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Part 13: UDT and ST interface
Part 6: UDT-ST open interface for "type 2" UDT

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Contents

Foreword

This document is the Publicly Available Specification (PAS) of the TETRAPOL land mobile radio system, which shall provide digital narrow band voice, messaging, and data services. Its main objective is to provide specifications dedicated to the more demanding PMR segment: the public safety. These specifications are also applicable to most PMR networks.

This PAS is a multipart document which consists of:

Part 1 General Network Design

Part 2 Radio Air interface

Part 3 Air Interface Protocol

Part 4 Gateway to X.400 MTA

Part 5 Interface to dispatch centre

Part 6 Line Connected Terminal interface

Part 7