | CALPN_RELEASE_IND | 12 | 0x0c |
| Release Confirmation | CALPN_RELEASE_CONF | 16 | 0x10 |
| Resume Indication | CALPN_RESUME_IND | 14 | 0x0e |
| Setup Indication | CALPN_SETUP_IND | 1 | 0x01 |
| Setup Confirmation | CALPN_SETUP_CONF | 9 | 0x09 |
| Suspend Indication | CALPN_SUS_IND | 13 | 0x0d |
| Tariff Change Indication v[2] | CALPN_CHT_IND | 203 | 0xcb |
| User to User Information Indication v[2] | CALPN_MUU_IND | 45 | 0x2d |

Table 2: Call control primitives sent from TUP module to user application

Primitives marked [1] are only for use with circuit groups configured for ITU mode.

Primitives marked v[2] are only for use with circuit groups configured for SSUTR2 mode.

Primitives marked [3] are only for use with circuit groups configured for China mode.

Primitives marked v[2] [3] are for use with circuit groups configured only for SSUTR2 or China TUP mode.

All other primitives may be used for any version of TUP.

6.3 Call control primitives, user application to TUP module

The following sections detail the parameters associated with each primitive for use in an ITU compatible environment. The parameters are categorized into classes, this definition having local significance only to the TUP module call control interface.

The TUP module may be used in environments compatible with other recommendations.

[Appendix C](#) details use with Chinese GF001-9001.

[O](#) details use with the French SSUTR2 VN5/VN6.

Key

| | | |
|----------|------------------|---|
| M | Mandatory | This parameter must be included in the primitive by the user otherwise the primitive will be rejected by the TUP module. |
| O | Optional | <p>This parameter may be excluded from the primitive issued by the user. It provides optional additional functionality.</p> <p>Where this parameter is mandatory in the TUP message sent to the network, a default value will be inserted by the TUP module.</p> <p>Default parameter values are indicated thus: [default value].</p> <p>Unless otherwise stated, all parameters are valid for circuit groups configured for ITU operation.</p> <p>Where appropriate, notes are included for parameter use on circuit groups configured for other environments.</p> |

6.3.1 Alerting request

The alerting request primitive is issued by the application for an incoming call to indicate that a valid called party address has been received and allows various indications in the backwards direction (i.e., subscriber line status). It corresponds to the TUP Address Complete Message (ACM).

| Alerting request | | |
|---|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 6 (0x06) |
| Backward call indicators | O | Used to set : called party's category [ordinary subscriber] called party status [subscriber free] charging status [charge] interworking indicator [no interworking] incoming echo suppressor indicator [incoming half echo control device not included] |
| Event information | O | Used to indicate call forwarding [call not forwarded is assumed] Not used in SSUTR2 mode |
| SSUTR2 Additional Called Party Information. | O | SSUTR2 mode only |
| Access Transport | O | SSUTR2 mode only |
| User to User Information | O | SSUTR2 mode only |

6.3.2 Backward information request

This primitive allows the user to request additional information about an incoming call during call setup. This will cause a TUP General Request Message (GRQ) to be sent in the backwards direction.

| Backward information request | | |
|------------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 3 (0x03) |
| Information request indicators | M | Used to request: Holding Malicious call identification Calling party category Calling line identity SSUTR2 : only CPC and CLI may be requested |
| TUP Information request indicators | O | Used to request: Outgoing half echo suppressor Original called number Not used in SSUTR2 |

6.3.3 Backward information response

This primitive allows the user to indicate the availability of facilities that were requested in an information request indication primitive previously received during outgoing call setup. This primitive will cause a TUP General Forwards Setup Message (GSM) to be sent to the network.

| Backward information response | | |
|---------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 4 (0x04) |
| Nature of connection indicators | O | Used to indicate: outgoing half echo suppresser status [outgoing half echo suppresser not included] Not used in SSUTR2 |
| Information indicators | M | Indicates: calling party address availability calling party category availability holding status Not used in SSUTR2 |
| TUP information indicators | O | Indicates: MCI status [MCI not provided] original called number availability [original called number not included] incoming trunk & transit exchange identity availability [incoming trunk and transit exchange |

| | | |
|--|---|---|
| | | identity not provided] Not used in SSUTR2 |
| Calling party's category | O | [ordinary calling subscriber] |
| Calling party number | O | calling party number and presentation restricted indicator |
| Incoming trunk & transit exchange identity | O | Provides id of the transit exchange and of the incoming trunk Not used in SSUTR2 |
| Original called number | O | Provides original called number Not used in SSUTR2 |

6.3.4 Charging request

Only for use with circuit groups configured for SSUTR2 operation.

The charging request primitive is issued by the application for an incoming call before answer and provides information about how the call should be charged.

It corresponds to the SSUTR2 Charging Message (TAX).

| Charging request | | |
|-----------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 49 (0x31) |
| Packet charging (current tariff) | O | Number of charging units (from 0 to 15) on called party answer (current tariff) |
| Tariff indicator (current tariff) | O | Gives the tariff scale value for the current tariff (from 0 to 15) |
| Tariff factor (current tariff). | O | Number from 1 to 255 which multiplied by the tariff scale of the tariff indicators gives the charging period (in second) to charge the call |
| Time indicator | O | Indicates the time when the next change in tariff will occur |
| Packet charging (next tariff) | O | Number of charging units (from 0 to 15) on called party answer (next tariff) |
| Tariff indicator (next tariff) | O | Gives the tariff scale value for the next tariff. (from 0 to 15) |
| Tariff factor (next tariff) | O | Number from 1 to 255 which multiplied by the tariff scale of the tariff indicators gives the charging period (in second) to charge the call |

6.3.5 Charging acknowledgement request

Only for use with circuit groups configured for SSUTR2 operation.

The charging acknowledgement request primitive is issued by the application for an outgoing call to acknowledge a valid collection charging message [Message d'imputation de taxes] (ITX) or a tariff change message [Message de changement de tarification] (CHT).

It corresponds to the SSUTR2 Charging Acknowledgement Message [Signal d'accusé de reception de taxation](TXA).

| Charging acknowledgement request | | |
|----------------------------------|-------|--------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 202 (0xca) |

6.3.6 Circuit seized request

The circuit seized request primitive is issued by the application for an outgoing continuity check and causes a CCR (CCD for SSUTR2) message to be sent by the TUP module.

| Circuit seized request | | |
|---------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 199 (0xc7) |
| Nature of connection indicators | M | Used to set the Continuity check indicator (i.e. whether continuity check is requested) |

6.3.7 Collection charging request

Use with circuit groups configured for China or SSUTR2 operation.

The collection charging request primitive is issued by the application after called party answer to provide the number of charging units to be billed to the calling subscriber.

For SSUTR2 it corresponds to Collection Charging Message [Message d'imputation de taxes] (ITX).

For China TUP it corresponds to the Metering Pulse Message (MPM).

| Collection charging request | | |
|-----------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 201 (0xc9) |
| Number of metering pulses | M | Number of charging units to input to the subscriber account when this message is received |
| Message number | O | Collection charging message number sent for a given call. Mandatory for SSUTR2 |

6.3.8 Continuity report request

The Continuity report request primitive is issued by the application to indicate the outcome of a continuity check for an incoming circuit when a call is being transited onto an outgoing circuit.

| Continuity report request | | |
|---------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 5 (0x05) |
| Continuity indicators | M | Indicates continuity check success or failure |

6.3.9 End-to-end information request

Only for use with circuit groups configured for SSUTR2 operation.

The end-to-end information request primitive allows end-to-end information to be sent in either direction at any stage of the call. In SSUTR2 it corresponds to the End-to-end Information Message [Message d'information entre commutateur d'extrémités] (MCE).

| End-to-end information request | | |
|--------------------------------|-------|--------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 200 (0xc8) |
| Access Transport | O | |
| User to user information | O | |

6.3.10 Forward information request

This primitive allows the user to send additional called party address digits during outgoing call setup. A single address digit is conveyed to the destination in a Subsequent Address message with One signal (SAO) message. Two or more digits are conveyed in a Subsequent Address Message (SAM).

| Forward information request | | |
|-----------------------------|-------|------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 2 (0x02) |
| Subsequent number | M | |

6.3.11 Forward transfer request

Not used in SSUTR2 mode.

The Forward transfer request primitive is issued by the application to request operator assistance on an outgoing call.

| Forward transfer request | | |
|--------------------------|-------|------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 8 (0x08) |

6.3.12 Release request

The release request primitive allows the application to end an outgoing call (or call attempt) and to reject or end an incoming call. It may be used at any stage of the call. It is also used as an immediate response to a received Release Indication primitive from the TUP module.

If an incoming call is being cleared and the user wishes to have the option to re-answer, a Suspend Request should be used in place of a Release Request.

The Release request primitive specifies the reason for the call termination. This is translated by the TUP to an unsuccessful backwards message (UBM) type when received during incoming call setup. A signaling point code may optionally be included to cause an Extended Unsuccessful Backwards message (EUM) to be sent to the network.

To initiate call clearing, the application should send this message to the TUP module. It should then wait until a Release Confirmation is received from the TUP module before selecting the circuit for a new outgoing call attempt.

When the application receives a Release Indication message from the TUP module, it must take the following action:

- If the application has not yet issued a Release Request message, then it should do so immediately. It should follow this with a Release Response when it has finished clearing the switch path. If however the application is in a position to issue the Release Response immediately it may omit the Release Request.
- If the application has already issued a Release Request, then it should respond with a Release Response when it has finished clearing the switch path.

In both cases, the application should wait until a Release Confirmation has been received from the TUP module before selecting the circuit for a new outgoing call attempt.

This call clearing mechanism ensures the circuit is properly released before the user application may initiate a new call attempt. It should be used where possible. Configuration options TUPF_NAI and TUPF_ACR must be set to select this behavior.

Note: For China TUP, a Release Request will cause a CCL (calling party clearing) message to be sent (in answered state), if holding has been requested previously for the call.

| Release request | | |
|------------------------------|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 12 (0x0c) |
| Cause indicators | O | Used to convey the reason for call clearing |
| Additional cause information | O | Contains the cause to be used in the SND or EAR message. SSUTR2 mode only |
| Signaling point code | O | Causes an EUM to be sent when releasing a call in the incoming setup state Not used in SSUTR2 |
| Access Transport | O | SSUTR2 mode only |
| User to User Information | O | SSUTR2 mode only |

6.3.13 Release response

This primitive is used by the application where call clearing was initiated by the TUP module. It advises the TUP module that the application has finished to clear the switch path and that the circuit is available for re-selection.

Whenever a Release Indication is received from the TUP module, the application must return a Release Response to the TUP module once it has finished clearing the call.

| Release response | | |
|----------------------|-------|-------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 16 (0x10) |

6.3.14 Resume request

A primitive issued in the backwards direction indicating that the called party wishes to re-answer a call after having previously issued a suspended request. This will cause a Re-Answer Message (RAN) to be sent to the network.

| Resume request | | |
|--------------------------|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 14 (0x0e) |
| Suspend/resume indicator | O | [network initiated] Used to indicate whether the resume is network or user initiated. The primitive is ignored when set to "user-initiated". This parameter is useful when interworking with ISUP or Q.931. |

6.3.15 Setup request

The setup request primitive is issued by the application to initiate an outgoing call attempt. The information will be conveyed to the network in either an Initial Address message (IAM) or an Initial Address message with additional Information (IAI). A Subsequent Address Message (SAM/SAO) will be sent to the network after the IAM or IAI if more than 16 called party number address digits are included, to convey these extra digits.

Note: Refer to 0 for details of parameter fields in SSUTR2 mode.

| Setup request | | |
|--|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 1 (0x01) |
| Called party number | M | The destination address |
| Calling party's category | O | [ordinary calling subscriber] |
| Calling party number | O | The calling party number, and the presentation restricted indicator |
| Transmission medium requirement | O | Indicates the type of call, (speech/data) [3.1 kHz audio] |
| Nature of connection indicators | O | Indicates: - satellite [no satellite circuit in the connection] - continuity check required [continuity check not required] - outgoing echo control device status [outgoing half echo suppressor not included] |
| Forward call indicators | O | Indicates: - national/international call [other than international] - signalling path [any path] |
| Optional forward call indicators | O | Indicates if a call is Closed User Group [ordinary (non-CUG) call] |
| Closed user group interlock code | O | |
| Redirection information | O | Indicates if this is a redirected call [not a redirected call] |
| Original called number | O | |
| Charging information | O | Not used in SSUTR2 |
| Additional calling party information | O | |
| Additional routing information | O | |
| IAI national use octet | O | Not used in SSUTR2 |
| Incoming trunk and transit exchange identity | O | Not used in SSUTR2 |
| Access Transport | O | SSUTR2 mode only. |

| | | |
|--|---|--|
| User service information | O | SSUTR2 mode only |
| User to user information | O | SSUTR2 mode only |
| SSUTR2 further redirection information | O | SSUTR2 mode only |
| Access Transport | O | SSUTR2 mode only |
| Generic number | O | Conveys additional address SSUTR2 mode only |

6.3.16 Setup response

The setup response primitive is issued by the application to answer an incoming call. It causes an answer message (ANU, ANN or ANC) to be issued to the network.

| Setup response | | |
|--------------------------|-------|---------------------------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 9 (0x09) |
| Backward call indicators | O | Specifies charging [no indication] |
| Access Transport | O | SSUTR2 mode only |
| User to user information | O | SSUTR2 mode only |

6.3.17 Suspend request

This primitive allows a calling party to suspend a call with the option of subsequently re-answering. It causes a CBK to be sent to the network.

| Suspend request | | |
|--------------------------|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 13 (0x0d) |
| Access Transport | O | SSUTR2 mode only. |
| Suspend/resume indicator | O | [network initiated] Used to indicate whether the resume is network or user initiated. The primitive is ignored when set to "user-initiated". This parameter is useful when interworking with ISUP or Q.931. |
| User to user information | O | SSUTR2 mode only |

6.3.18 Tariff change request

Only for use with circuit groups configured for SSUTR2 operation.

The tariff change request primitive is issued by the application for an incoming call after this call has been answered and contains information about a change in tariff for the call.

In SSUTR2 it corresponds to the Charging Message [Message de changement de tarification] (CHT).

| Tariff change request | | |
|--------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 203 (0xcb) |
| Tariff indicators (next) | M | Gives the next tariff scale value |
| Tariff factor (next) | O | Number from 1 to 255 which multiplied by the tariff scale of the tariff indicators gives the next charging period (in seconds) to charge the call |
| Time indicator | M | Indicates the time when the next change in tariff will occur |

6.3.19

User-to-user information request

Only for use with circuit groups configured for SSUTR2 operation.

The user-to-user information request primitive allows the transport of end-to-end specific information in either direction and at any stage of the call.

In SSUTR2 it corresponds to the User-to-user Information Message [Message d'information d'utilisateur à utilisateur] (MUU).

| User-to-user information request | | |
|----------------------------------|-------|-------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 45 (0x2d) |
| Access Transport | O | |
| User to user information | O | |

6.4 Call control primitives, TUP module to user application

The following sections detail the parameters associated with each primitive. The parameters are categorized into classes, this definition having local significance only to the TUP module call control interface.

Key

| | | |
|----------|------------------|---|
| M | Mandatory | This parameter will always be present in the primitive. |
| O | Optional | This parameter will be passed to the user application if the corresponding information has been received from the network or is available locally. In some cases if the specified parameter has been omitted, this indicates a particular default value. In these cases, the default value is given thus: [default value]. Unless otherwise stated, all parameters are valid for circuit groups configured for ITU operation. Where appropriate, notes are included for parameter use on circuit groups configured for other environments. |

6.4.1 Alerting indication

The alerting indication message is issued to the application to indicate that the called party number has been recognized by the network.

| Alerting indication | | |
|--|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 6 (0x06) |
| Backward call indicators | M | Used to indicate type of address complete, subscriber free status, signalling path indicator and incoming half echo control device indicator |
| Event information | O | Used to indicate call forwarding. [call not forwarded] Not used in SSUTR2 mode |
| Access Transport | O | SSUTR2 mode only. |
| User to User Information | O | SSUTR2 mode only. |
| SSUTR2 Additional called party information | O | SSUTR2 mode only |

6.4.2 Backward information indication

This primitive indicates that the succeeding exchange is requesting additional facilities (using a TUP General Request, GRQ message) for an outgoing call that is currently being setup.

| Backward information indication | | |
|------------------------------------|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 3 (0x03) |
| Information request indicators | M | Indicates: Hold requested MCI requested Calling party category requested Calling line identity requested SSUTR2 : only CPC and CLI may be requested. |
| TUP Information request indicators | O | Indicates: Outgoing half echo suppressor requested [outgoing half echo suppressor not requested] Original called number requested [original called number not requested] Not used in SSUTR2 |

6.4.3 Backward information confirmation

This primitive indicates that a response to a previously issued information request has been received from the network. This would be in the form of a TUP GSM.

| Backward information confirmation | | |
|--|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 4 (0x04) |
| Information indicators | M | Indicates: Calling party address availability Calling party category availability Holding status Not used in SSUTR2. |
| TUP information indicator | O | Indicates: MCI status [MCI not provided] Original called number availability [Original called number not provided] Incoming trunk & transit exchange identity availability [Incoming trunk & transit exchange identity not provided] Not used in SSUTR2 |
| Nature of connection indicator | O | Indicates outgoing half echo suppressor status Not used in SSUTR2 |
| Calling party category | O | |
| Calling party number | O | |
| Incoming trunk and transit exchange identity | O | Provides id of the transit exchange and of the incoming trunk Not used in SSUTR2 |
| Original called number | O | Provides original called number Not used in SSUTR2 |

6.4.4 Calling party clear indication

Only for use with circuit groups configured for China TUP operation.

The calling party clear indication primitive is used to indicate that a CCL message has been received from the network.

| Calling party clear indication | | |
|--------------------------------|-------|--------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 204 (0xcc) |

6.4.5 Charging indication

Only for use with circuit groups configured for SSUTR2 operation.

The charging indication primitive is issued to the application to indicate that the charging message has been received by the network. In SSUTR2 it corresponds to the charging message [Message de taxation] (TAX).

| Charging indication | | |
|-----------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 49 (0x31) |
| Packet charging (current tariff) | O | Number of charging units (from 0 to 15) on called party answer (current tariff) |
| Tariff indicator (current tariff) | O | Gives the tariff scale value for the current tariff. (from 0 to 15) |
| Tariff factor (current tariff). | O | Number from 1 to 255 which multiplied by the tariff scale of the tariff indicators gives the charging period (in second) to charge the call |
| Time indicator | O | Indicates the time when the next change in tariff will occur |
| Packet charging (next tariff) | O | Number of charging units (from 0 to 15) on called party answer (next tariff) |
| Tariff indicator (next tariff) | O | Gives the tariff scale value for the next tariff. (from 0 to 15) |
| Tariff factor (next tariff) | O | Number from 1 to 255 which multiplied by the tariff scale of the tariff indicators gives the charging period (in second) to charge the call |

6.4.6 Charging acknowledgement indication

Only for use with circuit groups configured for SSUTR2 operation.

The charging acknowledgement indication primitive is issued by the TUP module for an incoming call to acknowledge a valid collection charging message (ITX) or a tariff change message (CHT).

In SSUTR2 it corresponds to the Charging Acknowledgement Message [Signal d'accusé de reception de taxation] (TXA).

| Charging acknowledgement indication | | |
|-------------------------------------|-------|--------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 202 (0xca) |

6.4.7 Circuit seized indication

The circuit seized indication primitive is used to indicate an incoming call has been received but no digits have been received. This is the case, for example, when a CCR (continuity check request) message is received.

| Circuit seized indication | | |
|---------------------------------|-------|--|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 199 (0xc7) |
| Nature of connection indicators | M | Indicates the value of the Continuity check indicator (i.e. whether continuity check is requested) |

6.4.8 Collection charging indication

Only for use with circuit groups configured for SSUTR2 or China TUP operation.

The collection charging indication primitive is issued to the application to indicate the number of charging units to bill the calling subscriber.

In SSUTR2 it corresponds to the Collection Charging Message [Message d'imputation de taxes] (ITX)

For China TUP it corresponds to the Metering Pulse Message (MPM), which belongs to the NSB (National Successful Backward setup message).

| Collection charging indication | | |
|--------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 201 (0xc9) |
| Number of metering pulses | M | Number of charging units to input to the subscriber account when this message is received. |
| Message number | O | Collection charging message number sent for a given call. Mandatory for SSUTR2 mode only |

6.4.9 Continuity report indication

The Continuity report indication primitive is issued to the user application to indicate a continuity result (COT or CCF) received from the network.

| Continuity report indication | | |
|------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 5 (0x05) |
| Continuity indicators | M | Indicates continuity check success or failure |

6.4.10 End-to-End Information Indication

Only for use with circuit groups configured for SSUTR2 operation.

The end-to-end information indication primitive allows end-to-end information to be sent in either direction at any stage of the call.

In SSUTR2 it corresponds to the End-to-End Information Message [Message d'information entre commutateur d'extrémités] (MCE).

| End-to-end information indication | | |
|-----------------------------------|-------|--------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 200 (0xc8) |
| Access Transport | O | |
| User to User Information | O | |

6.4.11 Forward information indication

The forward information indication message is issued to the application to convey subsequent called party address digits that have been received from the network (in either a SAM or SAO) since the original setup indication was issued.

| Forward information indication | | |
|--------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 2 (0x02) |
| Subsequent number | M | Contains additional called party address digits |

6.4.12 Forward transfer indication

Not used in SSUTR2 mode.

The Forward transfer indication primitive is issued to the user application to indicate reception of a TUP Forward Transfer (FOT) message from the network.

| Forward transfer indication | | |
|-----------------------------|-------|------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 8 (0x08) |

6.4.13 Release indication

The release indication message is issued to the application to indicate either call clearing or call failure. The message contains the reason for the call clearing. During call setup, this will map from the TUP Unsuccessful Backwards Message (UBM) type. During the established phase of a call this will be set to indicate cause "normal call clearing".

The "location" field of the cause indicators will be set to "public network serving the local user" if the call has failed or has been cleared due to failure or action within the local TUP. The location field will otherwise be set to "public network serving the remote user", indicating that the call has been released due to an event received via the network from the remote user.

On receipt of Release Indication from TUP, the application should (if it has not already issued Release Request) respond immediately with a Release Request. When it has cleared, the switch path the application should issue a Release Response to the TUP module.

| Release indication | | |
|------------------------------|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 12 (0x0c) |
| Cause indicators | M | Contains the reason for the call clearing. |
| Additional cause information | O | Contains the cause value received in the SND or EAR message. SSUTR2 mode only |
| Signaling point code | O | Indicates that an EUM has been received. Not used in SSUTR2 |
| Access Transport | O | SSUTR2 mode only |
| User to User Information | O | SSUTR2 mode only |

6.4.14 Release confirmation

TUP sends this primitive to indicate that the call clearing sequence has completed and the circuit is again available for re-selection. At the end of each call the application must wait until the Release Confirmation primitive has been received before selecting the circuit for a new outgoing call.

| Release confirmation | | |
|----------------------|-------|-------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 16 (0x10) |

6.4.15 Resume indication

This primitive is issued to the user on an outgoing call indicating that the called party wishes to re-answer after having previously suspended the call.

| Resume indication | | |
|----------------------|-------|-------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 14 (0x0e) |

6.4.16 Setup indication

The setup indication message is issued to the application to indicate the arrival of a new incoming call.

Note: Refer to 0 for details of parameter fields in SSUTR2 mode.

| Setup indication | | |
|--|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 1 (0x01) |
| Called party number | M | Contains the destination address |
| Calling party's category | M | |
| Calling party number | O | Contains the calling party number, and the presentation restricted indicator. |
| Transmission medium requirement | O | Indicates the type of call. [3.1kHz audio] |
| Nature of connection indicators | M | Indicates the state of the satellite indicator, continuity check and the outgoing half echo control device indicator. |
| Forward call indicators | O | Indicates national/international call [other than international] signaling path indicator [any path] |
| Optional forward call indicators | O | Only included if this is a CUG call |
| Redirection information | O | Indicates if this is a redirected call [not a redirected call] |
| Closed user group interlock code | O | |
| Original called number | O | |
| Charging information | O | Not used in SSUTR2 |
| Additional calling party information | O | |
| Additional routing information | O | |
| IAI national use octet | O | Not used in SSUTR2 |
| Incoming trunk and transit exchange identity | O | Not used in SSUTR2 |
| SSUTR2 Further redirection information | O | SSUTR2 mode only |
| Access Transport | O | SSUTR2 mode only |
| User service information | O | SSUTR2 mode only |
| User to user information | O | SSUTR2 mode only |
| Generic number | O | Conveys Additional address SSUTR2 mode only. |

6.4.17 Setup confirmation

The setup confirmation message is issued to the application to indicate that an outgoing call has been answered.

| Setup confirmation | | |
|--------------------------|-------|-------------------------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 9 (0x09) |
| Backward call indicators | O | Indicates the type of answer signal |
| Access Transport | O | SSUTR2 mode only. |
| User to user information | O | SSUTR2 mode only. |

6.4.18 Suspend indication

This primitive is issued to the user for an outgoing call to indicate that the called party has cleared, but the connection has not been released (T102 is running). This allows the called party to re-answer during the T102 period.

The use of the T102 timer is controlled by the Application Controlled Release mechanism, which should be selected when the module is configured. See section 8.1, [Configuration Request](#), option TUPF_ACR.

If ACR is in use, the TUP module will issue the Release Indication primitive to the user on the expiry of T102. The user application must then send a Release Response primitive as normal. When the connection has been released and the circuit has returned to the idle state a Release Confirm primitive will be sent to the user application.

If ACR is not in use, the outgoing connection will automatically be released when T102 expires. A release indication primitive is sent to the user and CLF to the called party. The user may issue a release request during the T102 period to clear the connection. T102 may be set to zero, in which case the connection will be cleared immediately.

| Suspend indication | | |
|--------------------------|-------|-------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 13 (0x0d) |
| Access Transport | O | SSUTR2 mode only. |
| User to user information | O | SSUTR2 mode only. |

6.4.19 Tariff change indication

Only for use with circuit groups configured for SSUTR2 operation.

The tariff change indication primitive is issued by the TUP module for an incoming call after this call has been answered and contains information about a change in tariff for the call.

In SSUTR2 it corresponds to the Charging Message [Message de changement de tarification] (CHT)

| Tariff change indication | | |
|---|-------|---|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 203 (0xcb) |
| Tariff indicators [Indicateurs tarifaires] (next) | M | Gives the next tariff scale value |
| Tariff factor [Facteur de tarification] (next) | O | Number from 1 to 255 which multiplied by the tariff scale of the tariff indicators gives the next charging period (in seconds) to charge the call |
| Time indicator | M | Indicates the time when the next change in tariff will occur |

6.4.20 User-to-user information indication

This is only for use with circuit groups configured for SSUTR2 operation.

The user-to-user information indication primitive allows the transport of end-to-end specific information in either direction and at any stage of the call.

It corresponds to the SSUTR2 User-to-user Information Message [Message d'information d'Usager à Usager] (MUU).

| User-to-user information indication | | |
|---|-------|-------------------|
| Parameter | Class | Comments |
| Primitive type octet | M | Value = 45 (0x2d) |
| Access Transport | O | |
| User to user information [Information d'accès] | O | |

6.5 Mapping Call Control Primitives to Network Messages

The mapping of call control primitives to network messages is straightforward. The table below gives the mapping for operation on circuit groups configured for ITU environments.

Refer to [Appendix C](#) for Chinese (GF001-9001) mapping.

Refer to [0](#) for SSUTR2 mapping.

| Primitive | Mnemonic | Value (dec) | Value (hex) | Network message mapping |
|--|--|-------------|-------------|--|
| Alerting request & indication | CALPN_ALERT_REQ CALPN_ALERT_IND | 6 | 0x06 | ACM |
| Backward information request & indication | CALPN_BINFO_REQ CALPN_BINFO_IND | 3 | 0x03 | GRQ |
| Backward information response & confirmation | CALPN_BINFO_RESP CALPN_BINFO_CONF | 4 | 0x04 | GSM |
| Circuit seized request & indication | CALPN_CCT_SIZE_REQ CALPN_CCT_SIZE_IND | 199 | 0xc7 | CCR |
| Continuity report request & indication | CALPN_COT_REQ CALPN_COT_IND | 5 | 0x05 | COT in the success case CCF in the failure case |
| Forward information request & indication | CALPN_FINFO_REQ CALPN_FINFO_IND | 2 | 0x02 | SAO – If only one digit included in subsequent address SAM – if more than one digit included |
| Forward transfer request & indication | CALPN_FOT_REQ CALPN_FOT_IND | 8 | 0x8 | FOT |
| Release request & indication | CALPN_RELEASE_REQ CALPN_RELEASE_IND | 12 | 0x0c | CLF – If outgoing call is connected CBK – If incoming call is connected UBM – If this is an incoming call and the user has not sent CALPN_SETUP_RESP yet |
| Release response & confirmation | CALPN_RELEASE_RESP CALPN_RELEASE_CONF | 16 | 0x10 | RLG |
| Resume request & indication | CALPN_RESUME_REQ CALPN_RESUME_IND | 14 | 0x0e | RAN |
| Setup request | CALPN_SETUP_REQ | 1 | 0x01 | IAM – if the only |

| | | | | |
|-------------------------------|--------------------------------------|----|------|--|
| & indication | CALPN_SETUP_IND | | | parameters supplied with the CALPN_SETUP_REQ primitive are CALPPN_CALLED_NUM and CALPPN_CPC IAI – if other parameters are included in the CALPN_SETUP_REQ primitive |
| Setup response & confirmation | CALPN_SETUP_RESP CALPN_SETUP_CONF | 9 | 0x09 | ANU – If the CALPN_SETUP_RESP primitive has parameter CALPPN_BCI set to “no indication” or is not present ANC - If the CALPN_SETUP_RESP primitive has parameter CALPPN_BCI set to “charge” ANN - If the CALPN_SETUP_RESP primitive has parameter CALPPN_BCI set to “no charge” |
| Suspend request & indication | CALPN_SUS_REQ CALPN_SUS_IND | 13 | 0x0d | CBK – CALPN_SUS_REQ used to release an incoming call permits subsequent re-answer using the CALPN_RESUME_REQ primitive |

Table 3: Mapping for operation on circuit groups configured for ITU environments

6.6 Parameter Definitions

The following parameters are defined for use in messages between the local user and TUP. The parameters are used in the parameter area of CAL_MSG_TX_REQ and CAL_MSG_RX_IND messages as detailed in the appropriate message specifications.

The parameter format is based on the ITU-T ISDN User Part (ISUP) Formats and Codes specified in ITU-T Recommendation Q.763. The use of a common parameter set allows applications to be written that can work with other telephony user parts.

| Parameter | Mnemonic | Value (dec) | Value (hex) |
|--|--------------------|-------------|-------------|
| Access Transport | CALPPN_AT | 3 | 0x03 |
| Additional calling party information ' | CALPPN_ACINF | 200 | 0xc8 |
| Additional Cause Information ' | CALPPN_ADD_CSE | 214 | 0xd6 |
| Additional routing information' | CALPPN_ARTINF | 201 | 0xc9 |
| Backward call indicators | CALPPN_BCI | 17 | 0x11 |
| Called party number | CALPPN_CALLED_NUM | 4 | 0x04 |
| Calling party number | CALPPN_CALLING_NUM | 10 | 0x0a |
| Calling party's category | CALPPN_CPC | 9 | 0x09 |
| Cause indicators | CALPPN_CAUSEI | 18 | 0x12 |
| Charging information ' | CALPPN_CHRGINF | 202 | 0xca |
| Closed user group interlock code | CALPPN_CUGIC | 26 | 0x1a |
| Continuity indicators | CALPPN_CONTI | 16 | 0x10 |
| Event information | CALPPN_EVENT_INF | 36 | 0x24 |
| Forward call indicators | CALPPN_FCI | 7 | 0x07 |
| Generic Number | CALPPN_GENERIC_NUM | 192 | 0xc0 |
| IAI national use octet ' | CALPPN_IAI_NAT | 203 | 0xcb |
| Incoming trunk and transit line identity ' | CALPPN_ITTI | 204 | 0xcc |
| Information indicators | CALPPN_INFOI | 15 | 0x0f |
| Information request indicators | CALPPN_INFOREQI | 14 | 0x0e |
| Message number field ' | CALPPN_MNF | 215 | 0xd7 |
| Nature of connection indicators | CALPPN_NOCI | 6 | 0x06 |
| Number of Metering Pulses' | CALPPN_COL_CHG | 255 | 0xff |
| Optional forward call indicators | CALPPN_OFCI | 8 | 0x08 |
| Original called number | CALPPN_ORIG_NUM | 40 | 0x28 |

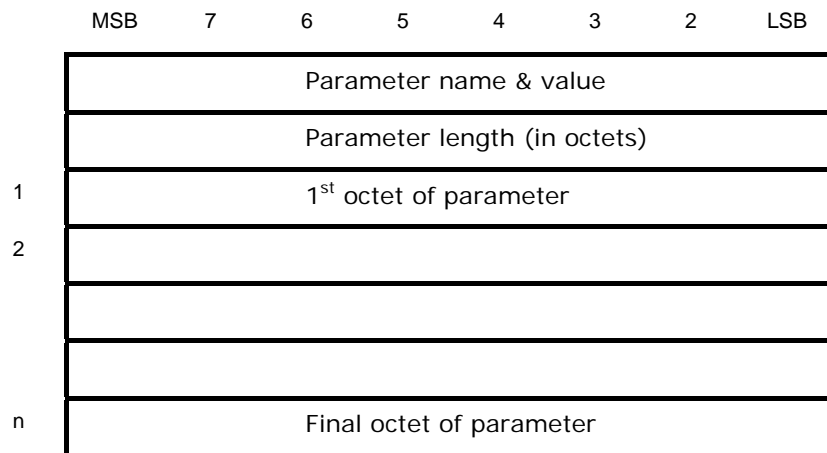
| | | | |
|--|-----------------------|-----|------|
| Packet charging | CALPPN_PKT_CHG | 213 | 0xd5 |
| Redirection information | CALPPN_REDIR_INFO | 19 | 0x13 |
| Signalling point code | CALPPN_SPC | 30 | 0x1e |
| SSUTR2 Additional Called Party Information ' | CALPPN_SSUTR2_ACDINF | 207 | 0xcf |
| SSUTR2 Further Redirection Information ' | CALPPN_RD_INFO | 206 | 0xce |
| Subsequent number | CALPPN_SUBSQ_NUM | 5 | 0x05 |
| Tariff factor ' | CALPPN_TRF_FAC | 211 | 0xd3 |
| Tariff indicators ' | CALPPN_TRF_IND | 210 | 0xd2 |
| Time indicator ' | CALPPN_TIM_IND | 212 | 0xd4 |
| Transmission medium requirement | CALPPN_TMR | 2 | 0x02 |
| TUP information indicators ' | CALPPN_CCPN_TUP_INFOI | 205 | 0xcd |
| TUP Information request indicators | CALPPN_INFOREQI | 216 | 0xd8 |
| User Service Information | CALPPN_USINF | 29 | 0x1d |
| User to User Information | CALPPN_UUINF | 32 | 0x20 |

Table 4: Parameters for use in messages between the local user and TUP

Parameters marked ' provide TUP specific functionality and are not necessarily supported by other Dialogic® SS7 protocols. Their use in user primitives is optional. However, they do allow the complete TUP functionality to be accessed by the user via the primitive interface.

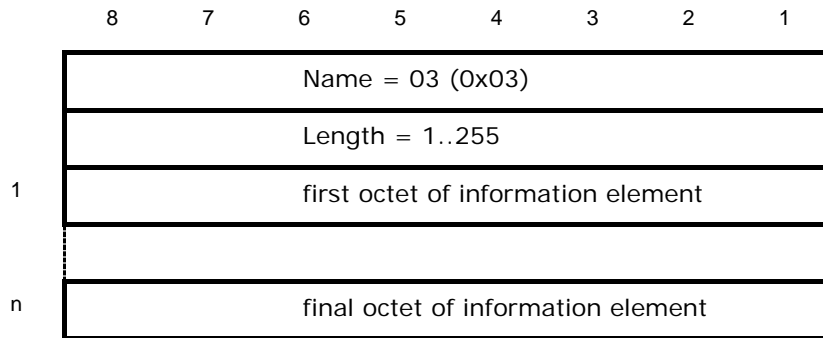
Where the parameter descriptions in the following sections state that "the TUP module transport this parameter transparently", please, refer to the appropriate TUP specification for the format of the parameter (e.g. ITU-T Q.723).

The notation used for the parameter specifications is shown below:



6.6.1 Access Transport

The Access Transport parameter is only used in SSUTR2 mode. The format of the Access Transport parameter is shown in the following figure. It is a variable length parameter, with maximum length of 255 octets.



The information element is coded as described in Q.931, including the Q.931 name and length octets. Multiple Q.931 information elements may be included. The information elements applicable to a particular usage of the Access Transport parameter are dependent on the relevant procedures.

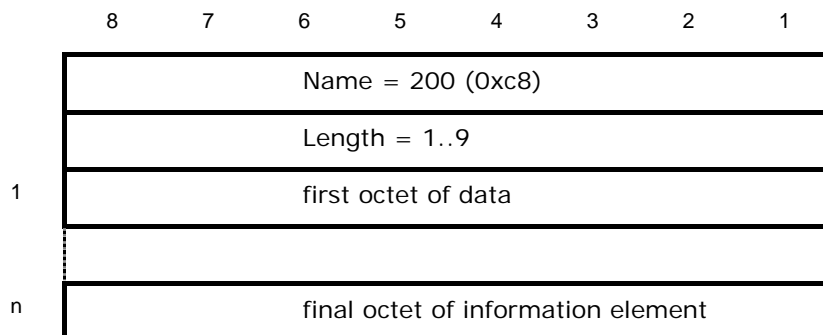
The user to user information element should be passed to the TUP module in the user to user information parameter and the bearer capability information element should be passed to the TUP module in the user service information parameter.

The TUP module transports this parameter transparently. It only verifies the length of the Q.931 information elements contained.

This parameter corresponds to the SSUTR2 access information [domaine d'information d'accès].

6.6.2 Additional calling party information

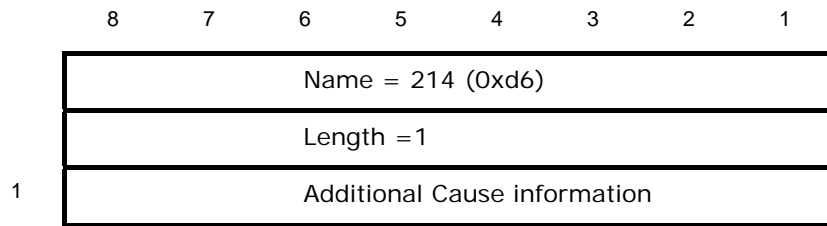
The format of the additional calling party information parameter is shown in the following figure. It is a variable length parameter, with maximum length of 9 octets.



This parameter allows calling party information not carried in the calling party category to be conveyed in the forwards direction during call set up. The TUP module transports this parameter transparently without verifying its format.

6.6.3 Additional cause information

This is an SSUTR2 mode only parameter. The format of the additional cause information parameter is shown in the following figure. It is a fixed-length parameter of length 1.



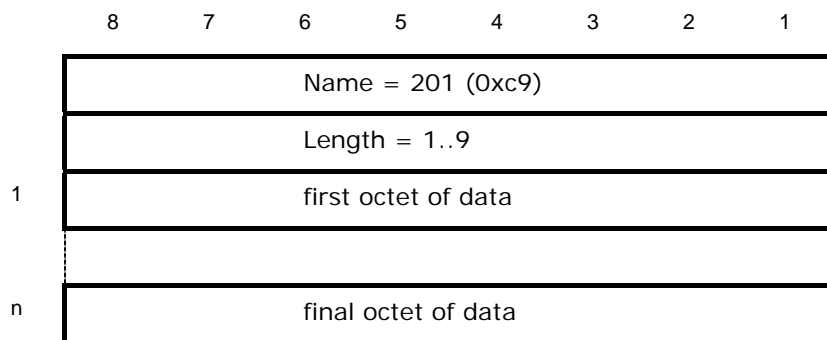
Additional cause information

This field conveys the cause of the call failure. Maps transparently to the cause field of the SSUTR2 EAR [Echec de l'Appel RNIS] and SND [Service Non Disponible] messages.

For those cases, the message type is indicated in the cause indicators parameter.

6.6.4 Additional routing information

The format of the additional routing information parameter is shown in the following figure. It is a variable length parameter, with maximum length of 9 octets.

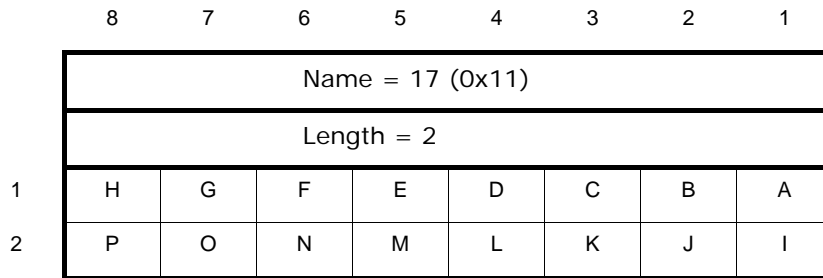


This parameter allows specific routing information to be conveyed in the forwards direction.

TUP module transports this parameter transparently without verifying its format.

6.6.5 Backward call indicators

The format of the backward call indicators parameter is shown in the following figure. It is a fixed length parameter with two octets following the length octet.



The following codes are currently supported:

Bits B A are the charge indicator:

| B | A | Charge indicator |
|---|---|--------------------------------------|
| 0 | 0 | No indication |
| 0 | 1 | No charge |
| 1 | 0 | Charge |
| 1 | 1 | Not used, (treated as no indication) |

Note: These values only apply when the TUPGOP_CCC_CHG option is set. This option should be set for all new applications. Refer to section 8.2, TUP_MSG_CNF_GRP <option> field for further details.

Bits D C are the called party status indicator:

| D | C | Subscriber free indicator |
|---|---|--|
| 0 | 0 | No indication |
| 0 | 1 | Subscriber free |
| 1 | 0 | Not used, (treated as subscriber free) |
| 1 | 1 | Not used, (treated as no indication) |

Bits F E are the called party's category indicator:

| F | E | Called party's category indicator |
|---|---|--------------------------------------|
| 0 | 0 | No indication |
| 0 | 1 | Ordinary subscriber |
| 1 | 0 | Payphone |
| 1 | 1 | Not used, (treated as no indication) |

Bit I is the interworking indicator:

| I | Interworking indicator |
|---|---|
| 0 | No interworking encountered (all signaling system No. 7 path) |
| 1 | Any path |

Bit K is the ISDN User Part indicator:

Defaulted to 0 (ISDN User Part not used all the way) in messages sent to the user. Not used in messages received from the user.

Bit M is the ISDN access indicator:

Defaulted to 0 (terminating access non-ISDN) in messages sent to the user. Not used in messages received from the user.

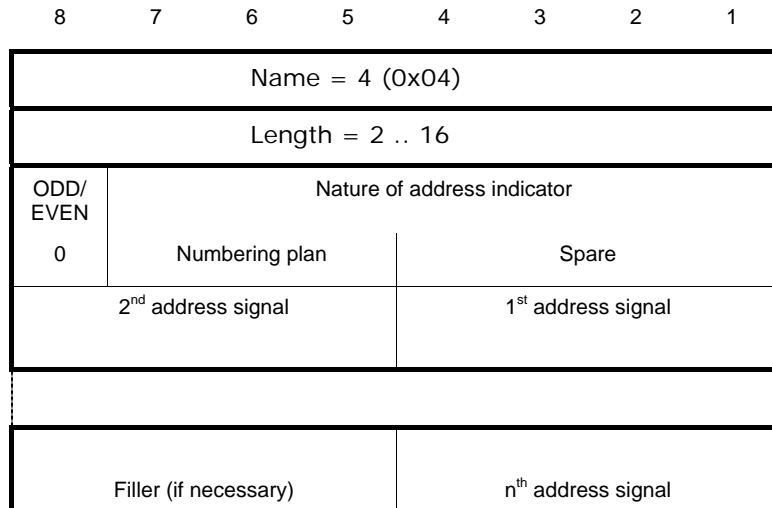
Bit N is the echo control device indicator:

| N | Echo control device indicator |
|---|--|
| 0 | Incoming half echo control device not included |
| 1 | Incoming half echo control device included |

Bits O and P are not currently used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.6 Called party number

The format of the called party number parameter is shown in the following figure. It is a variable length parameter.



Nature of address indicator

This field specifies the TUP nature of address indicators used in a forward setup message according to the following table:

| Value | TUP nature of address indicators |
|-----------------|----------------------------------|
| 0 0 0 0 0 1 | Subscriber number |
| 0 0 0 0 1 0 | Spare, national use |
| 0 0 0 0 1 1 | National significant number |
| 0 0 0 1 0 0 | International number |
| Any other value | National significant number |

Odd / Even indicator

The odd/even indicator is set to one if there are an odd number of digits present in the called party number. Otherwise, it is set to zero.

Spare and unused fields

Fields not currently used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

Numbering plan

The user should (and the TUP module will) always set this field to 1 (indicating that the Numbering Plan is the ISDN (Telephony) numbering plan E.164/E.163).

Address signal

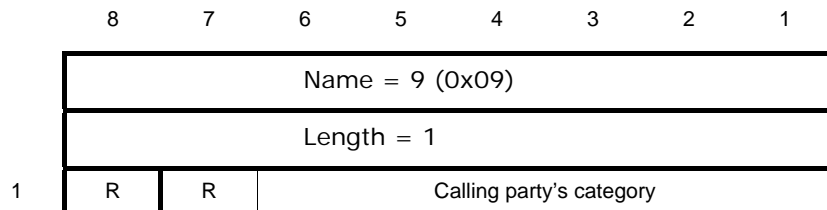
The most significant address signal is sent first. Subsequent address signals are sent in successive 4-bit fields. If the address contains an odd number of signals then a filler code (0000) is inserted after the last address signal. The end of the called address is indicated by the ST (end of dialling) signal which is coded 1111.

The TUP module supports address signals 0 – 14 and the ST signal.

The maximum number of digits allowed in the called address parameter is of 26 (including the ST digit). If the user supplies more than the 16 address digits supported by the TUP Initial Address Message (IAM) and by the Initial Address message with additional Information (IAI), the TUP module will issue an IAM or IAI with 16 address signals followed by a Subsequent Address Message (SAM) containing the remainder of the address signals.

6.6.7 Calling party's category

The format of the calling party's category parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.



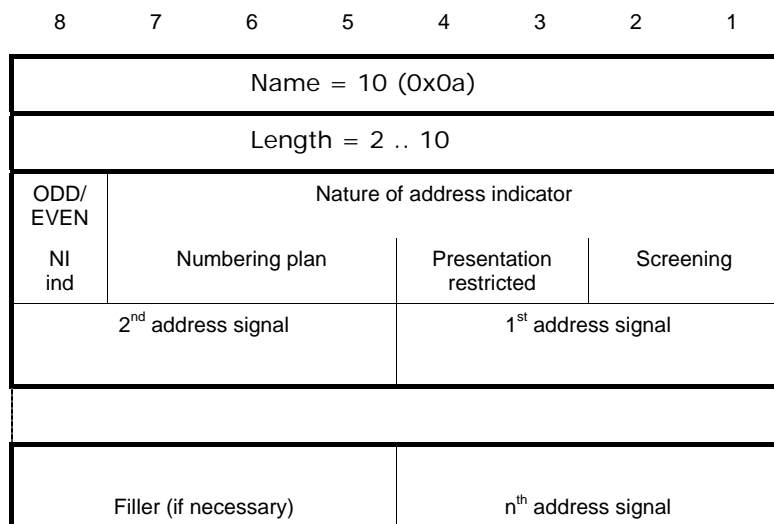
The TUP calling party's category values are 6 bits in length and correspond in value/meaning to the least significant 6 bits of the ITU-T ISUP defined calling party category values. The 6-bit user supplied calling party category is transported transparently by the TUP module.

The two bits marked "R" are reserved. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.8 Calling party number

The format of the calling party number parameter is shown in the following figure. It is a variable length parameter.

A parameter length of 2, with no address signals indicates calling party number not available.



Nature of address indicator

This field specifies the nature of address indicators field of the calling line identity in a forward setup message, according to the following table:

| Value | TUP address indicators |
|-----------------|-----------------------------|
| 0 0 0 0 0 1 | Subscriber number |
| 0 0 0 0 0 1 0 | Spare, national use |
| 0 0 0 0 0 1 1 | National significant number |
| 0 0 0 0 1 0 0 | International number |
| Any other value | National significant number |

Odd / Even indicator

The odd/even indicator is set to one if there are an odd number of digits present in the calling party number. Otherwise it is set to zero.

Screening

Currently used in French SSUTR2 mode only. See [0](#) for details.

Presentation restricted indicator

This parameter (called in SSUTR2 "Indicateur de divulgation") indicates the availability and presentation restriction of the calling line identity, according to the following table:

| Value | Presentation restricted indicator |
|-------|--|
| 0 0 | Presentation not restricted. |
| 0 1 | Presentation restricted. |
| 1 0 | Calling line identity not available. |
| 1 1 | Not used, (treated as presentation not restricted) |

Numbering plan

The user should (and the TUP module will) always set this field to 1 (indicating that the Numbering Plan is the ISDN (Telephony) numbering plan E.164/E.163).

Number incomplete (NI) indicator

This single bit indicates if this is a complete calling line identity:

| Value | Number incomplete indicator |
|-------|----------------------------------|
| 0 | No indication |
| 1 | Incomplete calling line identity |

Address signal

The most significant address signal is sent first. Subsequent address signals are sent in successive 4-bit fields. If the address contains an odd number of signals then a filler code (0000) is inserted after the last address signal.

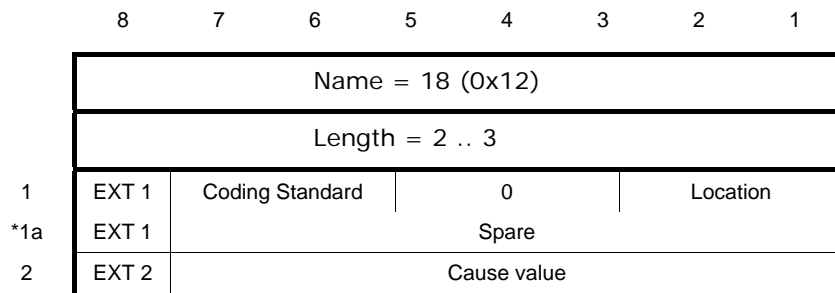
The TUP module supports address signals 0 – 15.

Spare and unused fields

Fields currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.9**Cause indicators**

The format of the cause indicators parameter is shown in the following figure. It is a variable length parameter. (Although in indications received by the user from the TUP module the parameter currently always has a length of two octets).



Octet 1a is optional.

Location

Defines where the release was generated. In primitive requests from the user this field is ignored by the TUP module (the event is implicitly generated by the local user). In primitive indications issued to the user, the following values will be used:

| Value | Number incomplete indicator |
|-------|--|
| 0010 | Call has been released by the local TUP module. |
| 0100 | Call has been released due to a message received from the network. |

Coding Standard

This field should be set to 0 in messages issued by the user indicating that the Cause Value is coded according to the ITU-T (ITU) recommendation Q.764. The TUP module will always set the field to 0.

Extension indicator 1 (EXT1)

Extension indicator for the "first" octet. Octet 1a is an optional octet, if it is present the extension indicator in octet 1 is set to 0, otherwise the extension indicator in octet 1 is set to 1.

The extension indicator in octet 1a (if present) is always set to 1.

Spare and unused fields

Fields currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

Cause Value

This field is used to convey the unsuccessful backwards setup information message (UBM) type during unsuccessful call setup. During the “speech” phase of a call, this parameter is ignored in requests from the user and set to “normal, unspecified” in release indication primitives sent to the user from the TUP module. The mapping to UBM type is defined in the following table:

| Cause Value | TUP UBM Type | |
|-----------------|--------------|-------------------------------|
| 0101010 | SEC | switching equipment congested |
| 0100010 | CGC | circuit group congested |
| 0101001 | NNC | national network congested |
| 0011100 | ADI | address incomplete |
| 0010001 | SSB | subscriber busy |
| 0000001 | UNN | unallocated number |
| 0011011 | LOS | line out of service |
| 0000100 | SST | send special information tone |
| 0110111 | ACB | access barred |
| 1000001 | DPN | digital path not provided |
| 0000101 | MPR | mis-dialled trunk prefix |
| 0010101 | CFL | call failure |
| Any other value | CFL | call failure |

The following additional cause values are used in release indications to the user:

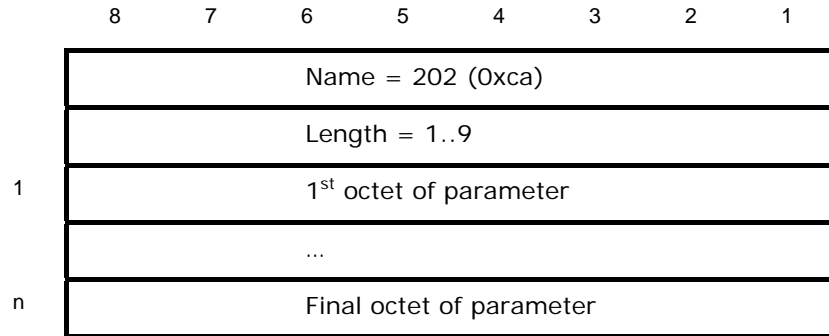
| Cause Value | Meaning |
|-------------|--|
| 1011111 | Invalid setup request message received from user |
| 0100110 | Destination out of order (not available) |
| 0101100 | Requested channel not available. For an outgoing call, indicates that the call should be retried on another circuit. |
| 0010000 | Normal call clearing |
| 0011111 | Normal - unspecified |

Extension indicator 2 (EXT2)

Extension indicator for the “second” octet. This indicator is reserved for future use to allow the “second” octet to be extended to multiple octets. It must be set to 0 on all except the final octet. The extension indicator will always be set to 1 for indications sent to the user from the TUP module.

6.6.10 Charging information

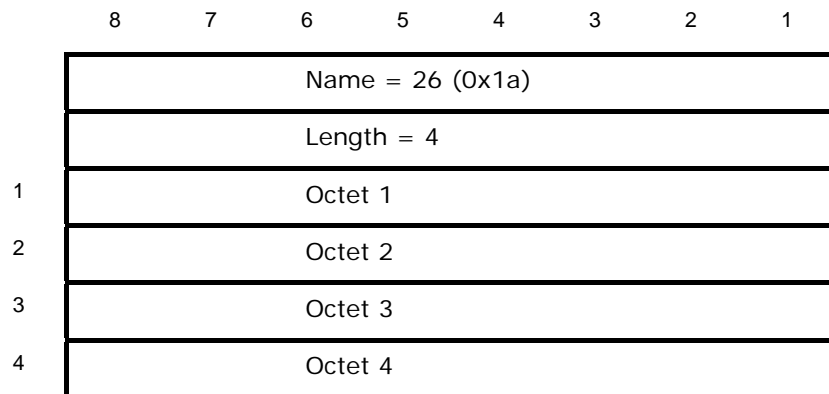
The format of the charging information parameter is shown in the following figure. It is a variable length parameter, with maximum length of 9 octets.



This parameter allows charging information to be conveyed in the forwards direction as part of a forwards call setup message. The TUP module transports this parameter transparently. This parameter is not used in SSUTR2 operation.

6.6.11 Closed user group interlock code

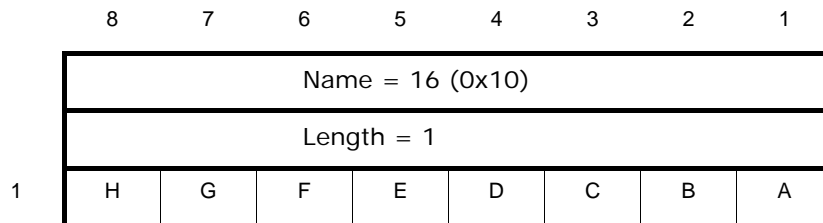
The format of the closed user group interlock code parameter is shown in the following figure. It is a fixed length parameter with four octets following the length octet.



This parameter provides the interlock code for the TUP closed user group information parameter sent in the forward direction during call setup. The TUP module passes this data transparently.

6.6.12 Continuity indicators

The format of the continuity indicators parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.



This parameter is used by the user to report continuity success or failure to the TUP module, or by the TUP module to indicate to the user the receipt of a Continuity signal (COT), or a Continuity failure signal (CCF) from the network.

The following codes are currently supported:

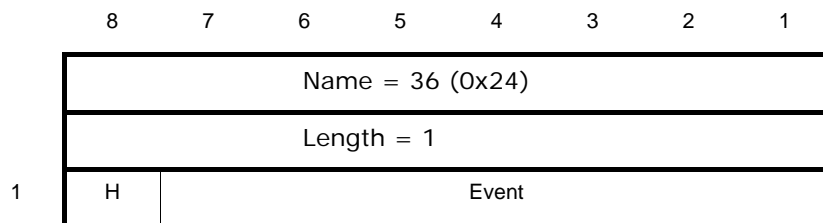
Bit

| A | Continuity status |
|---|----------------------------------|
| 0 | Continuity check failed, CCF |
| 1 | Continuity check successful, COT |

Bits B to F are not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.13 Event information

The format of the event information parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.



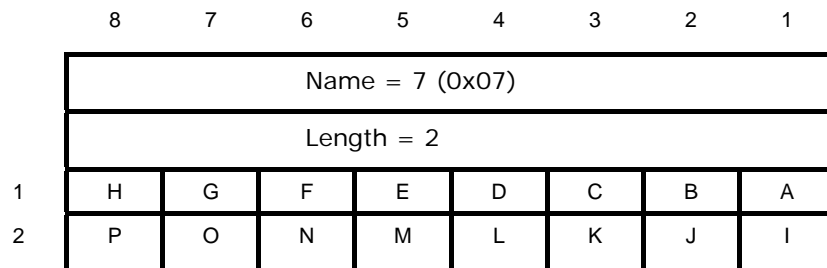
This parameter is used to indicate additional information about a call during the call setup phase. It is not used in SSUTR2 mode.

Currently, this parameter is only used to indicate that a call has been forwarded when an Alerting primitive is issued. Supported values are:

| Event | TUP Call Forwarding Indicator |
|-----------------|-------------------------------|
| 0 0 0 0 0 0 0 0 | Call not forwarded |
| 0 0 0 0 0 1 0 0 | Call forwarded |
| 0 0 0 0 0 1 0 1 | Call forwarded |
| 0 0 0 0 0 1 1 0 | Call forwarded |
| Any other value | Call not forwarded |

6.6.14 Forward call indicators

The format of the forward call indicators parameter is shown in the following figure. It is a fixed length parameter with two octets following the length octet.



The following codes are currently supported:

Bit A is the national/international call indicator:

| A | National/international call indicator |
|---|--|
| 0 | Call other than incoming international |
| 1 | Incoming international call |

Bit D is the inter-working indicator, and corresponds to the TUP signaling path indicator:

| D | Inter-working indicator |
|---|--|
| 0 | No inter-working encountered (all signaling system No. 7 path) |
| 1 | Inter-working encountered (any path) |

Bit F is the ISDN user part indicator:

Defaulted to 0 (ISDN user part not used all the way) in messages sent to the user. Not used in messages received from the user.

Bits H G are the ISDN user part preference indicator:

Defaulted to 01 (ISDN user part not required all the way) in messages sent to the user. Not used in messages received from the user.

Bit I is the ISDN access indicator:

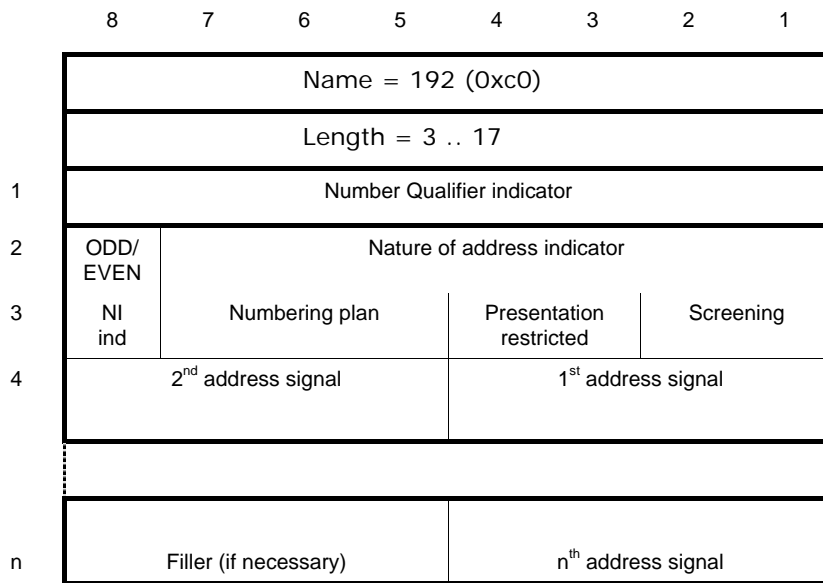
Defaulted to 0 (originating access non ISDN) in messages sent to the user.
Not used in messages received from the user.

All other bits are currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.15 Generic number

It is currently used only in SSUTR2 mode to convey the Additional Address [identité additionnelle] parameter of the MIF message. This parameter is only used in SSUTR2 VN5/VN6.

The format of the generic number parameter is shown in the following figure. It is a variable length parameter.



Number Qualifier Indicator

In SSUTR2 this field conveys the number qualifier [bits FEDC, first octet, qualification du numéro] field of the additional address parameter of the SSUTR2 MIF message. It is conveyed transparently.

| Value | | | | Number qualifier [qualification du numéro] |
|-------|----|---|---|---|
| 0 | 0 | 0 | 0 | Reserved |
| 0 | 0 | 0 | 1 | Localisation |
| 0 | 0 | 1 | 0 | Private number [numéro privé] |
| 0 | 0 | 1 | 1 | Number requested before translation [numéro demandé avant traduction (vert,azur,...)] |
| 0 | 1 | 0 | 0 | Charging code [code d'imputation] |
| 0 | 1 | 0 | 1 | } |
| | to | | | } Reserved |
| 1 | 1 | 1 | 1 | } |

Nature of address indicator

This field specifies the TUP nature of address indicators. It is mapped to the nature of address field [bits BA, second octet, Nature de l'adresse] of the additional address parameter of the MIF message. The values are conveyed transparently.

| Value | | Nature of address [Nature de l'adresse] |
|-------|---|---|
| 0 | 0 | Unknown |
| 0 | 1 | Reserved |
| 1 | 0 | National number |
| 1 | 1 | International number |

Odd / Even indicator

The odd/even indicator is set to one if there are an odd number of digits present in the calling party number. Otherwise, it is set to zero.

Screening Indicator

The screening indicator maps to the address verification field [bits BA, first octet, statut de l'identité additionnelle] of the additional address parameter of the MIF message. The values are conveyed transparently.

| Value | | Screening indicator [statut de l'identité additionnelle] |
|-------|---|--|
| 0 | 0 | Reserved |
| 0 | 1 | User provided and network checked (coding not used) [fournie par l'abonné et vérifiée par le réseau (codage non utilisé)] |
| 1 | 0 | Reserved |
| 1 | 1 | Network provided [fournie par le réseau] |

Presentation restricted indicator

This indicator maps to [bit C, second octet, Indicateur de divulgation] of the additional address parameter. It indicates the availability and presentation restriction of this additional address. The values are conveyed transparently.

| Value | Presentation restricted indicator [Indicateur de divulgation] |
|-------|---|
| 0 | Presentation not restricted [divulgation autorisée] |
| 1 | Presentation restricted [divulgation interdite] |

Numbering plan

The Numbering plan Indicator is mapped to the numbering plan [bits HG, plan de numérotage] field of the additional address parameter of the MIF message.

| Value | | Numbering plan [plan de numérotage] |
|-------|---|-------------------------------------|
| 0 | 0 | Reserved |
| 0 | 1 | E.164 |
| 1 | 0 | PNP |
| 1 | 1 | Reserved |

Number Incomplete (NI) indicator

Not Used.

Address signal

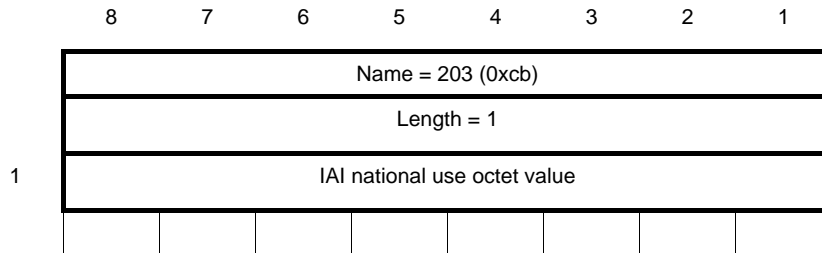
The most significant address signal is sent first. Subsequent address signals are sent in successive 4-bit fields. If the address contains an odd number of signals then a filler code (0000) is inserted after the last address signal.

The TUP module supports address signals 0 – 15.

6.6.16

IAI national use octet

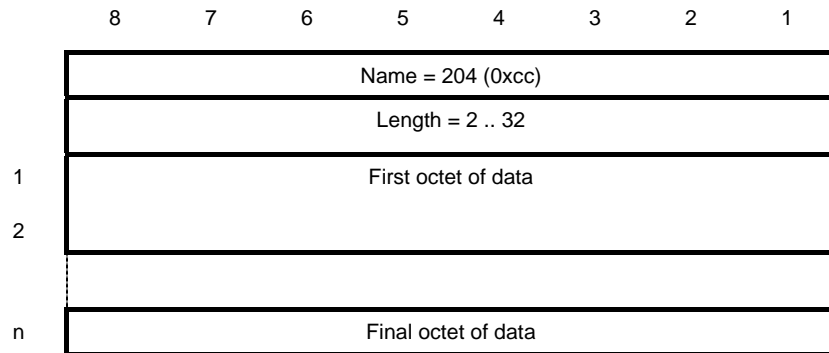
The format of the IAI national use octet parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.



This parameter provides access to the “national use octet” field of the TUP Initial Address message with additional Information (IAI).

6.6.17 Incoming trunk and transit identity

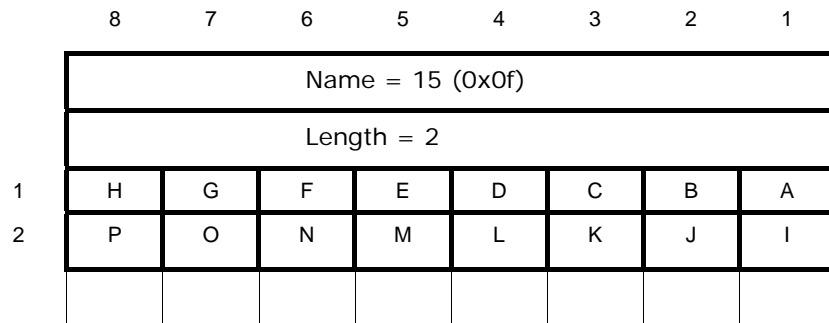
The format of the incoming trunk and transit identity parameter is shown in the following figure. It is a variable length parameter with a maximum length of 32 octets.



This parameter allows information relating to the transit exchange and incoming trunk on which a call is established to be sent in the forwards direction. The TUP module transports this parameter transparently.

6.6.18 Information indicators

The format of the information indicators parameter is shown in the following figure. It is a fixed length parameter with two octets following the length octet.



Bits A and B indicate the availability of the calling party number:

| A | B | |
|---|---|------------------------------------|
| 0 | 0 | Calling party number not included |
| 0 | 1 | Calling party number not available |
| 1 | 0 | Spare |
| 1 | 1 | Calling party number included |

Bit C is the hold provided indicator:

| C | |
|---|-------------------|
| 0 | Hold not provided |
| 1 | Hold provided |

Bit F is the calling party category response indicator. In primitive indications sent to the user from the TUP module it indicates that the calling party category has been received from the network. In primitive requests from the user to the TUP module this bit controls the inclusion of the calling party category in messages sent to the network.

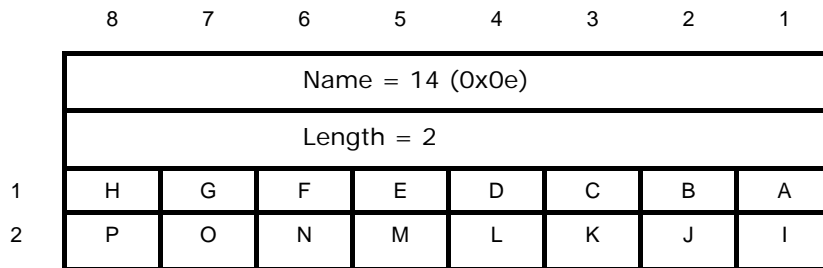
If the user supplies the calling party category, but does not set this bit, the calling party category will not be conveyed in the TUP message sent to the network.

| F | Calling party category response indicator |
|---|---|
| 0 | Calling party category not included |
| 1 | Calling party category included |

All other bits are currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.19 Information request indicators

The format of the information request indicators parameter is shown in the following figure. It is a fixed length parameter with two octets following the length octet.



The following codes are currently supported.

Bit A is used to request calling line identity:

| A | |
|---|-------------------------------------|
| 0 | Calling line identity not requested |
| 1 | Calling line identity requested |

Bit B is used to request holding of the connection:

| B | |
|---|-----------------------|
| 0 | Holding not requested |
| 1 | Holding requested |

Bit D is used to request calling party category:

| D | |
|---|--------------------------------------|
| 0 | Calling party category not requested |
| 1 | Calling party category requested |

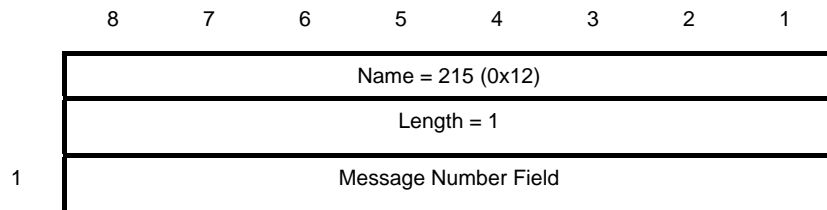
Bit H is used to request activation of malicious call identification.

| H | |
|---|---|
| 0 | Malicious call identification not encountered |
| 1 | Malicious call identification encountered |

Bits C, E, F, G are not currently used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.20 Message number field

The format of the message number field parameter is shown in the following figure. It is a fixed-length parameter.



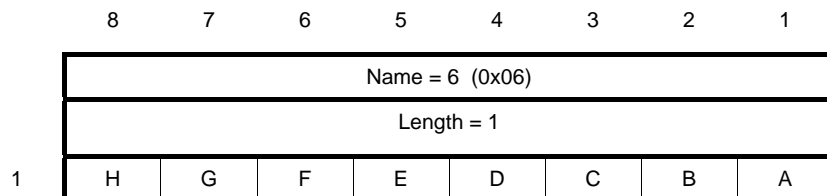
Message Number Field

This field conveys the number of the collection charging message.

Maps transparently to the message number [numéro du message] field of the SSUTR2 ITX message.

6.6.21 Nature of connection indicators

The format of the nature of connection indicators parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.



The following codes are currently supported:

Bits

| B | A | Satellite indicator |
|---|---|--|
| 0 | 0 | No satellite circuit in the connection |
| 0 | 1 | One (or more) satellite circuits in the connection |
| 1 | 0 | Not used |
| 1 | 1 | Not used |

Bits

| D | C | Continuity check indicator |
|---|---|--|
| 0 | 0 | Continuity check not required |
| 0 | 1 | Continuity check required on this circuit |
| 1 | 0 | Continuity check performed on a previous circuit |
| 1 | 1 | Not used |

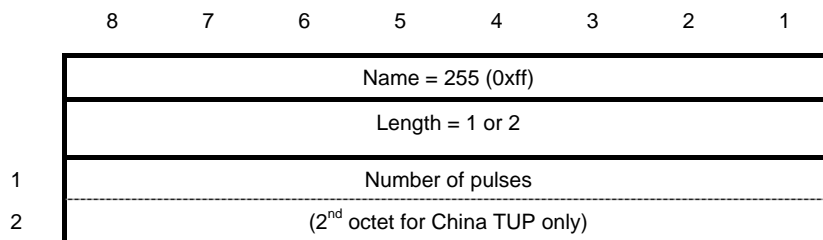
Bit

| E | Echo control device indicator |
|---|--|
| 0 | Outgoing half echo control device not included |
| 1 | Outgoing half echo control device included |

Bits F, G, H are currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.22 Number of metering pulses

The format of the number of metering pulses parameter is shown in the following figure. It is a fixed-length parameter.

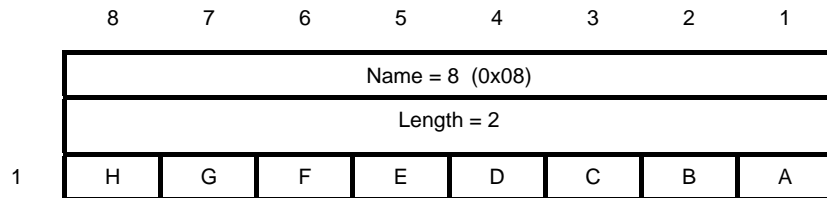


Number of pulses field

This field conveys the number of charging units to be charged to the calling party. It maps transparently to the Collection charging [Domaine d'imputation de taxe] field of the SSUTR2 ITX message (1 octet length): and the Collection charging field of the China TUP MPM message (2 octets length).

6.6.23 Optional forward call indicators

The format of the optional forward call indicators parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.



The following codes are currently supported:

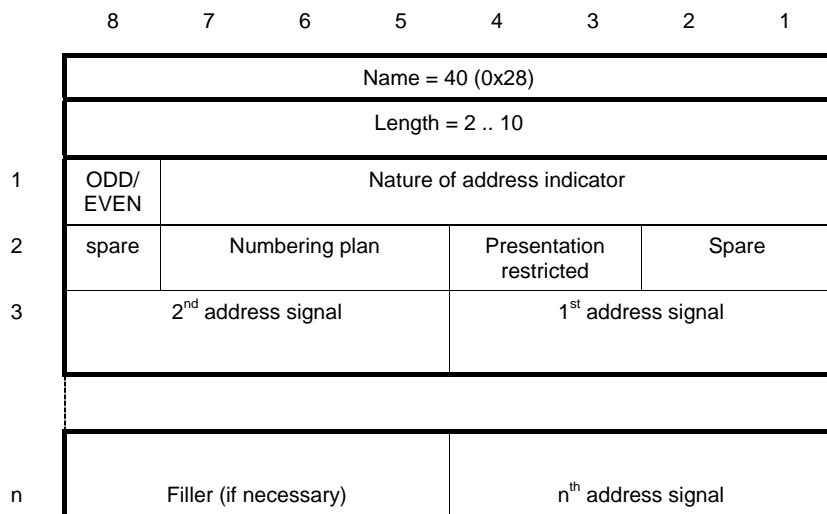
Bits B A specify whether or not the call involves a closed user group and if the calling party has outgoing access, according to the following table:

| B | A | Closed user group call indicator |
|---|---|---|
| 0 | 0 | Ordinary (non-CUG) call |
| 0 | 1 | Successful check |
| 1 | 0 | Closed user group call, outgoing access allowed |
| 1 | 1 | Closed user group call, outgoing access not allowed |

All other fields are currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.24 Original called number

The format of the original called number parameter is shown in the following figure. It is a variable length parameter.



Nature of address indicator

This field specifies the TUP original called number nature of address indicator according to the following table:

| Value | TUP nature of address indicator |
|-----------------|---------------------------------|
| 0 0 0 0 0 1 | Subscriber number |
| 0 0 0 0 1 0 | Spare, national use |
| 0 0 0 0 1 1 | National (significant) number |
| 0 0 0 1 0 0 | International number |
| Any other value | National (significant) number |

Odd / Even indicator

The odd/even indicator is set to one if there are an odd number of digits present in the original called number. Otherwise it is set to zero.

Spare and unused fields

Bit fields currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

Presentation restricted indicator

This parameter indicates the availability of the original called number:

| 0 | 0 | Presentation allowed |
|---|---|---|
| 0 | 1 | Not used, (treated as presentation allowed) |
| 1 | 0 | Original called number not available. |
| 1 | 1 | Not used, (treated as presentation allowed) |

Numbering plan

The user should (and the TUP module will) always set this field to 1 (indicating that the Numbering Plan is the ISDN (Telephony) numbering plan E.164/E.163).

Address signal

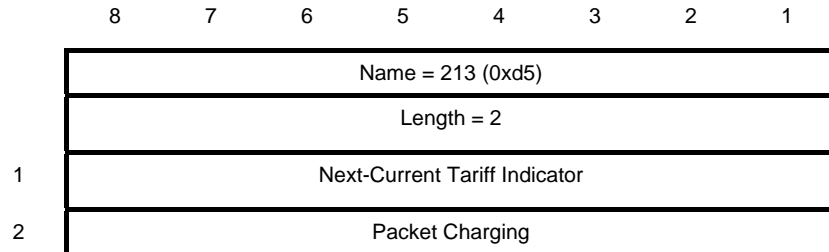
The most significant address signal is sent first. Subsequent address signals are sent in successive 4-bit fields. If the address contains an odd number of signals then a filler code (0000) is inserted after the last address signal.

The TUP module supports address signals 0 – 15.

A parameter length of 2 with no address signals indicates original called number not available.

6.6.25 Packet charging

The format of the packet charging parameter is shown in the following figure. It is a fixed-length parameter.



Next-current tariff Indicator

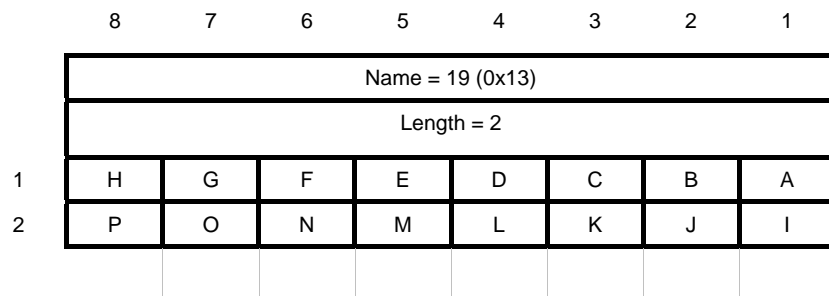
| Value | Next current tariff indicator |
|-------|-------------------------------|
| 0 | Current charge |
| 1 | Next charge |

Packet charging

This field conveys the number of charging units on answer. Maps to the packet charging field of the SSUTR2 TAX message.

6.6.26 Redirection information

The format of the redirection information parameter is shown in the following figure. It is a fixed length parameter with two octets of data following the length octet.



The following codes are currently supported.

Bits A, B, and C are the redirecting indicator and indicate the state of the redirected call indicator in TUP forward setup messages.

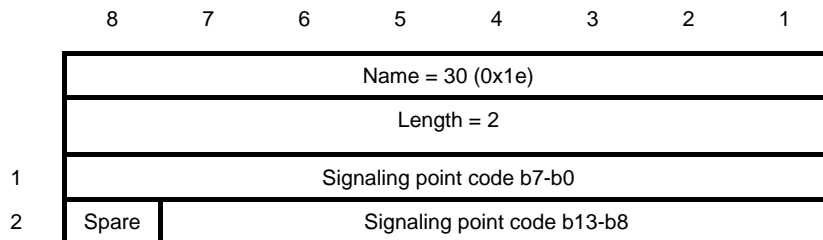
| C | B | A | |
|------------------|---|---|--|
| 0 | 0 | 0 | Not a redirected call |
| 1 | 1 | 1 | Spare (treated as not a redirected call) |
| All other values | | | Redirected call |

All other bits are currently not used. They should be set to zero in messages issued by the user and are discarded by the TUP module in messages received by the user.

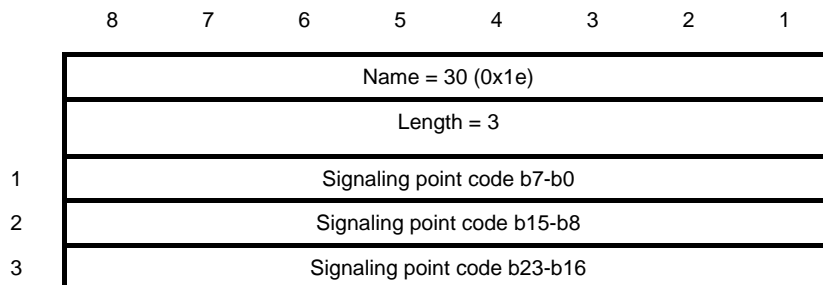
6.6.27 Signaling point code

The format of the signalling point code parameter is shown in the following figure. The TUP module accepts two point code lengths, 14 bit point codes, which are encoded in two octets of data, and 24 bit point codes which are encoded in 3 octets of data. The TUP module will use the point code length set at module configuration time in messages to the user.

14 bit point code:



24 bit point code:

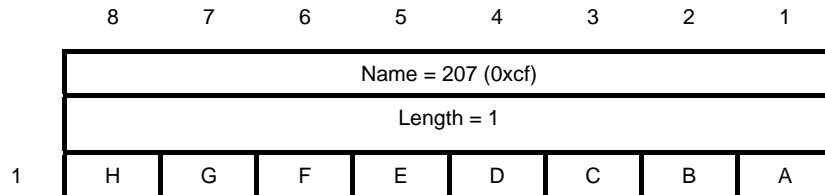


6.6.28 SSUTR2 Additional called party information

Currently used in SSUTR2 mode only.

The format of the SSUTR2 Additional called party information [complément d'information concernant le demandé] parameter is shown in the following figure.

It is a fixed length parameter with a single octet of data following the length octet.



This parameter is coded as shown below.

The ISDN access indicator, bit M of the backward call indicators, also indicates ISDN or non-ISDN access.

| C | B | A | Nature of called party access [Nature de l'accès du demandé] |
|----|---|---|--|
| 0 | 0 | 0 | Unknown |
| 0 | 0 | 1 | Analog access |
| 0 | 1 | 0 | Transcom access |
| 0 | 1 | 1 | ISDN access |
| 1 | 0 | 0 | |
| to | | | Reserved |
| 1 | 1 | 1 | |

Bits FED : reserved (coded "000")

| G | Maps bit H (responding terminal type indicator [indicateur du type de réponse du terminal]) of the message indicators [indicateurs de message] of ACF message |
|---|---|
| 0 | Manual terminal |
| 1 | Automatic terminal |

| H | Circuit information to be received indicator [Indicateur de présence d'information à recevoir sur le circuit] |
|---|---|
| 0 | No information |
| 1 | Circuit information to be received |

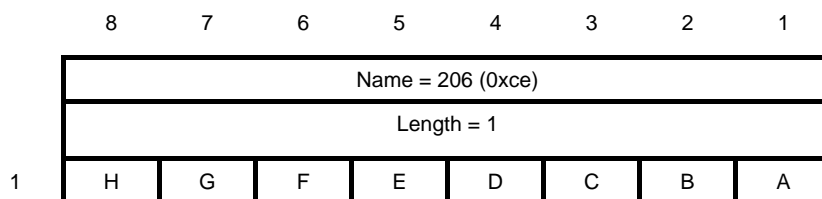
Note: This responding terminal type indicator is only relevant for an ISDN called access and should be coded "0" if this access is not ISDN.

"Access type" [Nature de l'accès demandé] and "Presence indicator of information to be received" [indicateur de présence d'informations à recevoir sur le circuit] parameters of the SSUTR2 ACF message are carried transparently by this parameter.

6.6.29 SSUTR2 Further redirection information

Used in SSUTR2 mode only.

The format of the redirection information parameter is shown in the following figure. It is a fixed length parameter with a single octet of data following the length octet.



The following codes are currently supported.

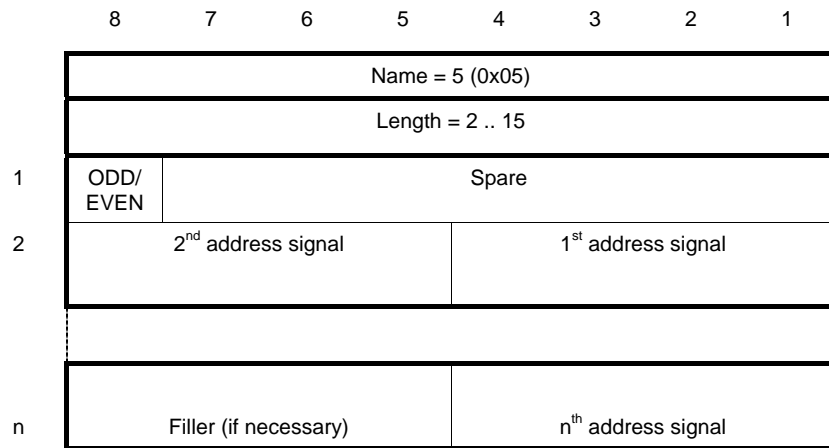
Bits B and A are the redirection indicator [indicateur d'appel renvoyé] used in the message indicator parameter of the SSUTR2 MIF message.

| B | A | |
|------------------|---|---|
| 0 | 0 | Not a redirected call |
| 0 | 1 | Redirected call |
| 1 | 0 | Reserved |
| 1 | 1 | Redirected, call with right to override the calling party presentation restriction. |
| All other values | | Not used |

All other bits fields are currently not used. They should be set to zero in messages issued by the user and are discarded by the TUP module in messages received by the user.

6.6.30 Subsequent number

The format of the subsequent number parameter is shown in the following figure. It is a variable length parameter.



Spare field

Bit fields currently not used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

Odd / Even indicator

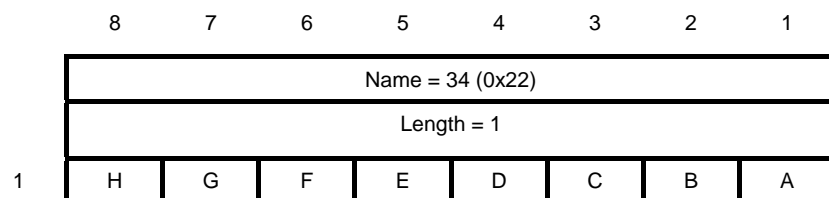
The odd/even indicator is set to one if there are an odd number of digits present in the subsequent number. Otherwise it is set to zero.

Address signal

The most significant address signal is sent first. Subsequent address signals are sent in successive 4-bit fields. If the address contains an odd number of signals then a filler code (0000) is inserted after the last address signal. The end of the called address is indicated by the ST (end of dialling) signal which is coded 1111.

The TUP module supports address signals 0 –14 and the ST signal.

6.6.31 Suspend/resume indicator



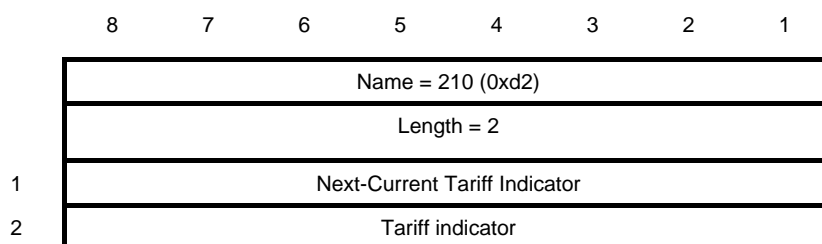
The following codes are used in the suspend/resume indicator parameter:

| A | Suspend/resume indicator |
|---|---------------------------|
| 0 | ISDN subscriber initiated |
| 1 | Network initiated |

Bits H-B Spare (not used)

6.6.32 Tariff indicators

The format of the tariff indicators parameter is shown in the following figure. It is a fixed-length parameter.



Next-current tariff indicator

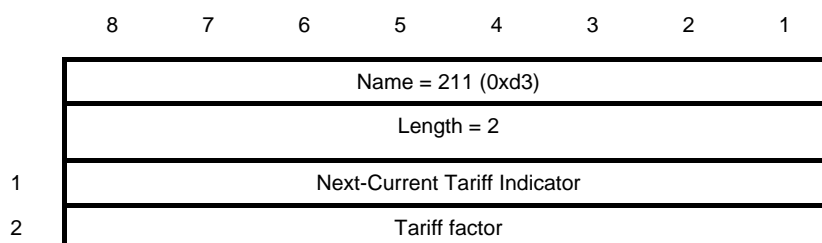
| Value | Next current tariff indicator |
|-------|-------------------------------|
| 0 | Current charge |
| 1 | Next charge |

Tariff indicator

This field conveys the required tariff scale. It maps transparently to the tariff indicator [Indicateur de tarif] field of the TAX and CHT SSUTR2 messages.

6.6.33 Tariff factor

The format of the tariff indicator parameter is shown in the following figure. It is a fixed-length parameter.



Next-current tariff Indicator

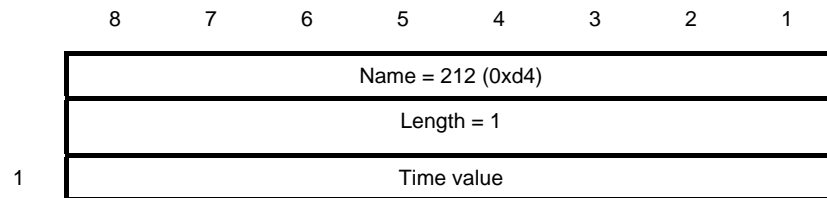
| Value | Next-current tariff indicator |
|-------|-------------------------------|
| 0 | Current charge |
| 1 | Next charge |

Tariff factor

This field conveys the required charging period. Maps transparently to the tariff factor [Facteur tarifaire] field of the TAX and CHT SSUTR2 messages.

6.6.34 Time indicator

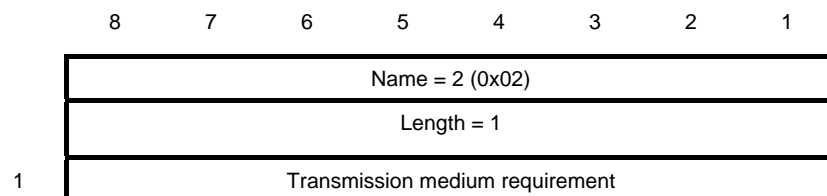
The format of the time indicator parameter is shown in the following figure. It is a fixed-length parameter.

**Time Value**

This field conveys the time at which the next tariff change will occur. Maps transparently to the time value [Indicateur horaire] field of the TAX and CHT SSUTR2 messages.

6.6.35 Transmission medium requirement

The format of the transmission medium requirement parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.

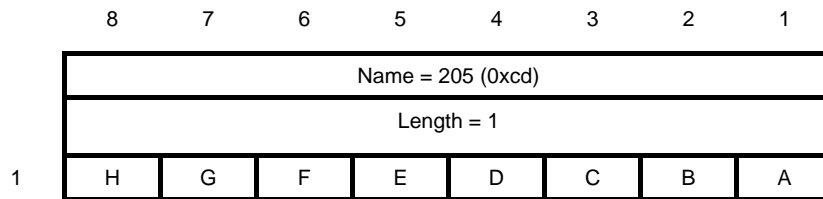


This parameter is used to indicate the value of the TUP all digital path required indicator as detailed in the following table:

| Value | Meaning |
|-----------------|-------------------------------------|
| 0 | Ordinary call (i.e. speech) |
| 2 | Digital path required |
| 3 | 3.1kHz audio |
| 4 | Digital path required |
| 5 | Digital path required |
| 7 | Digital path required |
| 8 | Digital path required |
| 9 | Digital path required |
| 10 | Digital path required |
| Any other value | Not used (treated as 3.1 kHz audio) |

6.6.36 TUP information indicator

The format of the TUP information indicator parameter is shown in the following figure. It is a fixed length parameter with one octet following the length octet.



This parameter provides access to specific TUP features not provided in other telephony user parts.

Bit A is the malicious call identification provided indicator

| A | |
|---|--|
| 0 | Malicious call identification not provided |
| 1 | Malicious call identification provided |

Bit B is indicates the availability of the incoming trunk and transit exchange identity

| B | |
|---|---|
| 0 | Incoming trunk and transit exchange identity not provided |
| 1 | Incoming trunk and transit exchange identity provided |

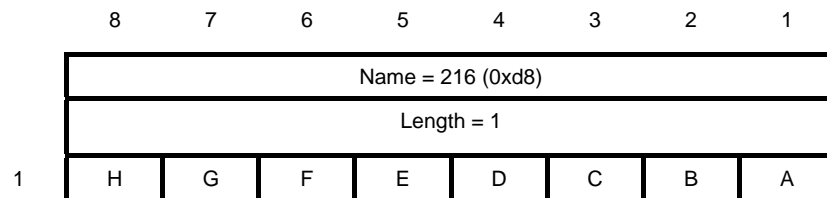
Bits C and D indicate the availability of the original called number

| D | C | |
|---|---|--------------------------------------|
| 0 | 0 | Original called number not included |
| 0 | 1 | Original called number not available |
| 1 | 0 | Spare |
| 1 | 1 | Original called number included |

Bits E, F, G, and H are not currently used. They should be set to zero in messages issued by the user and discarded in messages received by the user.

6.6.37 TUP Information request indicators

The format of the information request indicators parameter is shown in the following figure. It is a fixed length parameter with a single octet following the length octet.



The following codes are currently supported.

Bit A is used to request outgoing half echo suppressor:

| A | |
|---|---|
| 0 | Outgoing half echo suppressor not requested |
| 1 | Outgoing half echo suppressor requested |

Bit B is used to request original called number:

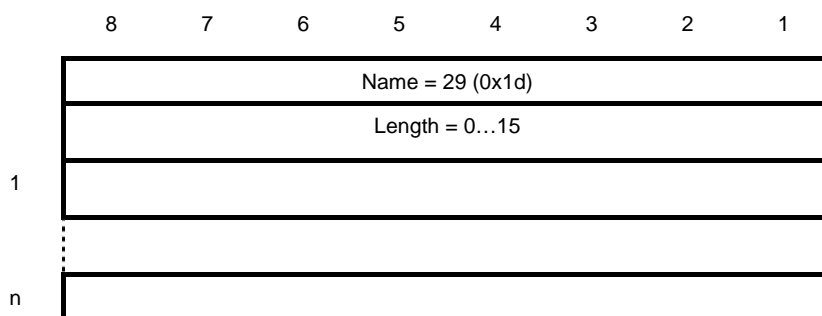
| B | |
|---|--------------------------------------|
| 0 | Original called number not requested |
| 1 | Original called number requested |

6.6.38 User service information

The format of the User Service Information parameter is shown below:

This parameter is used in SSUTR2 mode only. It conveys the contents of the Q.931 "Bearer Capability" information element. Maps to [Domaine d'information d'accès].

It is a variable length parameter with a maximum length of 15 octets. User information is carried transparently by TUP module without any verification.

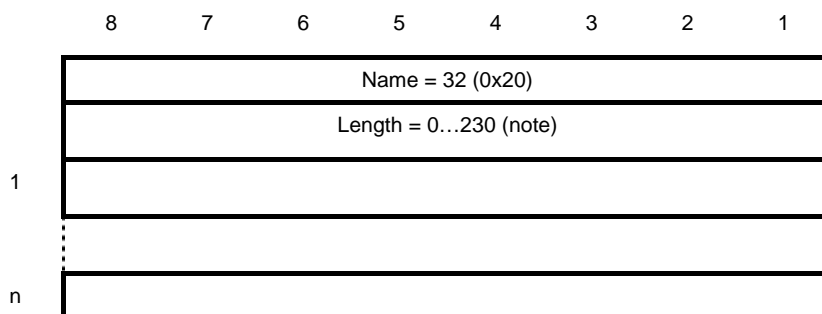


6.6.39 User to user information

The format of the User to User Information parameter is shown below:

This parameter is used in SSUTR2 mode only. Conveys the contents of the Q.931 "User -user" information element. Maps to [Domaine d'information d'accès]

It is a variable length parameter with a maximum length of 230 octets. User information is carried transparently by TUP module without any verification.



For the following messages, shorter maximum lengths apply:

| Message | Length |
|-------------------------------|--------|
| Release request & indication | 150 |
| Setup request & indication | 220 |
| Setup response & confirmation | 150 |

6.7 Use of call control primitives

6.7.1 Call clearing procedure

The current TUP module supports a full handshake mechanism during call release. This is known as the Application Controlled Release mechanism. It ensures that the TUP module has received a release action from both the network and the user before it considers the circuit idle.

This is significant in the case where the network sends IAM on a circuit immediately after sending clear forward. Early versions of the TUP module acknowledged the clear forward with a release guard at the same time as issuing a Release Indication primitive to the user. In the case of user failure or where the user was slow in sending a Release Request, the user could unintentionally release the new incoming call.

The Application Controlled Release mechanism prevents these problems. Two requirements are placed on the user.

- If the user receives a Release Indication primitive from TUP the user must acknowledge it with a Release Response primitive, indicating that the application has completed release of the circuit. The user must then wait until the TUP module responds with a Release Confirmation primitive before attempting a new call on this circuit.

The TUP module will continue to send Release Indication until the user issues Release Response. The user may send a Release Request prior to the Release Response. (This may be useful if it is not possible for the application to complete release of the circuit immediately.) If an IAM message is received from the network before the user issues Release Response the circuit is automatically blocked. When the user does issue the Release Response primitive the circuit is automatically unblocked.

- If the user sends a Release Request primitive to TUP to initiate release of the circuit, the user must wait for the TUP module to acknowledge it with a Release Confirmation primitive before attempting a new call on that circuit. If the user does attempt to set up a call before the TUP module has sent Release Confirmation, the Setup Request primitive will be discarded. A maintenance event is indicated to the Maintenance module.

Note: All new user applications should make use of the Application Controlled Release mechanism. It is enabled by setting the TUPF_ACR and TUPF_NAI options in the module configuration message.

6.7.2 Call collision procedure

If a dual seizure occurs for one circuit, in respect to the priority setting (bits 1 and 2 of the OGC_PRI group option) defined at each end for this circuit, the user (application) at the point code with the lower priority will receive the incoming setup indication from its TUP module. This indicates it is the responsibility of the user to re-attempt the call on another circuit, but the user does not need to release its initial unsuccessful call attempt.

Note: The point code which succeeds to initiate a call (because it has the higher priority) will not receive any indication that dual seizure occurred because the received IAM is discarded by the TUP module.

7 Management Interface

The management interface allows the user to interface with the Circuit Group Control (CGC) block of the TUP module. The interface is message based and uses the same basic message structure as defined previous sections. The messages available allow the user to carry out the following circuit supervision functions:

- Reset a circuit or circuit group
- Abort a reset cycle
- Block a circuit or circuit group (Maintenance, Hardware or Software)
- Unblock a circuit or circuit group (Maintenance, Hardware or Software)
- Abort a blocking/unblocking attempt

Commands originated by the user take the form of a Circuit Group Supervision Request. On completion of command execution, the user receives notification in the form of a Circuit Group Supervision Confirmation, indicating that the expected response or acknowledgement has been received from the network for the command. Events initiated at the remote end of the network are notified to the user in a Circuit Group Supervision Indication.

The TUP module supports the following blocking types.

- **Hardware Blocking:** This is typically invoked due to PCM loss or other hardware failure. Hardware blocking causes any active calls to be released on all affected circuits.
- **Software Blocking:** Invoked when the system detects an internal fault affects a individual circuit or group of circuits. Software blocking causes any active calls to be release on all affected circuits.
It is recommended that software blocking not be used, as it is not a feature supported by other Dialogic® SS7 protocols.
- **Maintenance Blocking:** Invoked following a user command. Maintenance blocking does not cause active calls to be released but upon the circuit becoming idle will prevent further calls.

When the TUP module returns a confirmation message containing a status value the status will be one of the following:

| Mnemonic | Value | Description |
|----------------|-------|---|
| none | 0 | Success |
| TUPE_BAD_ID | 1 | Inappropriate or invalid id in request message |
| TUPE_BAD_MSG | 5 | Inappropriate or unrecognised message type . |
| TUPE_BAD_PARAM | 6 | Invalid parameters contained in message. |

The message structure and parameters for each message are defined in the following paragraphs.

7.1 Circuit Group Supervision Control Request

Synopsis:

Message used by system management to initiate a circuit group supervision control function.

| MESSAGE HEADER | | |
|----------------|--|--|
| Field Name | Meaning | |
| type | CAL_MSG_CGSC_REQ (0x7703) | |
| id | gid | |
| src | Originating module ID | |
| dst | TUP module ID | |
| rsp_req | Sending layer's bit set if confirmation required | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 6 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | ptype – Management primitive type. |
| 1 | 1 | reserved – must be set to zero |
| 2 | 4 | cic_mask – bits set to indicate the affected circuits in the group |

Description:

This message is issued by system management to initiate a circuit group supervision control function. The functions supported are RESET, BLOCK & UNBLOCK. The command operates on specified circuits within the given circuit group.

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the **rsp_req** field which will cause a confirmation message of the same format to be returned. The **status** field in this message is zero on success or an error code otherwise.

Parameter Description:

gid

The group identifier for the Circuit Group.

ptype

The type of management primitive taken from the following table:

| Name | Value | Function |
|------------|-------|---|
| Reset | 0 | Reset circuit(s) |
| Stop Reset | 1 | Abort reset operation |
| M-Block | 2 | Maintenance block circuit(s) |
| M-Unblock | 3 | Maintenance unblock circuit(s) |
| M-Stop | 4 | Abort maintenance (un)blocking |
| H-Block | 5 | Hardware block circuit(s) |
| H-Unblock | 6 | Hardware unblock circuit(s) |
| H-Stop | 7 | Abort hardware (un)blocking |
| S-Block | 9 | Software block circuit(s) |
| S-Unblock | 10 | Software unblock circuit(s) |
| S-Stop | 11 | Abort software (un)blocking |
| IC Active | 14 | Circuit has been set into an incoming active (Answer) state |
| OG Active | 15 | Circuit has been into an outgoing active (Answer) state |

cic_mask

A 32 bit mask indicating to which of the circuits in the circuit group the message applies. It is usual for a command to apply to all circuits in the circuit group in which case **cic_mask** may be set to all ones (e.g. **cic_mask=0xffffffff**).

7.2 Circuit Group Supervision Control Confirmation

Synopsis:

This message is issued by the TUP module to indicate successful completion of a circuit group supervision control function.

| MESSAGE HEADER | | |
|----------------|--|---|
| Field Name | Meaning | |
| type | CAL_MSG_CGSC_CONF (0x0709) | |
| id | gid | |
| src | TUP module ID | |
| dst | Circuit Group Management module ID (cgsm_id) | |
| rsp_req | 0 | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 6 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | ptype – Management primitive type. |
| 1 | 1 | reserved – must be set to zero |
| 2 | 4 | cic_mask – bits set to indicate the affected circuits in the group |

Description:

This message is issued by the TUP module to indicate successful completion of the indicated circuit management operation. This indicates that the expected response/acknowledgement has been received from the network for the indicated circuits.

Note that it is possible that the completion of a command will occur at different times for different circuits in the group. In this case, more than one confirmation message will be issued. The user should therefore always check the **cic_mask** in the confirmation message to determine to which circuits the confirmation applies.

Parameter Description:

gid

The group identifier for the Circuit Group.

ptype

The type of management primitive taken from the following table:

| Name | Value | Function |
|------------|-------|--|
| Reset | 0 | Reset circuit(s) |
| Stop Reset | 1 | Abort reset operation |
| M-Block | 2 | Maintenance block circuit(s) |
| M-Unblock | 3 | Maintenance unblock circuit(s) |
| M-Stop | 4 | Abort maintenance (un)blocking |
| H-Block | 5 | Hardware block circuit(s) |
| H-Unblock | 6 | Hardware unblock circuit(s) |
| H-Stop | 7 | Abort hardware (un)blocking |
| S-Block | 9 | Software block circuit(s) |
| S-Unblock | 10 | Software unlock circuit(s) |
| S-Stop | 11 | Abort software (un)blocking |
| IC Active | 14 | Circuit to be set into an incoming active (Answer) state |
| OG Active | 15 | Circuit to be set into an outgoing active (Answer) state |

cic_mask

A 32 bit mask indicating which of the circuits in the circuit group have successfully completed the indicated operation. It is common for a command to apply to all circuits in the circuit group, in which case `cic_mask` may be set to all ones (e.g. `cic_mask=0xffffffff`).

7.3 Circuit Group Supervision Control Indication

Synopsis:

This message indicates completion of a circuit control function initiated from the remote signaling point.

| MESSAGE HEADER | | |
|----------------|--|--|
| Field Name | Meaning | |
| type | CAL_MSG_CGSC_IND (0x0708) | |
| id | gid | |
| src | TUP module ID | |
| dst | Circuit group management module ID (cgsm_id) | |
| rsp_req | 0 | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 6 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | ptype – Management primitive type. |
| 1 | 1 | reserved – must be set to zero |
| 2 | 4 | cic_mask – bits set to indicate the affected circuits in the group |

Description:

This message is issued by the TUP module to indicate that a circuit management function that was initiated by a message received from the remote signaling point has been successfully completed.

It is also used to indicate a change in status of a remote signaling point when the TUPF_GSPS module option is set. When this option is not set, the Remote Point Code status Indication is used instead.

Parameter Description:

gid

The group identifier for the Circuit Group.

ptype

The type of management primitive taken from the following table:

| Name | Value | Function |
|-------------|-------|---|
| Reset | 0 | Circuits have been remotely reset |
| M-Block | 2 | Circuits have been remotely maintenance blocked |
| M-Unblock | 3 | Circuits have been remotely maintenance unblocked |
| H-Block | 5 | Circuits have been remotely hardware blocked |
| H-Unblock | 6 | Circuits have been remotely hardware unblocked |
| S-Block | 9 | Circuits have been remotely software blocked |
| S-Unblock | 10 | Circuits have been remotely software unblocked |
| Available | 12 | Remote Signaling Point available |
| Unavailable | 13 | Remote Signaling Point unavailable |

cic_mask

A 32 bit mask indicating to which of the circuits in the circuit group the message applies. It is common for a command to apply to all circuits in the circuit group in which case cic_mask may be set to all ones (e.g. cic_mask=0xffffffff).

7.4 Remote Point Code Status Indication

Synopsis:

Message issued to indicate a change in status of a remote signaling point.

| MESSAGE HEADER | | |
|----------------|---|--|
| Field Name | Meaning | |
| type | CAL_MSG_STATUS (0x070e) | |
| id | 0 | |
| src | TUP module ID | |
| dst | Management module ID | |
| rsp_req | 0 | |
| class | 0 | |
| status | 1 = Remote user unavailable 2 = Congestion | |
| err_info | 0 | |
| len | 6 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | Affected destination point code |
| 4 | 2 | Congestion status – only applicable for remote congestion, otherwise set to zero. |

Description:

This message is issued by the TUP module to indicate user availability and congestion at a remote signalling point.

Note: When the TUPF_GSPS module option is set, the Circuit Group Supervision Indication is used instead of this message to indicate signaling point code availability.

Parameter Description:

The congestion status of the remote signaling point as shown in the following table:

| Value | Meaning |
|-------|---|
| 0 | No congestion |
| 1 | Congestion level 1 (minimum level of congestion reported) |
| 2 | Congestion level 2 |
| 3 | Congestion level 3 (maximum level of congestion reported) |

7.5 Local Overload Request

Synopsis:

Message used by system management to initiate that the local system is becoming overloaded.

| MESSAGE HEADER | |
|-----------------|--|
| Field Name | Meaning |
| type | CAL_MSG_OVLD_REQ (0x770d) |
| id | 0 |
| src | Originating module ID |
| dst | TUP module ID |
| rsp_req | Sending layer's bit set if confirmation required |
| class | 0 |
| status | overload_level |
| err_info | 0 |
| len | 0 |

Description:

This message is issued by system management to mark the local system as overloaded.

This will cause the Automatic Congestion Control procedures to become active. The module will reply to CLF with the ACC message indicating the congestion level.

This will occur on any circuits belonging to circuit groups configured for ITU operation for which a CLF is received.

Congestion control procedures are not specified for SSUTR2 operation.

RLG is also sent in reply to CLF as normal.

Once local congestion has abated the user must re-issue this message with the overload level set to zero.

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the `rsp_req` field which will cause a confirmation message of the same format to be returned. The status field in this message is zero on success or an error code otherwise.

Parameter Description:

overload_level

The congestion level to be indicated to the remote signaling point of this circuit group. This may take the following values:

| Value | Meaning |
|-------|-------------------------------|
| 0 | No overload |
| 1 | Lower overload level exceeded |
| 2 | Upper overload level exceeded |

8 Non-Primitive Interface

In addition to the primitive interface for passing protocol messages and management messages between the TUP module and the user modules, the TUP module supports a non-primitive interface for implementation specific functionality.

The non-primitive interface is used to by the user for configuration and diagnostic purposes and to allow TUP to report protocol based and software error events to the local system management module.

This section describes the formats of all the messages used in the non-primitive interface.

When the TUP module returns a confirmation message containing a status value, the status will be one of the following:

| Mnemonic | Value | Description |
|----------------|-------|--|
| none | 0 | Success |
| TUPE_BAD_ID | 1 | Inappropriate or invalid id in request message |
| TUPE_BAD_MSG | 5 | Inappropriate or unrecognised message type. |
| TUPE_BAD_PARAM | 6 | Invalid parameters contained in message. |

8.1 Configuration Request

Synopsis:

Message used to configure the TUP module for operation.

Message Format:

| MESSAGE HEADER | | |
|----------------|--------------------------------|---------------------------------------|
| Field Name | Meaning | |
| type | TUP_MSG_CONFIG (0x77c0) | |
| id | 0 | |
| src | Sending module_id | |
| dst | TUP module ID | |
| rsp_req | used to request a confirmation | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 40 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | cnf_ver – must be set to zero |
| 1 | 1 | sio – Service Information Octet value |

| MESSAGE HEADER | | |
|----------------|----|--|
| 2 | 1 | mtp_id – MTP module id |
| 3 | 1 | mngt_id – Management module id |
| 4 | 1 | maint_id – Maintenance module id |
| 5 | 1 | cgsn_id – Circuit group supervision management module. |
| 6 | 1 | user_id – Local user module id |
| 7 | 1 | reserved – must be set to 0 |
| 8 | 2 | options – Run-time options |
| 10 | 2 | max_sif |
| 12 | 2 | timer_res |
| 14 | 2 | num_tscan |
| 16 | 2 | num_grps |
| 18 | 2 | num_ccts |
| 20 | 2 | instance |
| 22 | 1 | ucic_id |
| 23 | 1 | trace_id |
| 24 | 2 | gap_msgs |
| 26 | 2 | gap_tim |
| 28 | 12 | reserved – must be set to zero |

Description:

This message is used to configure the TUP module for operation. It should be the first message sent to the module (any messages received before a valid configuration message will be discarded) and should only be issued once.

The message contains parameters relating to the environment in which the TUP module is operating such as the identity of other modules with which it needs to communicate. It also contains run-time options (such as the service information octet (SIO) and the maximum SIF capability of the local MTP).

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the `rsp_req` field which will cause a confirmation message of the same format to be returned. The status field in this message is zero on success or an error code otherwise.

Parameter Description:**sio**

The value used for the Service Information Octet in all messages sent to the MTP module. This will be used if the per-group is zero.

mtp_id

The module id for the MTP module. All MTP-TRANSFER-REQ messages are sent to this module. This will be used if the per-group **mtp_id** is zero.

mngt_id

The module id for the management module. All error indications will be sent to this module.

maint_id

The module id for the maintenance module. All protocol maintenance indications are sent to this module.

cgsm_id

All circuit group supervision indications will be sent to this module. This will be used if the per group **cgsm_id** is zero.

user_id

The module id for the application module. All receive indications are sent to this module. This is the default that will be used if the per group **cgsm_id** is zero.

options

Run time options assigned according to the following table:

| Bit | Mnemonic | Description |
|-----|-----------|--|
| 0 | TUPF_TFRM | If set to 1, messages sent to the MTP use the T_FRAME format, otherwise they use the MSG format. |
| 1 | TUPF_24PC | If set to 1, uses 24-bit point codes in messages sent and received from the MTP. Otherwise 14-bit point codes will be used. Note: for new applications this option should be set to 0 and the corresponding circuit group option (bit 20) used instead. This option is retained for backwards compatibility. |
| 2 | TUPF_CHN | If set to 1, enable protocol extensions for China GF001-9001. Note: for new applications this option should be set to 0 and the corresponding circuit group option (bit 21) used instead. This option is retained for backwards compatibility. |
| 3 | TUPF_ZCAD | If set to 1, TUP interprets a zero in the number of digits in the IAM message called address field as zero digits in the address. If set to 0 TUP interprets a zero in the number of digits in the IAM message called address field as the maximum number of digits in the address. Note: for new applications this option should be set to 0 and the corresponding circuit group option (bit 22) used instead. This option is retained for backwards compatibility. |

| 4 | TUPF_DUAL | When set to 1, if a message is received from MTP for a circuit that does not belong to a circuit group, the message is passed on to the partner module specified in the ucic_id field of this message. This option allows two instances of the TUP module to exist in a single signalling point. Each instance handles a sub-set of the total circuits and co-operates with the other instance to ensure that all messages arrive at the correct instance. Note that for correct operation, all circuits on one route must be handled by the same instance of TUP. | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|----------------|---|-----------------------|----------|------------------|------------------|----------------|--------|----------------|--------|------------------|----------------|------------------|--------|----------------|-----|-----|---------------|-----|-----|--------------|-----|-----|
| 5 | TUPF_GSPS | If set to 1 Point Code status is indicated on a per circuit group basis via the Circuit group Supervision Control Indication message. If set to 0 Point Code Status is indicated via the Remote point Code Status Indication message. | | | | | | | | | | | | | | | | | | | | | |
| 6 | TUPF_ACR | Application Controlled Release. This bit should always be set to 1 for applications conforming to the call release procedures described in this manual. Earlier application versions will set this bit to zero. | | | | | | | | | | | | | | | | | | | | | |
| 7 | Reserved | Reserved for future use – must be set to 0 | | | | | | | | | | | | | | | | | | | | | |
| 8 | TUPF_PARAM | <p>Common Call user interface. This bit should be set for all new applications.</p> <p>This option should only be clear for use with existing applications requiring backward compatibility for certain affected parameters.</p> <p>Only the parameters shown below are affected. All parameters are accessible by using the Common Call Control Interface.</p> <p>The value of the parameter Identity in the V1 interface is given below along with the equivalent Common Call Control parameter.</p> <p>Values in decimal.</p> <table border="1"> <thead> <tr> <th>Mnemonic</th> <th>V1 value</th> <th>CC value</th> </tr> </thead> <tbody> <tr> <td>CALPPN_TUP_INFOI</td> <td>197</td> <td>205</td> </tr> <tr> <td>CALPPN_ITTI</td> <td>196</td> <td>204</td> </tr> <tr> <td>CALPPN_IAI_NAT</td> <td>195</td> <td>203</td> </tr> <tr> <td>CALPPN_CHRGINF</td> <td>194</td> <td>202</td> </tr> <tr> <td>CALPPN_ARTINF</td> <td>193</td> <td>201</td> </tr> <tr> <td>CALPPN_ACINF</td> <td>192</td> <td>200</td> </tr> </tbody> </table> | Mnemonic | V1 value | CC value | CALPPN_TUP_INFOI | 197 | 205 | CALPPN_ITTI | 196 | 204 | CALPPN_IAI_NAT | 195 | 203 | CALPPN_CHRGINF | 194 | 202 | CALPPN_ARTINF | 193 | 201 | CALPPN_ACINF | 192 | 200 |
| Mnemonic | V1 value | CC value | | | | | | | | | | | | | | | | | | | | | |
| CALPPN_TUP_INFOI | 197 | 205 | | | | | | | | | | | | | | | | | | | | | |
| CALPPN_ITTI | 196 | 204 | | | | | | | | | | | | | | | | | | | | | |
| CALPPN_IAI_NAT | 195 | 203 | | | | | | | | | | | | | | | | | | | | | |
| CALPPN_CHRGINF | 194 | 202 | | | | | | | | | | | | | | | | | | | | | |
| CALPPN_ARTINF | 193 | 201 | | | | | | | | | | | | | | | | | | | | | |
| CALPPN_ACINF | 192 | 200 | | | | | | | | | | | | | | | | | | | | | |
| 9 | TUPF_PC_SIZE | If this option is set to 1, the size of the point code used is determined at run-time for messages received from the MTP. (The label format is indicated in the id field of the MTP_TRANSFER_IND). If the option is set to 0, the point code size of a message received from the MTP is determined by the setting of the TUPF_24PC module option. Note: Currently, this option is not required and should be set to zero. | | | | | | | | | | | | | | | | | | | | | |
| 10 | TUPF_STD_MTYPE | <p>If set to 1 enable the application to use the same set of message type values that are used by other telephony protocols.</p> <p>This option should be used with all new applications.</p> <p>Note that the previous message type values are retained for backward compatibility</p> <table border="1"> <thead> <tr> <th>Previous message type</th> <th>Value</th> <th>New message type</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>TUP_MSG_STATUS</td> <td>0x07c9</td> <td>CAL_MSG_STATUS</td> <td>0x070e</td> </tr> <tr> <td>TUP_MSG_OVLD_REQ</td> <td>0x77c8</td> <td>CAL_MSG_OVLD_REQ</td> <td>0x770d</td> </tr> </tbody> </table> | Previous message type | Value | New message type | Value | TUP_MSG_STATUS | 0x07c9 | CAL_MSG_STATUS | 0x070e | TUP_MSG_OVLD_REQ | 0x77c8 | CAL_MSG_OVLD_REQ | 0x770d | | | | | | | | | |
| Previous message type | Value | New message type | Value | | | | | | | | | | | | | | | | | | | | |
| TUP_MSG_STATUS | 0x07c9 | CAL_MSG_STATUS | 0x070e | | | | | | | | | | | | | | | | | | | | |
| TUP_MSG_OVLD_REQ | 0x77c8 | CAL_MSG_OVLD_REQ | 0x770d | | | | | | | | | | | | | | | | | | | | |
| 11 – 14 | Reserved | Reserved for future use and must be set to zero. | | | | | | | | | | | | | | | | | | | | | |
| 15 | TUPF_NAI | Notify Application on Idle. If this is enabled a Release Confirmation primitive will always be sent to the user when the circuit becomes idle after call release. Should always be set in conjunction with TUPF_ACR. | | | | | | | | | | | | | | | | | | | | | |

max_sif

The maximum length Signaling Information Field permitted by the MTP. This should either be set to 62 or 272 depending on the MTP capabilities.

timer_res

The number of system ticks between timer expiry messages being issued to the TUP module. This should usually be configured so that a timer expiry message is sent to the TUP module every 100ms.

num_tscan

The number of timer expiry messages received for each full scan of the protocol timer table. This should usually be set to 10 so that each timer is checked once per second (or every 10 timer expiry messages).

num_grps

This limits the number of circuit groups that the module will maintain and must be less than (or equal to) the maximum number of circuit groups that the module is capable of supporting.

The TUP module continually scans all its circuit groups for protocol activity (such as timer expiry). The user may limit the number of circuit groups to the maximum that the application will use. This will exclude groups that will never be configured by the application from the circuit group processing that the TUP module performs.

num_ccts

This limits the number of circuits that the module will maintain and must be less than (or equal to) the maximum number of circuits that the module is capable of supporting.

The TUP module continually scans all its circuits for protocol activity (such as timer expiry). The user may limit the number of circuits to the maximum that the application will use. This will exclude circuits that will never be configured by the application from the circuit processing that the TUP module performs.

instance

This assigns the instance value for this invocation of the TUP module in replicated TUP operation.

ucic_id

Unrecognized CIC module id. Module id to which messages will be relayed if the TUPF_DUAL option bit is set and the circuit identity code in the message is not one handled by this TUP instance.

trace_id

Trace module id. Module id to which trace messages will be sent. If this parameter is not supplied (set to zero) trace messages will be sent to the management module id.

gap_msgs

In order to reduce traffic load when circuits are (un)blocked or reset by the user, the TUP module issues messages for **gap_msgs** circuits every **gap_tim** system ticks. (Only used when TUPGOP_NO_CGB or TUPGOP_NO_GRS options are selected). Recommended setting = 5.

gap_tim

The time in system ticks between issuing (un)blocking (or reset) messages for gap_msgs circuits when the user application requests (un)blocking (or reset) for a number of circuits. (Only used when TUPGOP_NO_CGB or TUPGOP_NO_GRS options are selected). Recommended setting = 1.

8.2 Configure Circuit Group Request

Synopsis:

This message is used to assign circuits to a circuit group and to configure the operating parameters for the circuit group.

Message Format:

| MESSAGE HEADER | | |
|-----------------|--------------------------------|---|
| Field Name | Meaning | |
| type | TUP_MSG_CNF_GRP (0x77c1) | |
| id | gid | |
| src | Sending module_id | |
| dst | TUP module ID | |
| rsp_req | used to request a confirmation | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 40 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | opc |
| 4 | 4 | dpc |
| 8 | 2 | base_cic – The first CIC in the circuit group |
| 10 | 2 | base_cid |
| 12 | 4 | cic_mask |
| 16 | 4 | options – Circuit group options. |
| 20 | 2 | Reserved – Must be set to 0 |
| 22 | 2 | tup_id – Module Id of TUP module managing this group |

| MESSAGE HEADER | | |
|----------------|---|--|
| 24 | 1 | user_id – Circuit group local user module id |
| 25 | 1 | user_inst – Circuit group user instance value |
| 26 | 1 | maint_id – Circuit group maintenance module id |
| 27 | 1 | maint_inst – Circuit group maintenance module instance value |
| 28 | 1 | cgsn_id – Circuit group supervision management module id. |
| 29 | 1 | cgsn_inst – Circuit group supervision management module instance value. |
| 30 | 1 | mtp_id – Circuit group MTP3 module id. |
| 31 | 1 | mtp_inst – Circuit group MTP3 module instance number. |
| 32 | 1 | sio – Circuit group sio |
| 33 | 1 | tim_tab_id –Timer table id for circuit group. |
| 34 | 6 | reserved for future use – must be set to 0 |

Description:

This message is used to configure a circuit group. Circuits must be assigned to a circuit group before they may be used for any call activity. This message may be used only once for each circuit group.

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the `rsp_req` field which will cause a confirmation message of the same format to be returned. The status field in this message is zero on success or an error code otherwise.

Parameter Description:**opc**

The originating point code to be used in all TUP messages issued for circuits in the circuit group. The `opc` will usually be set to the same value for all circuit groups in the module.

dpc

The destination point code is the point code of the signaling point at the remote end of the voice circuits in the circuit group.

base_cic

The circuit identification code of the first bit (bit 0) in the group `cic_mask`. This value must be agreed between administrations before configuring the module.

base_cid

The logical circuit Identifier used for the first bit (bit 0) in the group **cic_mask**. The Circuit Identifier is of local significance only. The user however must ensure that each cid is allocated to only one circuit group.

cic_mask

Each circuit group may contain up to 32 circuits. The circuits allocated to the circuit group are identified by setting bits in the **cic_mask**. The least significant bit (bit 0) corresponds to the first cic. Bit n in the **cic_mask** (if set) corresponds to circuit identification code = (**base_cic** + n) and circuit identifier = (**base_cid** + n). If the bit is not set then this cic and cid can instead be allocated to a different circuit group. Note that a single circuit group may not span more than 32 circuits.

options

The options field allows various run-time options as shown in the following table to be selected for the circuits in the circuit group.

| Bit | Mnemonic | Description |
|-------|-----------------|--|
| 0 | TUPGOP_RST_REQ | The circuit must be reset by the local user or from the remote signalling point before it is available for call traffic. |
| 1 – 2 | TUPGOP_OGC_PRI | Outgoing call priority set as follows: 0 – Incoming call priority on all circuits. 1 – Outgoing call priority on all circuits. 2 – Highest point code has priority on even cic's. 3 – Highest point code has priority on odd cic's |
| 3 | TUPGOP_OGC_COT | A continuity check is required on outgoing circuits. |
| 4 | TUPGOP_ACM_CTRL | If set to 1, timer T2 will be run while waiting address complete. |
| 5 | TUPGOP_ANS_CTRL | If set to 1, timer T100 will be run on outgoing calls while waiting for answer. |
| 6 | TUPGOP_ICC_CLI | Request calling line identity on incoming calls if not included in the initial address message. |
| 7 | TUPGOP_ICC_ECHO | Request outgoing half echo suppresser on incoming calls if not indicated in the initial address message. |
| 8 | TUPGOP_ICC_OCN | Request the original called number on re-directed incoming calls if not provided in the initial address message. |
| 9 | TUPGOP_ICC_ST | Generate and send a ST (end of dialling) address signal to the user during incoming call setup after a period of T103 after the last address signal has been received, if no ST digit was included. |
| 10 | TUPGOP_NIAI_CLI | Do not request calling line identity in GRQ if IAI message received. |
| 11 | TUPGOP_OGC_UGRQ | User controls GSM/GRQ message for calling line identity requests & calling party category requests. |
| 12 | TUPGOP_SSUTR2 | French TUP – If set to 1, enable protocol extensions for France Telecom SSUTR2 VN5 on this circuit group. |

| | | |
|----|-----------------|---|
| 13 | TUPGOP_SAM_TIM | When set the TUP module will use the Subsequent Address timer T112. |
| 14 | TUPGOP_RESP_TIM | When set the TUP module will use the Backward response timer T113. |
| 15 | Reserved | Reserved. Must be set to 0. |
| 16 | TUPGOP_CLF_TIM | When set the TUP module will use the waiting for Clear Forward timer T114. |
| 17 | TUPGOP_NO_CGB | When set group blocking or unblocking messages will not be used. Individual BLO and UBL messages will be used instead. |
| 18 | TUPGOP_NO_GRS | When set group reset messages will not be used when resetting circuits in this group. Individual RSC messages will be used instead. May only be set if NO_CGB is also set. |
| 19 | TUPGOP_GRS_GRP | Group reset and group reset acknowledgement messages sent for this circuit group use the alternate format described in Q.723. The range is set to zero and the CIC is a representative CIC for the group. The message applies to all circuits in the group. Note: both local and remote TUP modules must be assigned the same circuit grouping for group reset messages conforming to Q.723. |
| 20 | TUPGOP_24PC | This option is for future use. It should be set to zero. |
| 21 | TUPGOP_CHN | This bit should be set to 1 to enable the China specification or left at 0 for Blue Book operation. |
| 22 | TUPGOP_ZCAD | If set to 1, TUP interprets a zero in the number of digits in the IAM message called address field as zero digits in the address. If set to 0 (Blue Book operation) TUP interprets a zero in the number of digits in the IAM message as meaning that there are 16 called address digits. |
| 23 | TUPGOP_UBA_IAM | When the option is set, an IAM received while awaiting UBA will cause the circuit to be reset. This option should be set when configuring the module for SSUTR2. |
| 24 | TUPGOP_TST_IRR | When the option is set, an unrecognised message or a message received in a wrong state during test call set up will not cause the circuit to be reset. This option should be set when configuring the module for SSUTR2. Note: For non-SSUTR2 specifications, messages with unrecognised header codes are ignored and therefore the option does not apply. |
| 25 | TUPGOP_IEO_CTRL | When the option is set, the [Domaine d'information d'accès] is mapped into the Access Transport parameter and vice versa. The User service information and User to user information parameters should not be used, otherwise they will be discarded. This allows the information to be passed transparently to and from the access. |

| | | |
|-------|----------------|---|
| 26 | TUPGOP_CCC_CHG | <p>This option allows selection of the BCI coding format. It affects the charge/no charge coding format.</p> <p>When the option is set, the BCI is considered as being coded according to the common call control format. If the option is not set, the BCI is coded according to the TUP standard:</p> <p>bits B A Charge indicator</p> <p>0 0 no indication</p> <p>0 1 charge</p> <p>1 0 no charge</p> <p>1 1 no indication</p> <p>This bit should be set for all new applications.</p> |
| 27 | TUPGOP_CCL | <p>If set to 1, a Calling party clear indication is issued to the user instead of a Release Indication.</p> |
| 28-31 | Reserved | <p>Reserved for future use and must be set to zero.</p> |

tup_id

Module Id of TUP module managing this circuit group.

user_id

Circuit group local user module id. All messages sent to the user by the TUP module for calls in this circuit group will be sent to this user id. This will default to the used _id supplied in the module configuration message if not supplied.

user_inst

Circuit group user instance value. All messages sent to the user by the TUP module for calls in this circuit group will be sent to this user instance.

maint_id

Circuit group maintenance module id. This will default to the id supplied in the module configuration message if not supplied.

maint_inst

Circuit group maintenance module instance value

cgsms_id

Circuit group supervision management module id. All messages sent to the circuit group supervision module by the TUP module for calls in this circuit group will be sent to this user instance This will default to the id supplied in the module configuration message if not supplied.

cgsms_inst

Circuit group supervision management module instance value. All messages sent to the circuit group supervision module by the TUP module for calls in this circuit group will be sent to this user instance.

mtp_id

The module_id of the module to which all MTP-TRANSFER-REQ messages are sent. If this field is set to zero for backwards compatibility with previous releases of software, then TUP will use the mtp_id supplied in the per-module configuration message and force mtp_inst to zero.

mtp_inst

The instance number used in messages sent to the mtp_id module.

sio

The value to be used for the Service Indicator Octet in messages issued to the MTP for the group being configured, instead of the sio provided in the module configuration message.

If this field is set to zero (for backwards compatibility with previous releases of TUP software), the TUP will use the sio supplied in the per module configuration message.

tim_tab_id

The id of the timer table to be used for circuits in this group

8.3 Change Configure Circuit Group Request

Synopsis:

This message is used to change certain parameters relating to a configured circuit group.

Message Format:

| MESSAGE HEADER | | |
|----------------|--------------------------------|--|
| Field Name | Meaning | |
| type | TUP_MSG_CNG_GRP (0x7d12) | |
| id | Gid | |
| src | Sending module_id | |
| dst | TUP module ID | |
| rsp_req | used to request a confirmation | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 10 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | cgsm_id – Circuit group supervision management module id. |
| 1 | 1 | cgsm_inst – Circuit group supervision management module instance value. |
| 2 | 1 | user_id – Circuit group local user module id |
| 3 | 1 | user_inst – Circuit group user instance value |
| 4 | 1 | maint_id – Circuit group maintenance module id |
| 5 | 1 | maint_inst – Circuit group maintenance module instance value |
| 6 | 4 | Reserved – must be set to zero |

Description:

This message is used to specify new values for the circuit group supervision, user and maintenance modules and their instances for a configured circuit group.

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the `rsp_req` field which will cause a confirmation message of the same format to be returned. The status field in this message is zero on success or an error code otherwise.

Parameter Description:

cgsm_id

Circuit group supervision management module id. All messages sent to the circuit group supervision module by the TUP module for calls in this circuit group will be sent to this user instance

cgsm_inst

Circuit group supervision management module instance value. All messages sent to the circuit group supervision module by the TUP module for calls in this circuit group will be sent to this user instance.

user_id

Circuit group local user module id. All messages sent to the user by the TUP module for calls in this circuit group will be sent to this user id.

user_inst

Circuit group user instance value. All messages sent to the user by the TUP module for calls in this circuit group will be sent to this user instance.

maint_id

Circuit group maintenance module id.

maint_inst

Circuit group maintenance module instance value

8.4 Configure Timers Request

Synopsis:

Message used to configure the TUP module timer values.

Message Format:

| MESSAGE HEADER | | |
|----------------|--------------------------------|--|
| Field Name | Meaning | |
| type | TUP_MSG_CNF_TIM (0x77c3) | |
| id | tim_tab_id | |
| src | Sending module_id | |
| dst | TUP module ID | |
| rsp_req | used to request a confirmation | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 120 (or zero, see below) | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | tim_ver – must be set to zero |
| 1 | 1 | Reserved for future use, must be set to zero |
| 2 | 2 | T1 – protocol timer T1 value |
| 4 | 2 | T2 – protocol timer T2 value |
| 6 | 2 | T3 – protocol timer T3 value |
| 8 | 2 | T4 – protocol timer T4 value |
| 10 | 2 | T5 – protocol timer T5 value |
| 12 | 2 | T6 – protocol timer T6 value |
| 14 | 2 | T7 – protocol timer T7 value |
| 16 | 2 | T8 – protocol timer T8 value |
| 18 | 2 | T9 – protocol timer T9 value |
| 20 | 2 | T10 – protocol timer T10 value |
| 22 | 2 | T11- protocol timer T11 value |
| 24 | 2 | T12 – protocol timer T12 value |
| 26 | 2 | T13 – protocol timer T13 value |
| 28 | 2 | T14 – protocol timer T14 value |
| 30 | 2 | T15 – protocol timer T15 value |
| 32 | 2 | T16 – protocol timer T16 value |

| MESSAGE HEADER | | |
|----------------|---|---|
| 34 | 2 | T17 – protocol timer T17 value |
| 36 | 2 | T18 – protocol timer T18 value |
| 38 | 2 | T19 – protocol timer T19 value |
| 40 | 2 | T20 – protocol timer T20 value |
| 42 | 2 | T21 – protocol timer T21 value |
| 44 | 2 | T22 – protocol timer T22 value |
| 46 | 2 | T23 – protocol timer T23 value |
| 48 | 2 | T24 – protocol timer T24 value |
| 50 | 2 | T25 – protocol timer T25 value |
| 52 | 2 | T26 – protocol timer T26 value |
| 54 | 2 | T27 – protocol timer T27 value |
| 56 | 2 | T28 – protocol timer T28 value |
| 58 | 2 | T29 – protocol timer T29 value |
| 60 | 2 | T30 – protocol timer T30 value |
| 62 | 2 | T31 – protocol timer T31 value |
| 64 | 2 | T32 – protocol timer T32 value |
| 66 | 2 | T33 – protocol timer T33 value |
| 68 | 2 | T34 – protocol timer T34 value |
| 70 | 2 | T35 – protocol timer T35 value |
| 72 | 2 | T36 – protocol timer T36 value |
| 74 | 2 | T37 – protocol timer T37 value |
| 76 | 2 | T38 – protocol timer T38 value |
| 78 | 2 | T39 – protocol timer T39 value |
| 80 | 2 | T40 – protocol timer T40 value |
| 82 | 2 | T41 – protocol timer T41 value |
| 84 | 2 | T100 – timer T100 value |
| 86 | 2 | Reserved |
| 88 | 2 | T101 – timer T101 value |
| 90 | 2 | T102 – timer T102 value |
| 92 | 2 | T103 – timer T103 value |
| 94 | 2 | T104 – timer T104 value (resolution in ticks) |
| 96 | 2 | T105 – timer T105 value (resolution in ticks) |
| 98 | 2 | T106 – timer T106 value (resolution in ticks) |
| 100 | 6 | reserved for future use – must be set to 0 |
| 106 | 2 | T110 – timer T110 value |
| 108 | 2 | T111 – timer T111 value |

| MESSAGE HEADER | | |
|----------------|---|-------------------------|
| 110 | 2 | T112 – timer T112 value |
| 112 | 2 | T113 – timer T113 value |
| 114 | 2 | T114 – timer T114 value |
| 116 | 2 | T115 – timer T115 value |
| 118 | 2 | T116 – timer T116 value |

Description:

This message is used to configure the TUP protocol timers. The message can be issued at any time after the TUP_MSG_CONFIG message. Timer values are in multiples of the TUP timer tick period that should usually be 100ms. The new timer value takes effect when the timer is next started.

The maximum timer value is 1023s for timers defined in second or 1023 ticks for timers defined in ticks. The timers may be set to their default values (shown in the following table which assumes a tick period of 100ms) by sending a message with the parameter length set to zero.

The id field is used to select the timer table to be configured. Up to four timer tables (numbered 0, 1, 2, and 3) can be supported. Note that the signaling point timers always use table 0.

| Timer | Description | Default (seconds) |
|-------|--|-------------------|
| T1 | Waiting for continuity | 10 |
| T2 | Waiting for address complete | 25 |
| T3 | Waiting for CLF after sending a UBM | 10 |
| T4 | Waiting for CLF after sending CFL | 10 |
| T5 | Stop sending CFL timeout | 60 |
| T6 | Waiting for RLG | 10 |
| T7 | Stop sending CLF | 60 |
| T8 | Waiting for backward check tone | 2 |
| T9 | Delay to start first time continuity check | 5 |
| T10 | Delay for multiple continuity re-test | 120 |
| T11 | Delay to alert maintenance on M-blocking | 300 |
| T12 | Waiting for BLA | 15 |
| T13 | Waiting to alert maintenance on failure to receive BLA | 60 |
| T14 | Delay to repeat sending of BLO | 60 |
| T15 | Waiting for UBA | 10 |
| T16 | Waiting to alert maintenance on failure to receive UBA | 60 |
| T17 | Delay to repeat sending of UBL | 60 |
| T18 | Waiting for reset circuit response | 10 |
| T19 | Delay to send reset circuit | 60 |

| | | |
|------|--|--------|
| T20 | Waiting for second group reset message | 5 |
| T21 | Waiting for group reset acknowledgement | 10 |
| T22 | Delay to send circuit group reset | 60 |
| T23 | Waiting for second maintenance group blocking message | 5 |
| T24 | Waiting for second maintenance group unblocking message | 5 |
| T25 | Waiting to alert maintenance on initiation of maintenance blocking | 300 |
| T26 | Waiting for maintenance group blocking acknowledgement | 10 |
| T27 | Delay to send maintenance group blocking message | 60 |
| T28 | Waiting for maintenance group unblocking acknowledgement | 10 |
| T29 | Delay to send maintenance group unblocking message | 60 |
| T30 | Waiting for second hardware failure group blocking message | 5 |
| T31 | Waiting for second hardware failure group unblocking message | 5 |
| T32 | Waiting for hardware failure blocking acknowledgement message | 10 |
| T33 | Delay to send hardware failure group blocking message | 60 |
| T34 | Waiting for hardware failure unblocking acknowledgement message | 10 |
| T35 | Delay to send hardware failure group blocking message | 60 |
| T36 | Waiting for second software failure group blocking message | 5 |
| T37 | Waiting for second software failure group unblocking message | 5 |
| T38 | Waiting for software failure blocking acknowledgement message | 10 |
| T39 | Delay to send software failure group blocking message | 60 |
| T40 | Waiting for software failure unblocking acknowledgement message | 10 |
| T41 | Delay to send software failure group blocking message | 60 |
| T100 | Outgoing calls waiting for answer | 180 |
| T101 | Waiting to release incoming circuit | 0 |
| T102 | Waiting to release outgoing circuit | 0 |
| T103 | Waiting to generate ST during incoming call setup | 5 |
| T104 | remote automatic congestion control abatement | 5000ms |
| T105 | MTP congestion timer Tue1 | 500ms |
| T106 | MTP congestion timer Tue2 | 8000ms |
| T110 | Waiting for Maintenance Blocking or unblocking acknowledgements when Group blocking not used | 5 |
| T111 | Waiting for Software Blocking or unblocking acknowledgements when Group blocking not used | 5 |
| T112 | Waiting for SAM | 15 |
| T113 | Waiting for backward response | 24 |
| T114 | Waiting for CLF after CBK | 40 |
| T115 | Waiting for Hardware Blocking or unblocking acknowledgements when Group blocking not used | 5 |
| T116 | Waiting for Reset acknowledgements when Group reset not used | 5 |

Note: The use of Tue1 and Tue2 is described in ITU-T Blue Book Recommendation Q.724§13.2.2.

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the **rsp_req** field, which will cause a confirmation message of the same format to be returned. The **status** field in this message is zero on success or an error code otherwise.

Implementation specific timers

The following specific timers are implemented for various reasons such as:

- dealing with the communication between TUP module and the application (e.g., T101);
- providing flexibility in the way TUP module operates (e.g., T106);
- supporting national TUP variants (e.g., T113 for SSUTR2).

T100

This timer may be run as a circuit group option on outgoing calls while waiting for answer. If no answer message is received from the called party within T100, a clear forward (CLF) will be sent to clear the connection.

T101

The use of timer T101 is controlled by the Application Controlled Release (TUPF_ACR) option.

Configuration option TUPF_ACR should be selected for all new applications.

Timer T101 is not used if the TUPF_ACR option is selected.

If the TUPF_ACR option is not selected the TUP module will automatically release an incoming call in response to a CLF (clear forwards) received from the network. If T101 is configured with a zero duration a Release Guard (RLG) is sent to the network immediately.

T101 has a default duration of zero. If the user wishes to have control of this RLG message without using the TUPF_ACR option, timer T101 may be set non zero. T101 will then be run after CLF has been received. During this period, the user may issue a Release Response primitive to indicate that the incoming connection has been cleared. If T101 expires, RLG will be issued to the network.

T102

Timer T102 is the re-answer timer. Used on outgoing calls when the remote called party clears the call. It provides a period during which the called party may re-answer. It has two modes of operation based on the setting of the Application Controlled Release option (TUPF_ACR).

Configuration option TUPF_ACR should be selected for all new applications.

If TUPF_ACR is selected:

Timer T102 is started when the network indicates called party clear down by sending the CBK message. A Suspend Indication primitive is sent to the user. If timer T102 subsequently expires a Release Indication primitive is sent to the user. The user is then required to send a Release Response primitive to initiate forward release of the call as normal. The called party may re-answer at any time until this Release Indication primitive is sent to the user. If T102 is set to 0 (zero duration), T102 is given a default duration equal to the setting value of T6 plus 2 seconds.

If TUPF_ACR is not selected:

Timer T102 is started when the network indicates called party clear down by sending the CBK message. A Suspend Indication primitive is sent to the user. If the T102 timer subsequently expires, TUP module automatically initiates the connection release by sending CLF to the network. During the T102 period, the user may release the call using the Release Request primitive or the called party may re-answer. If T102 is set to 0 (zero duration), the call is released immediately and no re-answer is possible.

T103

T103 may be run (as a circuit group option) during the call setup phase of an incoming call. If no ST digit (end of dialing) has been received on T103 expiry, an ST digit will be generated locally and sent to the user (in a forwards information indication primitive). This operation is local only and does not cause any signals to be sent to the network.

T104

This is the period between reducing the stored congestion level of a remote signaling point by one level. Remote signaling point congestion is indicated by the receipt of an ACC (automatic congestion control) message from the network. The user is informed of the congestion status of a remote signaling point with the CAL_MSG_STATUS_IND message or CAL_MSG_CGSC_IND depending on the setting of option TUPF_GSPS in the module configuration message.

T105

This timer implements the TUP signaling congestion control timer Tue1. It is started on receipt of a congestion primitive from the MTP and causes any further received congestion primitives to be ignored for the time that it is active. The user is informed of the signaling congestion status with the CAL_MSG_STATUS_IND message or CAL_MSG_CGSC_IND depending on the setting of option TUPF_GSPS in the module configuration message.

T106

This timer implements the TUP signaling congestion control timer Tue2. It is the period between reducing the signaling congestion level by one step after the last congestion primitive has been received from the MTP.

T110

This timer is started when all the individual Maintenance blocking (or unblocking) messages have been sent out. On expiry, a Maintenance blocking (or unblocking) confirmation is sent to the user for those circuits for which a BLA has been received.

(Only used when TUPGOP_NO_CGB option is set.)

T111

This timer is started when all the individual Software blocking (or unblocking) messages have been sent out. On expiry, a Software blocking (or unblocking) confirmation is sent to the user for those circuits for which a BLA has been received.

(Only used when TUPGOP_NO_CGB option is set.)

T112

This timer is started after reception of an Initial Address message. A call failure message will be sent if the Initial Address is not followed by a Subsequent Address message. The timer is not re-started after receipt of the first Subsequent Address message.

(Only used when circuit group option TUPGOP_SAM_TIM is set.)

T113

This timer is started on receipt of an Initial Address message. The call will be released if no backward message is received after the outgoing Initial Address message.

(Only used when circuit group option TUPGOP_RESP_TIM is set.)

T114

This timer is started after transmission of clear back message on an incoming call. A call fail message is sent if this timer expires before a clear forward is received in reply.

(Only used when circuit group option TUPGOP_CLF_TIM is set.)

T115

This timer is started when all the individual Hardware blocking (or unblocking) messages have been sent out. On expiry, a Hardware blocking (or unblocking) confirmation is sent to the user for those circuits for which a BLA has been received. (Only used when TUPGOP_NO_CGB option is set.)

T116

This timer is started when all the individual Reset messages have been sent out. On expiry, a Reset confirmation is sent to the user for those circuits for which a RLG has been received. (Only used when TUPGOP_NO_GRS option is set.)

8.5 End Circuit Group Request

Synopsis:

This message is used to end a circuit group (and all the circuits in that group). It allows the user to add and remove circuit groups dynamically at run time.

Message Format:

| MESSAGE HEADER | |
|-----------------|--|
| Field Name | Meaning |
| type | TUP_MSG_END_GRP (0x77c2) |
| id | gid |
| src | Originating module_id |
| dst | TUP module ID |
| rsp_req | Sending layer's bit set if confirmation required |
| class | 0 |
| status | 0 |
| err_info | 0 |
| len | 0 |

8.6 Read TUP RAM Request

Synopsis:

Message used for diagnostic purposes to return the address of the TUP modules internal data storage area.

Message Format:

| MESSAGE HEADER | | |
|----------------|---------------------------------|--|
| Field Name | Meaning | |
| type | TUP_MSG_R_RAM (0x67c4) | |
| id | 0 | |
| src | Sending module_id | |
| dst | TUP_TASK_ID | |
| rsp_req | Sending layer's bit must be set | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 4 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | Base address of TUP module's global RAM structure written by TUP module in response message. |

Description:

This message is provided solely for diagnostic purposes to allow the user to locate the base address of the TUP modules internal data structure.

Confirmation Message:

The module sending the message must set the sending layer's bit in the **rsp_req** field to cause a confirmation message containing the address to be returned.

8.7 Read Circuit Group Request

Synopsis:

Message used for diagnostic purposes to return the address of a circuit group structure in the TUP module.

Message Format:

| MESSAGE HEADER | | |
|----------------|---------------------------------|---|
| Field Name | Meaning | |
| type | TUP_MSG_R_GRP (0x67c5) | |
| id | gid | |
| src | Sending module_id | |
| dst | TUP_TASK_ID | |
| rsp_req | Sending layer's bit must be set | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 4 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | Base address of circuit group resource structure written by TUP module in response message. |

Description:

This message is provided solely for diagnostic purposes to allow the user to locate internal data structures within the TUP module.

Confirmation Message:

The module sending the message must set the sending layer's bit in the **rsp_req** field to cause a confirmation message containing the address to be returned.

8.8 Read Circuit Request

Synopsis:

Message used for diagnostic purposes to return the address of a circuit structure in the TUP module.

Message Format:

| MESSAGE HEADER | | |
|----------------|---------------------------------|---|
| Field Name | Meaning | |
| type | TUP_MSG_R_CCT (0x67c6) | |
| id | cid | |
| src | Sending module_id | |
| dst | TUP_TASK_ID | |
| rsp_req | Sending layer's bit must be set | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 4 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | Base address of circuit resource structure written by TUP module in response message. |

Description:

This message is provided solely for diagnostic purposes to allow the user to locate internal data structures within the TUP module.

Confirmation Message:

The module sending the message must set the sending layer's bit in the **rsp_req** field to cause a confirmation message containing the address to be returned.

8.9 Read Revision Request

Synopsis:

Message used to request the module type and software revision number.

Message Format:

| MESSAGE HEADER | | |
|----------------|---------------------------------|--|
| Field Name | Meaning | |
| type | GEN_MSG_MOD_IDENT (0x6111) | |
| id | 0 | |
| src | Originating module ID | |
| dst | TUP module ID | |
| rsp_req | Sending layer's bit must be set | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 28 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 2 | type Currently undefined. |
| 2 | 1 | maj_rev Major version number |
| 3 | 1 | min_rev Minor version number |
| 4 | 24 | Text Null terminated string giving textual module identity |

Description:

This message is provided to request the software version used for the TUP module.

On receipt of this request, the TUP module returns the message with status "SUCCESS" to the sender including the information requested.

8.10 Set Trace Mask Request

Synopsis:

Message issued to set the TUP module's event masks for tracing messages.

Message Format:

| MESSAGE HEADER | | |
|----------------|--------------------------------|--|
| Field Name | Meaning | |
| type | TUP_MSG_TRACE_MASK (0x57ce) | |
| id | 0 | |
| src | Sending module id | |
| dst | TUP module ID | |
| rsp_req | used to request a confirmation | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 12 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | op_evt_mask - Output event trace mask |
| 4 | 4 | ip_evt_mask - Input event trace mask |
| 8 | 4 | mng_evt_mask - Management event trace mask |

Description:

Message issued to set the TUP module event masks for tracing input, output and management messages to the trace module on a per primitive basis and tracing non-primitive events on a per-event basis. The fields in the masks are defined below.

Parameter Description:**op_evt_mask**

The output event trace mask. This is a 32 bit value with bits set to 1 to cause a trace message to be sent to the trace module whenever a message is issued by TUP for the events indicated:

| Bit | Mnemonic | Description |
|-------|------------------------|--|
| 0 | TUP_EVT_MSG_RX_IND | Protocol primitive sent to user. |
| 1 | TUP_EVT_API_TX_REQ | Protocol message sent to network |
| 2 | TUP_EVT_TFRAME_TX_REQ | Protocol T frame sent to network. |
| 3 | TUP_EVT_MSG_CGSC_IND | Circuit group event indication to user |
| 4 | TUP_EVT_MSG_CGSC_CONF | Circuit group event confirmation to user |
| 5 | TUP_EVT_MSG_SDL_SIG | Circuit group event to remote TUP |
| 6 | TUP_EVT_MSG_STATUS | Remote SP status ind to user |
| 7 | TUP_EVT_REPLICATE_SPRC | Message received from network with unrecognised cic forwarded to replicated TUP |
| 8 | TUP_EVT_REMOTE_SPRC | Message received from network with cic managed by remote TUP forwarded to remote TUP |
| 9 | TUP_EVT_MSG_MAINT_IND | Maintenance event ind to user |
| 10 | TUP_EVT_MSG_ERROR_IND | Error event ind to user |
| 11-31 | Reserved | Reserved - Should be set to zero |

ip_evt_mask

The input event trace mask. This is a 32 bit value with bits set to 1 to cause a trace message to be sent to the trace module whenever a message is issued by TUP for the events indicated:

| Bit | Mnemonic | Description |
|------|------------------------|--|
| 0 | TUP_EVT_MSG_TX_REQ | Protocol primitive received from user |
| 1 | TUP_EVT_API_RX_IND | Protocol message received from network |
| 2 | TUP_EVT_RFRAME_RX_IND | Protocol R-frame received from network |
| 3 | TUP_EVT_MTP_PAUSE | MTP Pause indication received |
| 4 | TUP_EVT_MTP_RESUME | MTP Resume indication received |
| 5 | TUP_EVT_MTP_STATUS | MTP Status indication received |
| 6 | TUP_EVT_RX_UNSUPPORTED | Unsupported message received |
| 7-31 | Reserved | Reserved - Should be set to zero |

mng_evt_mask

The management event trace mask. This is a 32 bit value with bits set to 1 to cause a trace message to be sent to the trace module whenever a message is issued by TUP for the events indicated:

| Bit | Mnemonic | Description |
|--------|-------------------------|--|
| 0 | TUP_EVT_MSG_SET_TIMER | Set individual timer message received from the user |
| 1 | TUP_EVT_MSG_CNF_TIM | Timer Configuration message received from the user |
| 2 | TUP_EVT_MSG_CNF_GRP | Configure circuit group message received from the user |
| 3 | TUP_EVT_MSG_END_GRP | End circuit group message received from the user |
| 4 | TUP_EVT_MSG_CGSC_REQ | Circuit group supervision message received from the user |
| 5 | TUP_EVT_MSG_OVLD_REQ | Local system overload message received from the user |
| 6 | TUP_EVT_MSG_R_RAM | Read RAM base address message received from the user |
| 7 | TUP_EVT_MSG_R_GRP | Read circuit group base address message received from the user |
| 8 | TUP_EVT_MSG_R_CCT | Read circuit base address message received from the user |
| 9 | TUP_EVT_MSG_R_STATUS | Read circuit status message received from the user |
| 10 | TUP_EVT_MSG_MOD_IDENT | Read module revision message received from the user |
| 11 | TUP_EVT_RX_MSG_SDL_SIG | Management message received from remote TUP |
| 12 | TUP_EVT_MSG_TRACE_MASK | Set trace mask message from user |
| 13 | TUP_EVT_MSG_SELTRC_MASK | Set selective trace mask message received from the user |
| 14 | TUP_EVT_MSG_CNG_GRP | Change circuit group configuration request message from user |
| 15 | TUP_EVT_MSG_R_DATA | Read circuit group data message from user |
| 16 | TUP_EVT_MSG_R_GRPID | Read circuit group id message from user |
| 17- 31 | Reserved | Reserved - Should be set to zero |

8.11 Set Selective Trace Mask Request

Synopsis:

Enables extra information to be reported along with selected software and maintenance events for debug purposes.

Message Format:

| MESSAGE HEADER | | |
|----------------|----------------------------------|---|
| Field Name | Meaning | |
| type | TUP_MSG_S_SELTRACE_MASK (0x5d10) | |
| id | 0 | |
| src | Sending module id | |
| dst | TUP module ID | |
| rsp_req | used to request a confirmation | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 9 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 9 | mask - Bits set to indicate selective trace events which should be active |

Description:

Sends a mask indicating which selective trace events should be active to the TUP module. No selective trace events are active when the module is initialized. This message can be used to turn on some or all selective trace events or turn them back off again. The message may be sent at any time after the initial per-module configuration message has been sent to the TUP module.

mask

A bit mask indicating the selective trace events which are active. A "1" indicates that an event is active and a "0" indicates that it is not active. The first octet sent is for selective trace event codes 0-7, the second octet for selective trace event codes 8-15, etc. See the description of the Selective Trace Event Indication for a list of the events that may be traced.

8.12 Read Circuit Group Circuit Status Request

Synopsis:

Message used to read the state of each circuit in the circuit group held by the TUP module.

Message Format:

| MESSAGE HEADER | | |
|----------------|---------------------------------|--|
| Field Name | Meaning | |
| type | TUP_MSG_R_STATUS (0x67cf) | |
| id | gid | |
| src | Sending module_id | |
| dst | TUP module ID | |
| rsp_req | Sending layer's bit must be set | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 68 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | cic_mask – mask indicating the circuits in the circuit group for which the state is required. |
| 4 | 64 | circuit_states |

Description:

This message allows the user to read the state of each circuit in the given circuit group.

cic_mask

A 32 bit mask indicating to which of the circuits in the circuit group the message applies. A "1" set in bit n ($0 < n < 31$) indicates that the message applies to circuit n.

circuit_states

This parameter consists of 32 times 16-bit values. Each circuit state is represented by one 16-bit value.

For each 16-bit value field, the most significant octet is the circuit state indicator value detailed below.

Circuit state indicator values are specified in Q.763 3.12. Those used in the TUP are:

| Mnemonic | Value | Description |
|--------------------|-------|--|
| TUP_CSI_TRANSIENT | 0x00 | The circuit is in a transient Maintenance State. For example, a blocking message has been sent and no acknowledgement has yet been received. |
| TUP_CSI_UNEQUIPPED | 0x03 | The circuit does not belong to a group. |
| TUP_CSI_CPC_IDLE | 0x0c | Circuit Idle |
| TUP_CSI_CPC_ICC | 0x04 | Incoming call |
| TUP_CSI_CPC_OGC | 0x08 | Outgoing call |
| TUP_CSI_LOC_M_BLKD | 0x01 | Circuit locally maintenance blocked |
| TUP_CSI_REM_M_BLKD | 0x02 | Circuit remotely maintenance blocked |
| TUP_CSI_LOC_H_BLKD | 0x10 | Circuit locally hardware blocked |
| TUP_CSI_REM_H_BLKD | 0x20 | Circuit remotely blocked |

The least significant octet of the 16-bit circuit states parameter gives the internal current circuit state value of the CPC state machine. The internal circuit states are currently as follows:

| Value | State |
|-------|--|
| 0x01 | Incoming call waiting for continuity |
| 0x02 | Incoming call waiting for ACM |
| 0x03 | waiting for ANS |
| 0x04 | Incoming call in ANSWERED state |
| 0x05 | Incoming call waiting for the application to release |
| 0x06 | Incoming call waiting for CLF |
| 0x07 | Incoming call waiting for RLG |
| 0x08 | Incoming call waiting for BLA during release of a call on a locally blocked circuit |
| 0x20 | Circuit must be reset before it may be used – applicable when the circuit group is configured with the TUPGOP_RST_REQ option set |
| 0x22 | Waiting for GRA after sending GRS |
| 0x23 | Waiting for RLG after sending RSC |
| 0x40 | Idle |
| 0x46 | Waiting for the application to release during normal call release |
| 0x4a | Locally auto-blocked |
| 0x4b | Waiting for the application to release when outgoing call is rejected |
| 0x81 | outgoing call waiting for continuity |
| 0x82 | outgoing call waiting for ACM |
| 0x83 | outgoing call waiting for ANS |
| 0x84 | outgoing call in ANSWERED state |
| 0x85 | outgoing call in SUSPENDED state |

| | |
|------|--|
| 0x86 | outgoing call waiting for RLG |
| 0x87 | outgoing call waiting for the application to release |
| 0x88 | outgoing call waiting for Reset completion |
| 0x89 | outgoing call waiting for BLA during release of a call on a locally blocked circuit |
| 0xc1 | Waiting for CCR during an incoming continuity test call |
| 0xc2 | Waiting for CLF during an incoming continuity test call |
| 0xc3 | Waiting for the application to release during an incoming continuity test call |
| 0xc4 | Waiting for BLA (during release of a maintenance blocked circuit for an incoming continuity test call) |
| 0xe1 | Waiting for continuity recheck to be initiated by application |
| 0xe2 | Outgoing continuity test call waiting for backward check tone |
| 0xe3 | Outgoing continuity test call waiting for RLG |
| 0xe4 | Outgoing continuity test call waiting for reset to complete |

Confirmation Message:

The module sending the message must set the sending layer's bit in the `rsp_req` field to cause a confirmation message containing the status to be returned.

8.13 Read Circuit Group Data Request

Synopsis:

Message used to request the data for a specific circuit group.

Message Format:

| MESSAGE HEADER | | |
|----------------|---|---|
| Field Name | Meaning | |
| type | TUP_MSG_R_GRP_DATA (0x6d13) | |
| id | gid | |
| src | Sending module_id | |
| dst | TUP module ID | |
| rsp_req | Sending layer's bit must be set | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | Refer to section 8.2, Configure Circuit Group Request for details | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | Refer to section 8.2 for details | Refer to section 8.2, Configure Circuit Group Request for details |

Description:

This message allows the user to read the data for a given circuit group.

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the **rsp_req** field which will cause a confirmation message of *exactly* the same format as the 8.2, [Configure Circuit Group Request](#) (TUP_MSG_CNF_GRP) to be returned. The **status** field in this message is zero on success or an error code otherwise.

8.14 Read Circuit Group Identity Request

Synopsis:

Message used to request the indication of configured (active) circuit groups.

Message Format:

| MESSAGE HEADER | | |
|----------------|---------------------------------|----------|
| Field Name | Meaning | |
| Type | TUP_MSG_R_GRPID (0x6d11) | |
| Id | base gid | |
| Src | Sending module_id | |
| Dst | TUP module ID | |
| rsp_req | Sending layer's bit must be set | |
| Class | 0 | |
| Status | 0 | |
| err_info | 0 | |
| Len | User defined | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | User defined | gid mask |

Description:

This message allows the user to read all the configured circuit group ids for the TUP module from a specified circuit group id.

Confirmation Message:

The module sending the message can optionally request that a confirmation is returned by the TUP module when the message has been processed. This is achieved by setting the sending layer's bit in the **rsp_req** field which will cause a confirmation message with an indication of which circuit groups are active (configured) in TUP. The information provided will be a bit mask of groups. The **status** field in this message is zero on success or an error code otherwise.

Parameter Description:**base gid**

The group number from which the TUP module will start searching for groups.

len

The number of bytes of information to be requested; e.g. if the group id is 1 and the length is 4 this will request whether groups 1-32 are configured or not:

gid mask

A mask of configured circuit groups where a bit's position corresponds to a circuit group id offset from the **base gid** and it's value will indicate whether the corresponding circuit group has been configured in TUP or not. If the bit is set, this indicates that the corresponding circuit group is configured.

8.15 Maintenance Event Indication

Synopsis:

Message used by TUP to indicate a protocol related event to the local maintenance module.

Message Format:

| MESSAGE HEADER | | |
|----------------|------------------------------------|---|
| Field Name | Meaning | |
| type | TUP_MSG_MAINT_IND (0x07ca) | |
| id | See below | |
| src | TUP_TASK_ID | |
| dst | Maintenance module id | |
| rsp_req | Sending layer's bit must be set | |
| class | 0 | |
| status | Maintenance event code (see below) | |
| err_info | 0 | |
| reserved | 0 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | len | cic_mask – present for those maintenance events for which the id field contains the gid |

Description:

This message is used by TUP to indicate a protocol related event to the maintenance module.

The Maintenance event code contained in the status field of the message indicates the type of event. Possible values are listed in the following table which also lists the meaning of the id field in each case:

| Mnemonic | Code | | ID | Description |
|-----------------------|------|------|-----|--|
| | dec | hex | | |
| TUPMI_prim_discarded | 0 | 0x00 | cid | A user primitive request was discarded |
| TUPMI_T7_expiry | 2 | 0x02 | cid | Failed to receive RLG (T7 expiry) |
| TUPMI_T5_expiry | 3 | 0x03 | cid | Failed to receive CLF (T5 expiry) |
| TUPMI_bad_cic | 4 | 0x04 | cic | Message received for an unknown cic |
| TUPMI_bad_rxm | 5 | 0x05 | cic | Bad message type or format received |
| TUPMI_bad_cgm | 6 | 0x06 | cic | Bad group message received (bad acknowledgement or repetition different to first message) or bad range of received GRS (includes circuits which have not been configured). |
| TUPMI_cgm_discarded | 7 | 0x07 | cic | Unable to process received group supervision message (no resources). |
| TUPMI_T114_expiry | 8 | 0x08 | cic | Failed to receive CLF in response to CBK |
| TUPMI_CRR_reset | 10 | 0x0a | cid | Circuit reset by CRS rx'd |
| TUPMI_CRO_first_fail | 11 | 0x0b | cid | CRO first failure |
| TUPMI_CRO_stopped | 12 | 0x0c | cid | CRO stopped not on first |
| TUPMI_CRI_first_fail | 13 | 0x0d | gid | CRI first failure |
| TUPMI_CRI_passed | 14 | 0x0e | gid | CRI passed not on first |
| TUPMI_BLS_T13_expiry | 20 | 0x14 | cid | Failed to receive BLA |
| TUPMI_BLS_T16_expiry | 21 | 0x15 | cid | Failed to receive UBA |
| TUPMI_BLS_T11_expiry | 22 | 0x16 | cid | Local M-blk exceeds time limit |
| TUPMI_BLR_T11_expiry | 23 | 0x17 | cid | Remote M-blk exceeds time limit |
| TUPMI_CRS_T19_expiry | 30 | 0x1e | gid | Failed to receive RSC response |
| TUPMI_CGRS_T22_expiry | 31 | 0x1f | gid | Failed to receive GRS response |
| TUPMI_MBUS_T27_expiry | 40 | 0x28 | gid | Failed to receive MBA |
| TUPMI_MBUS_T29_expiry | 41 | 0x29 | gid | Failed to receive MUA |
| TUPMI_MBUR_T25_expiry | 42 | 0x2a | gid | Rem M-blk exceeds time limit |
| TUPMI_MBUS_T25_expiry | 43 | 0x2b | gid | Local M-blk exceeds time limit |
| TUPMI_HBUS_blocking | 50 | 0x32 | gid | Circuits locally H-blocked |
| TUPMI_HBUS_T33_expiry | 51 | 0x33 | gid | Failed to receive HBA |
| TUPMI_HBUS_T35_expiry | 52 | 0x34 | gid | Failed to receive HUA |
| TUPMI_HBUR_blocking | 53 | 0x35 | gid | Circuits remotely H-blocked |
| TUPMI_SBUS_blocking | 60 | 0x3c | gid | Circuits locally S-blocked |
| TUPMI_SBUS_T39_expiry | 61 | 0x3d | gid | Failed to receive SBA |

| | | | | |
|-----------------------|----|------|-----|--|
| TUPMI_SBUS_T41_expiry | 62 | 0x3e | gid | Failed to receive SUA |
| TUPMI_SBUR_blocking | 63 | 0x3f | gid | Circuits remotely S-blocked |
| TUPMI_NO_CGBA | 70 | 0x46 | gid | Not all requested circuits acknowledged as blocked |
| TUPMI_BAD_CGBA | 71 | 0x47 | gid | Blocking ack not expected |
| TUPMI_NO_CGUA | 72 | 0x48 | gid | Not all requested circuits acknowledged as blocked |
| TUPMI_BAD_CGUA | 73 | 0x49 | gid | Unblocking ack not expected |
| TUPMI_LBLK_rm_by_rsc | 74 | 0x4a | cid | Locally blocked condition removed by reset |
| TUPMI_SAM_AFTER_ST | 80 | 0x50 | cid | Called party address digits discarded because ST digit already sent to application for this call |

8.16 Software Event Indication

Synopsis:

Message used by TUP to indicate an implementation specific software related event to the local management module.

Message Format:

| MESSAGE HEADER | |
|----------------|---------------------------------|
| Field Name | Meaning |
| type | TUP_MSG_ERROR_IND (0x07cb) |
| id | See below |
| src | TUP_TASK_ID |
| dst | Management module id |
| rsp_req | Used to request a confirmation |
| class | 0 |
| status | Software event code (see below) |
| err_info | 0 |
| len | 0 |

Description:

This message is issued by the TUP module to notify system management of various software events which under normal operating conditions should not occur. These events may be due to lack of system resources or errors within the software.

The **Software event code** contained in the **status** field of the message indicates the type of event. Possible values are listed in the following table which also lists the meaning of the **id** field in each case.

| Mnemonic | Value | ID | Description |
|----------------------|-------|------------------|--|
| TUPSWE_TUPM_LOW | 3 | 0 | The internal pool of tupm message buffers is running short of entries. If this fault persists, the software should be re-built with more tupm messages in the pool |
| TUPSWE_NO_TUPM | 4 | 0 | The pool of tupm message buffers has been exhausted. If this occurs then correct operation of the module is not guaranteed. |
| TUPSWE_BAD_MSG | 5 | Message type | An unsupported (inter-module) message type has been received by the module. |
| TUPSWE_TIM_START_ERR | 6 | Timer identifier | An attempt was made to re-use an active timer resource. |

| | | | |
|----------------|---|---|--|
| TUPSWE_NO_TCGC | 7 | 0 | A request to handle circuit group supervision messages at the same time has exhausted the pool of TCGC structures. If this fault persists, the software should be re-built with more TCGC structures in the pool. |
| TUPSWE_NO_CSCM | 8 | 0 | A request to handle circuit group supervision messages at the same time has exhausted the pool of TCSC structures. If this fault persists, the software should be re-built with more TCSC structures in the pool. |

8.17 Management Event Indication

This message is issued by the TUP module to notify system management of general software events that under normal operating conditions should not occur. These events may be due to lack of system resources or errors within the software.

Message Format:

| MESSAGE HEADER | |
|-----------------|-----------------------------------|
| Field Name | Meaning |
| type | MGT_MSG_EVENT_IND (0x0008) |
| id | See below |
| src | TUP module id |
| dst | Management module ID |
| rsp_req | 0x00 |
| class | 0x00 |
| status | Management event code (see below) |
| err_info | Time-stamp |
| len | 0 |

The Management Event Code contained in the **status** field of the message indicates the type of event. Possible values are listed in the following table which also lists the meaning of the **id** field in each case.

| Mnemonic | Value | | ID | Description |
|----------------|-------|------|----|--|
| | dec | hex | | |
| ERR_SDLSIG_LOW | 47 | 0x2f | 0 | The internal signal queue is running short of entries. If this fault persists the software should be re-built with more signals allocated to the signal queue. |
| ERR_NO_SDLSIG | 46 | 0x2e | 0 | The internal signal queue has been exhausted. If this event occurs then correct operation of the module is not guaranteed. |

8.18 Trace Event Indication

Synopsis:

The TUP module may be configured to trace to the trace module most primitives issued or received. This is useful for debug purposes. The TUP event masks are used to enable and disable tracing on a per primitive basis for each link. The traced primitives are reported as event indications as shown below:

Message Format:

| MESSAGE HEADER | | |
|----------------|----------------------------|-------------------------------------|
| Field Name | Meaning | |
| type | MGT_MSG_TRACE_EV (0x0003) | |
| id | 0 | |
| src | TUP module id | |
| dst | trace module id | |
| rsp_req | 0 | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 18 + length of traced data | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | source module id |
| 1 | 1 | destination module id |
| 2 | 2 | id |
| 4 | 2 | type |
| 6 | 2 | status |
| 8 | 4 | timestamp |
| 12 | 4 | pointer to the message being traced |
| 16 | 2 | data length |
| 18 | 0 .. 280 | contents of the MSG parameter area. |

8.19 Selective Trace Event Indication

Synopsis:

Optionally provides extra information to be reported along with selected software and maintenance events for debug purposes.

Message Format:

| MESSAGE HEADER | | |
|----------------|----------------------------|-------------------------------------|
| Field Name | Meaning | |
| type | MGT_MSG_SEL_TRACE (0x0f16) | |
| id | 0 | |
| src | TUP module id | |
| dst | trace module id | |
| rsp_req | 0 | |
| class | 0 | |
| status | Reason for trace | |
| err_info | 0 | |
| len | 18 + length of traced data | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 1 | source module id |
| 1 | 1 | destination module id |
| 2 | 2 | id |
| 4 | 2 | type |
| 6 | 2 | status |
| 8 | 4 | timestamp |
| 12 | 4 | pointer to the message being traced |
| 16 | 2 | data length |
| 18 | 0 .. 280 | contents of the MSG parameter area. |

Description:

When certain maintenance and software events are reported the module may be configured to also send, to the trace module, a Trace Event Indication containing the message that caused the report to be made.

The Reason for trace contained in the **status** field of the message indicates the type of event. Possible values are listed in the following table:

| Status | | Mnemonic | Description |
|---------------|------|---------------------|--|
| 0 | 0x00 | TUPt_prim_discarded | Refer to Maintenance event indication 0. |
| 1 | 0x01 | TUPt_bad_cic | Refer to Maintenance event indication 4. |
| 2 | 0x02 | TUPt_bad_rxm | Refer to Maintenance event indication 5. |
| 3 | 0x03 | TUPt_bad_cgm | Refer to Maintenance event indication 6. |

Appendix A.

A.1 Message Type Table

The following table lists, by message type, the messages described in this manual:

| Message Type | Mnemonic | Description |
|--------------|--------------------|---|
| 0x0003 | MGT_MSG_TRACE_EV | Trace Event Indication |
| 0x0708 | CAL_MSG_CGSC_IND | Circuit Group Supervision Control Indication |
| 0x0709 | CAL_MSG_CGSC_CONF | Circuit Group Supervision Control Confirmation |
| 0x070e | CAL_MSG_STATUS | Remote Point Code Status Indication |
| 0x07c9 | TUP_MSG_STATUS | Same as 0x070e (used when TUPF_STD_MTYPE module option not set) |
| 0x07ca | TUP_MSG_MAINT_IND | Maintenance Event Indication |
| 0x07cb | TUP_MSG_ERROR_IND | Software Event Indication |
| 0x0f16 | MGT_MSG_SEL_TRACE | Selective Trace Event Indication |
| 0x57ce | TUP_MSG_TRACE_MASK | Set Trace Mask Request |
| 0x17ce | - | Confirmation for Set Trace Mask |
| 0x1d10 | - | Confirmation for Set Selective Trace Mask |
| 0x2111 | - | Confirmation for Read Revision |
| 0x27c4 | - | Confirmation for Read TUP RAM |
| 0x27c5 | - | Confirmation for Read Circuit Group |
| 0x27c6 | - | Confirmation for Read Circuit |
| 0x27cc | - | Confirmation for Read Circuit Group Statistics |
| 0x3703 | - | Confirmation for Circuit Group Supervision Control |
| 0x2d11 | - | Confirmation for Read Circuit Group Identity Request |
| 0x2d13 | - | Confirmation for Read Circuit Group Data Request |
| 0x37c0 | - | Confirmation for Configuration |
| 0x37c1 | - | Confirmation for Configure Circuit Group |
| 0x37c2 | - | Confirmation for End Circuit Group |
| 0x37c3 | - | Confirmation for Configure Timers |
| 0x37c8 | - | Confirmation for Local Overload |
| 0x3d12 | - | Confirmation for Change Host Configure Circuit Group Request |

| | | |
|--------|-------------------------|---|
| 0x5d10 | TUP_MSG_S_SELTRACE_MASK | Set Selective Trace Mask Request |
| 0x6111 | GEN_MSG_MOD_IDENT | Read Revision Request |
| 0x67c4 | TUP_MSG_R_RAM | Read TUP RAM Request |
| 0x67c5 | TUP_MSG_R_GRP | Read Circuit Group Request |
| 0x67c6 | TUP_MSG_R_CCT | Read Circuit Request |
| 0x67cc | TUP_MSG_R_GRP_STATS | Read Circuit Group Statistics Request |
| 0x67cf | TUP_MSG_R_STATUS | Read Circuit Group Circuit Status Request |
| 0x6d11 | TUP_MSG_R_GRPID | Read Circuit Group Identity Request |
| 0x6d13 | TUP_MSG_R_GRP_DATA | Read Circuit Group Data Request |
| 0x7006 | KEEP_TIME | Keep Time |
| 0x7703 | CAL_MSG_CGSC_REQ | Circuit Group Supervision Control Request |
| 0x770d | CAL_MSG_OVLD_REQ | Same as 0x77c8 (used when TUPF_STD_MTYPE module option not set) |
| 0x77c0 | TUP_MSG_CONFIG | Configuration Request |
| 0x77c1 | TUP_MSG_CNF_GRP | Configure Circuit Group Request |
| 0x77c2 | TUP_MSG_END_GRP | End Circuit Group Request |
| 0x77c3 | TUP_MSG_CNF_TIM | Configure Timers Request |
| 0x77c8 | TUPL_MSG_OVLD_REQ | Local Overload Request |
| 0x7d12 | TUP_MSG_CNG_GRP | Change Configure Circuit Group Request |
| 0x8700 | - | Confirmation for TUP-Transmit |
| 0x8701 | CAL_MSG_RX_IND | TUP-Receive Indication |
| 0xc002 | TM_EXP | Timer Expiry |
| 0xc700 | CAL_MSG_TX_REQ | TUP-Transmit Request |

Table 5: Message types

Note 1: The message type for the confirmation message is set as described in the System Software Environment Programmer's Manual, in the paragraph describing the **rsp_req** field.

Note 2: Only a request message (i.e., a message which has bit 14 set in its message type) may have a confirmation message associated.

Appendix B.

B.1 Timer Services

The notion of time in the TUP module is based on a periodic timer tick received from the timer module every 100 ms. This “tick” is used to run all TUP protocol timers. This appendix details the messages formats which are used by the TUP module to control timer services.

B.2 Keep Time

Synopsis:

Message sent to request the timer module to issue a periodic timer tick (TM_EXP) message to the TUP module.

Message Format:

| MESSAGE HEADER | | |
|----------------|---------------------|---|
| Field Name | Meaning | |
| Type | KEEP_TIME (0x7006) | |
| Id | 0 | |
| Src | Sending module's ID | |
| Dst | Timer module ID | |
| rsp_req | 0 | |
| Class | 0 | |
| Status | 0 | |
| err_info | 0 | |
| Len | 6 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | Reserved, should be set to zero if issued by the user and are discarded when received by the timer module |
| 4 | 2 | resolution |

Parameter Description :

resolution

The number of operating system ticks between timer expiry messages being issued to the TUP module. This parameter is set from the **timer_res** parameter in the TUP module configuration message.

B.3 Timer Expiry

Synopsis:

Periodic timer tick message issued by the timer module.

Message Format:

| MESSAGE HEADER | | |
|----------------|-------------------------|--------------------------------|
| Field Name | Meaning | |
| type | TM_EXP (0xc002) | |
| id | index of timer in table | |
| src | Timer module ID | |
| dst | Destination module ID | |
| rsp_req | 0 | |
| class | 0 | |
| status | 0 | |
| err_info | 0 | |
| len | 4 | |
| PARAMETER AREA | | |
| Offset | Size | Name |
| 0 | 4 | reserved – must be set to zero |

Appendix C.

C.1 Chinese National Telephone Network (GF001-9001)

Although the TUP module supports ITU recommendations, it is also able to support Chinese GF001-9001. The module provides protocol extensions to handle the extra functionality not specified by the ITU.

These extensions should be enabled by setting the **TUPF_CHN** bit in the options field of the module configuration message.

C.2 Point code size

The TUP module is able to support both 14 bit and 24 bit point code formats as a run-time option. The ITU specify a point code size of 14 bits, the National Network of China uses both 14 bit and 24 bit formats. The point code size used by the module is specified by the **TUPF_24PC** bit in the options field of the module configuration message. This bit should be set to 1 to select the 24 bit point code format, or 0 to select the 14 bit point code format as required by the application.

C.3 Subscriber Local Busy (SLB) message

The national unsuccessful backwards setup messages Subscriber Local Busy (SLB) is conveyed between the user application and the TUP module using the Release Request/Indication primitive during call setup, with the following cause value:

| Cause value | Message | Meaning |
|---------------|---------|-----------------------|
| 1111101 (125) | SLB | Subscriber local busy |

Note: The configuration options bit **TUPF_CHN** must be set for this cause value to be conveyed by the TUP module.

C.4 Subscriber Trunk Busy (STB) message

The national unsuccessful backwards setup message Subscriber trunk Busy (STB) is conveyed between the user application and the TUP module using the Release Request/Indication primitive during call setup, with the following cause value:

| Cause value | Message | Meaning |
|---------------|---------|-----------------------|
| 1111110 (126) | STB | Subscriber trunk busy |

Note: The configuration options bit **TUPF_CHN** must be set for these cause values to be conveyed by the TUP module.

C.5 Calling party clear (CCL) message

When the TUPGOP_CCL option is not set, the Calling Party Clear message (CCL) is conveyed between the TUP module and the user application using the Release Indication primitive, with the following cause value:

| Cause value | Message | Meaning |
|---------------|---------|---------------------|
| 1111100 (124) | CCL | Calling party clear |

When the TUPGOP_CCL option is set, the Calling Party Clear Indication primitive will be used.

Note: The configuration options bit **TUPF_CHN** must be set for this cause values to be conveyed by the TUP module.

C.6 Mapping Call Control Primitives to Network Messages

The mapping of call control primitives to network messages is straightforward. The table below gives the mapping for operation on circuit groups configured for China TUP environments. The values of the primitive types are expressed both in decimal and hexadecimal.

| Primitive | Mnemonic | Value (dec) | Value (hex) | Network message mapping |
|--|--|-------------|-------------|--|
| Alerting request & indication | CALPN_ALERT_REQ CALPN_ALERT_IND | 6 | 0x06 | ACM |
| Backward information request & indication | CALPN_BINFO_REQ CALPN_BINFO_IND | 3 | 0x03 | GRQ |
| Backward information response & confirmation | CALPN_BINFO_RESP CALPN_BINFO_CONF | 4 | 0x04 | GSM |
| Calling party clear indication | CALPN_CCL_IND | 204 | 0xcc | CCL (when TUPGOP_CCL option not set) |
| Circuit seized request & indication | CALPN_CCT_SZE_REQ CALPN_CCT_SZE_IND | 199 | 0xc7 | CCR |
| Collection charging request & indication | CALPN_MPM_REQ CALPN_MPM_IND | 201 | 0xc9 | MPM |
| Continuity report request & indication | CALPN_COT_REQ CALPN_COT_IND | 5 | 0x05 | COT in the success case CCF in the failure case |
| Forward information request & indication | CALPN_FINFO_REQ CALPN_FINFO_IND | 2 | 0x02 | SAO – If only one digit included in subsequent address SAM – if more than one digit included |
| Forward transfer request & indication | CALPN_FOT_REQ CALPN_FOT_IND | 8 | 0x8 | FOT |
| Release request & indication | CALPN_RELEASE_REQ CALPN_RELEASE_IND | 12 | 0x0c | CLF – If outgoing call is connected CCL – if holding has been previously requested. Only valid for China TUP and when TUPGOP_CCL option not set. CBK – If incoming call is connected UBM – If this is an incoming call and the user has not sent CALPN_SETUP_RESP yet |

| | | | | |
|---------------------------------|--|----|------|--|
| Release response & confirmation | CALPN_RELEASE_RESP CALPN_RELEASE_CONF | 16 | 0x10 | RLG |
| Resume request & indication | CALPN_RESUME_REQ CALPN_RESUME_IND | 14 | 0x0e | RAN |
| Setup request & indication | CALPN_SETUP_REQ CALPN_SETUP_IND | 1 | 0x01 | IAM – if the only parameters supplied with the CALPN_SETUP_REQ primitive are CALPPN_CALLED_NUM and CALPPN_CPC IAI – if other parameters are included in the CALPN_SETUP_REQ primitive |
| Setup response & confirmation | CALPN_SETUP_RESP CALPN_SETUP_CONF | 9 | 0x09 | ANU – If the CALPN_SETUP_RESP primitive has parameter CALPPN_BCI set to “no indication” or is not present ANC - If the CALPN_SETUP_RESP primitive has parameter CALPPN_BCI set to “charge” ANN - If the CALPN_SETUP_RESP primitive has parameter CALPPN_BCI set to “no charge” |
| Suspend request & indication | CALPN_SUS_REQ CALPN_SUS_IND | 13 | 0x0d | CBK – CALPN_SUS_REQ used to release an incoming call permits subsequent re-answer using the CALPN_RESUME_REQ primitive |

Table 6: Mapping of call control primitives to network messages

C.7 French national telephone network (SSUTR2)

Although the TUP module supports ITU recommendations, it is also able to support French SSUTR2 VN4, VN5 and VN6 specifications. The module provides protocol extensions to handle the extra functionality not specified by the ITU.

French SSUTR2 operation may be enabled on a per circuit group basis, allowing a single instance of the TUP module to support SSUTR2 and ITU circuit groups.

The SSUTR2 extensions are enabled by setting the SSUTR2 bit (bit 12) in the options field of the circuit group configuration message.

The user interface remains largely unchanged when operating in SSUTR2 mode. This Appendix details the differences in user parameter use that are required. The user should refer to the main text of the manual for the normal behavior.

Many of the features required in SSUTR2 compatible environments are common to other environments and are selected using individual feature options. All the options below should be enabled to provide full SSUTR2 compatibility.

| Circuit group options in the circuit group configuration message. See section 8.2. | | |
|--|-----------------|--|
| Bit Number | Option Name | Meaning |
| 13 | TUPGOP_SAM_TIM | Subsequent address message timer. Address timer T112 Call fails if no subsequent address message after receipt of the Initial Address message |
| 14 | TUPGOP_RESP_TIM | Backward response timer. Address timer T113 Call fails if no backward message received after reception of initial address message. |
| 16 | TUPGOP_CLF_TIM | Clear Forward timer. Call fails if no clear forward message received in response to transmitted clear back message. |
| 17 | TUPGOP_NO_CGB | Group Supervision blocking request results in individual circuit blocking and un-blocking messages instead of a group blocking message. |
| 18 | TUPGOP_NO_GRS | Group Supervision reset request results in individual circuit reset messages instead of a group message. |
| 19 | TUPGOP_GRS_GRP | Group reset applies to whole group |
| 23 | TUPGOP_UBA_IAM | When the option is set, an IAM received while awaiting UBA will cause the circuit to be reset. |
| 24 | TUPGOP_TST_IRR | When the option is set, an unrecognised message or a message received in a wrong state during test call set up will not cause the circuit to be reset. |

The use of options NO_CGB or NO_GRS as required for SSUTR2 also requires that the gap_tim and gap_msg fields of the module configuration message be setup. These fields control the number and frequency of the individual blocking/reset messages used to implement the required group blocking/reset operation.

Note: It is recommended that the following settings be used in the module configuration message.

| Module configuration parameter | Value |
|--------------------------------|-------|
| gap_tim | 1 |
| gap_msg | 5 |

Note: The TUP module considers all circuits to be bi-directional. The behavior required by SSUTR2 to support uni-directional circuit types is not provided. However, this may be readily implemented by the user application.

C.8 Mapping call control primitives to network messages

| Primitive | Mnemonic | Value (dec) | Value (hex) | Network message mapping |
|---|--|-------------|-------------|---|
| Alerting request & indication | CALPN_ALERT_REQ CALPN_ALERT_IND | 6 | 0x06 | ACF |
| Backward information request & indication | CALPN_BINFO_REQ CALPN_BINFO_IND | 3 | 0x03 | DEG |
| Backward information response & confirmation | CALPN_BINFO_RESP CALPN_BINFO_CONF | 4 | 0x04 | IFG |
| Charging acknowledgement request & indication | CALPN_TXA_REQ CALPN_TXA_IND | 202 | 0xca | TXA |
| Charging request & indication | CALPN_TAX_REQ CALPN_TAX_IND | 49 | 0x31 | TAX |
| Circuit seized request & indication | CALPN_CCT_SZE_REQ CALPN_CCT_SZE_IND | 199 | 0xc7 | CCR |
| Collection charging request & indication | CALPN_ITX_REQ CALPN_ITX_IND | 201 | 0xc9 | ITX |
| Continuity report request & indication | CALPN_COT_REQ CALPN_COT_IND | 5 | 0x05 | CCP in the success case CCN in the failure case |
| End to end information request & indication | CALPN_MCE_REQ CALPN_MCE_IND | 200 | 0xc8 | MCE |
| Forward information request & indication | CALPN_FINFO_REQ CALPN_FINFO_IND | 2 | 0x02 | MSS – If only one digit included in subsequent address MSA – if more than one digit included |
| Release request & indication | CALPN_RELEASE_REQ CALPN_RELEASE_IND | 12 | 0x0c | FIU – if outgoing call is connected RAU or ECH– if incoming call is connected EEC, EFC, ERN, OCC, NNU, LHS, TSI, ACI, INU, EAR, SND, ECH – if this is an incoming call and the user has not sent CALPN_SETUP_RESP yet |

| | | | | |
|---|--|-----|------|-----|
| Release response & confirmation | CALPN_RELEASE_RESP CALPN_RELEASE_CONF | 16 | 0x10 | LIG |
| Resume request & indication | CALPN_RESUME_REQ CALPN_RESUME_IND | 14 | 0x0e | NRP |
| Setup request & indication | CALPN_SETUP_REQ CALPN_SETUP_IND | 1 | 0x01 | MIF |
| Setup response & confirmation | CALPN_SETUP_RESP CALPN_SETUP_CONF | 9 | 0x09 | RIU |
| Suspend request & indication | CALPN_SUS_REQ CALPN_SUS_IND | 13 | 0x0d | RAU |
| Tariff change request & indication | CALPN_CHT_REQ CALPN_CHT_IND | 203 | 0xcb | CHT |
| User to user information request & indication | CALPN_MUU_REQ CALPN_MUU_IND | 45 | 0x2d | MUU |

C.9 Parameters definitions

Most of the existing TUP user primitive parameters are available in SSUTR2 mode. The primitive specifications, section 6.3 and 6.4 detail parameters use with individual primitives.

Where the content of fields within primitive parameters is altered to reflect SSUTR2 use, changes are listed below.

C.9.1 Additional calling party information

The Additional Calling Party Information is specified for further study by the ITU and not currently used. For SSUTR2 operation, the parameter conveys a single octet coded as shown below. This maps to the Additional Calling Party Information [Complément d'information concernant le demandeur] parameter of the SSUTR2 MIF message.

The nature of calling party access of the Additional Calling Party Information parameter of the SSUTR2 MIF message is also used to set the ISDN access indicator, Bit I of forward call indicators.

Bits C, B, and A:

| C | B | A | Nature of Calling party access [Nature de l'accès du demandeur] |
|----|---|---|---|
| 0 | 0 | 0 | Unknown |
| 0 | 0 | 1 | Analog access |
| 0 | 1 | 0 | Transcom access |
| 0 | 1 | 1 | ISDN access |
| 1 | 0 | 0 | |
| To | | | Reserved |
| 1 | 1 | 1 | |

Bit D:

| D | Transgroup call indicator (in VN4 1990) [indicateur d'appel Transgroupe] reserved in VN4 1995, VN5 and VN6 |
|---|--|
| 0 | Ordinary Call |
| 1 | Transgroupe Call |

The remaining bits HGFE are reserved (coded "0000").

C.9.2 Backward call indicators

In SSUTR2, the backward call indicators map to the message indicators [indicateurs de message] parameter of the ACF message.

Bits BA, DC and FE of the backward call indicators are mapped to the Type of address complete message indicators field in the message indicators parameter of the ACF message as shown below.

| Type of address complete message indicators [Indicateur du type de signal d'adresse complete] | | | Backward Call Indicators | | | | | |
|--|---|---|--------------------------|---|---|---|---|---|
| C | B | A | F | E | D | C | B | A |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |

Note: These mappings only apply when the TUPGOP_CCC_CHG option is set. This option should be set for all new applications.

Bit K of the backward call indicators is the ISDN User Part Indicator.

| K | Maps to bit G [indicateur de présence de signalisation RNIS depuis le commutateur d'arrivée] the message indicators [indicateurs de message] parameter of the ACF message. |
|---|--|
| 0 | ISDN user part not used all the way |
| 1 | ISDN user part used all the way |

Bit M of the backward call indicators is the ISDN access indicator.

| M | Maps to nature of called party access [nature de l'accès du demandé] field of the message indicators [indicateur de message] parameter of the ACF message. |
|---|--|
| 0 | Terminating access non ISDN |
| 1 | Terminating access ISDN |

C.9.3 Called party number

The format of the Called Party number remains unchanged.

The Nature of Address Indicators field may take the following additional values.

The Nature of Address Indicators maps to the translation codes [code de traduction] field of the additional routing information [Complément d'information concernant l'acheminement] parameter of the SSUTR2 MIF message.

| Value | TUP Address Indicators | Translation Codes Field Bits: D C B A |
|-----------------|---|---------------------------------------|
| 0 0 0 0 0 0 0 | reserved | - |
| 0 0 0 0 0 0 1 | reserved | - |
| 0 0 0 0 0 1 0 | reserved | - |
| 0 0 0 0 0 1 1 | national significant number | 0010 |
| 0 0 0 0 1 0 0 | international number | 0011 |
| 0 0 0 0 1 0 1 | reserved | - |
| 0 0 0 0 1 1 0 | reserved | - |
| 0 0 0 0 1 1 1 | special service | 0001 |
| 0 0 0 1 0 0 0 | inter-working number with Transgroupe – Colisée (VN4 – 1990) | 1 0 0 0 |
| 0 0 0 1 0 0 1 | general Transgroupe number (VN4 – 1990) | 1 0 0 1 |
| 0 0 0 1 0 1 0 | ordinary Transgroupe number (VN4 – 1990) | 1 0 1 0 |
| 0 0 0 1 0 1 1 | number relating to GFU international (VN4 – 1990) | 1 0 1 1 |
| 0 0 0 1 1 0 0 | National number with carrier selection [numéro national avec sélection du transporteur] | 0 1 0 0 |
| 0 0 0 1 1 0 1 | International number with carrier selection [numéro international avec sélection du transporteur] | 0 1 0 1 |
| Any other value | national significant number | - |

C.9.4 Calling party's category

The TUP calling party's category values are of 6 bits in length and correspond in value/meaning to the least significant 6 bits of the SSUTR2 defined calling party category [Catégorie du demandeur] values. The 6-bit user supplied calling party category is transported transparently by the TUP module. The two most significant bits are reserved. They are ignored by the TUP module in primitive requests from the user and are set to zero in primitive indications sent to the user.

In VN5 compatible environments bit 7 of the Calling Party category is not reserved and instead acts as "Roaming Number Indicator" as shown below.

Bit G:

| G | Roaming number indicator [Indicateur d'identification d'un numéro de réacheminement] |
|---|--|
| 0 | No indication – Default |
| 1 | Roaming Number [numéro de réacheminement] |

Bit H:

| H | ROC callr indicator [Indicateur d'appel ROC] |
|---|--|
| 0 | No indication – Default |
| 1 | ROC call [appel ROC] |

C.9.5 Calling party number

The format of the called party number is not changed for SSUTR2 operation. However, the two bits of the "screening" field are used where ITU environments ignore them. The use of individual fields in this parameter is detailed below.

Nature of address indicator

This field maps the nature of calling party address [nature de l' adresse du demandeur] field in the calling party number parameter of the SSUTR2 message.

| Value | TUP Address Indicators | MIF nature of calling party address Bits: B A |
|-----------------|-------------------------------|--|
| 0 0 0 0 1 1 | national (significant) number | 1 0 |
| 0 0 0 0 1 0 0 | international number | 1 1 |
| 0 0 0 1 1 0 0 | truncated number | 0 0 |
| Any other value | national significant number | - |

Screening

This field maps directly bits B A in the calling line identity [identité de la ligne appelante] parameter of the SSUTR2 MIF and IFG messages. Used to indicate the verification state of the address [statut de l'identité de la ligne appelante]. It is coded as shown below:

| B | A | |
|---|---|-----------------------------------|
| 0 | 0 | reserved |
| 0 | 1 | user provided verified and passed |
| 1 | 0 | reserved |
| 1 | 1 | network provided |

Number Incomplete (NI) indicator

This parameter not used in SSUTR2 operation.

C.9.6

Cause indicators

The format of the cause indicators parameter is not changed for SSUTR2 operation.

Note that during the "speech" phase of a call, this parameter is ignored in requests from the user and set to "normal, unspecified" in release indication primitives sent to the user from the TUP module. For SSUTR2, the "Cause Value" field takes the following values.

| Cause Value | SSUTR2 UBM Type | |
|-----------------|-----------------|-------------------------------|
| 0101010 | EEC | switching |
| 0100010 | EFC | circuit |
| 0101001 | ERN | national |
| 0010001 | OCC | subscriber |
| 0000001 | NNU | unallocated-number |
| 0011011 | LHS | line-out-of-service |
| 0000100 | TSI | send-special-information-tone |
| 0110111 | ACI | access barred |
| 0000101 | INU | mis-dialled trunk prefix |
| 0111100 | EAR | ISDN Call Failure |
| 0111011 | SND | Service unavailable |
| 0010101 | ECH | call-failure |
| Any other value | ECH | call-failure |

The following additional cause values are used in release indications to the user:

| Cause Value | Meaning |
|-------------|--|
| 1011111 | Invalid setup request message received from user |
| 0100110 | Destination out of order (not available) |
| 0101100 | Requested channel not available. For an outgoing call, indicates that the call should be retried on another circuit. |
| 0010000 | Normal call clearing |
| 0011111 | Normal - (unspecified) |

C.9.7 Closed User Group interlock Code

Use not changed for SSUTR2. Used with closed user groups [groupe fermé d'usagers] specified in VN4 – 1990 only.

C.9.8 Forward call indicators

Bit A (national/international call indicator) use is not changed for SSUTR2 operation.

Bit D is not used in SSUTR2 operation.

Bit F is the ISDN user part indicator:

| F | Maps to bit L [indicateur de présence de signalisation RNIS depuis le commutateur de départ] of the message indicators [indicateurs de message] of the MIF message |
|---|--|
| 0 | ISDN user part not used all the way |
| 1 | ISDN user part used all the way |

Bits H and G are the ISDN user part preference indicator:

| H | G | Maps to bits HG [demande de signalisation réseau] of the network service required [service réseau demandé] field of the additional routing information [Complément d'information concernant l'acheminement] parameter of the MIF message |
|---|---|--|
| 0 | 0 | ISDN signaling – interworking with non ISDN signaling permitted |
| 0 | 1 | Any network signaling |
| 1 | 0 | ISDN signaling – interworking with non ISDN signaling prohibited |
| 1 | 1 | Reserved |

Bit I is the ISDN access indicator:

| I | Maps to the access type [Nature de l'accès du demandeur] field of the additional calling party info parameter of the MIF message |
|---|--|
| 0 | Originating access non ISDN |
| 1 | Originating access ISDN |

All other bits are currently not used. They should be set to zero in message issued by the user and discarded in messages received by the user.

C.9.9 Information request indicators

Only bits A (request calling line identity) and D (request calling party category) are valid for use in SSUTR2 mode and maps respectively to bit B [indicateur d'identité de la ligne appelante] and bit A [indicateur de la catégorie du demandeur] of the [indicateur du type de réponse] of the SSUTR2 IFG message.

All other bits are currently not used. They should be set to zero in messages issued by the user and discarded in message received by the user.

C.9.10 Nature of connection indicators

Bit E – “Echo Control device Indicator” is not used in SSUTR2 operation.

The use of remaining bits unchanged. The satellite indicator maps to bits DC [indicateur de la nature du circuit], the continuity check indicator maps to bits FE [indicateur de contrôle de continuité] of the message indicator [indicateurs de message] parameter in the SSUTR2 MIF message.

C.9.11 Optional Forward Call Indicators

Use not changed for SSUTR2. Used with closed user groups [group fermé d'usagers] specified in VN4 – 1990 specifically.

C.9.12 Original Called Number

The use of this parameter is not changed for SSUTR2 operation. It corresponds to the [Identité du premier demandé] parameter in SSUTR2 message.

However, the Nature of Address Indicator may take only the following values.

| Value | TUP Nature of Address Indicator |
|-----------------|---------------------------------|
| 0 0 0 0 0 1 1 | National (significant) number |
| 0 0 0 0 1 0 0 | International number |
| Any other value | National (significant) number |

C.9.13 Transmission Medium Requirement.

This parameter is used to indicate the value of the SSUTR2 information transfer capability [capacité de transfert d'information demandée] field (bits FE) of the additional routing information [Complément d'information concernant l'acheminement] parameter of the SSUTR2 MIF message (see C.9.2).

Note: The “Transmission Medium Requirement” parameter values detailed here are compatible with the ISUP “Transmission Medium Requirements” parameter and not a direct mapping to the information transfer capacity field. The mapping is detailed in the following table:

| Transmission Medium Requirement | SSUTR2 MIF ARI Parameter Value of FE | Meaning |
|---------------------------------|--------------------------------------|---------------------------|
| 0 | 01 | Speech |
| 2 | 11 | 64kbit/s unrestricted |
| 3 | 10 | 3.1kHz audio |
| Other values | - | Defaults to 3.1 kHz audio |

ARI: Additional Routing Information parameter.

C.10 Circuit Group Supervision Control Request & Indication messages

The management primitives used with the circuit group supervision control request and the indication messages remain unchanged. See section 7.

The SSUTR2 blocking types map to the standard blocking functions as follows:

| Standard Blocking Type | SSUTR2 Blocking Type |
|------------------------|----------------------|
| Hardware Blocking | System Blocking |
| Software Blocking | System Blocking |
| Maintenance Blocking | Manual Blocking |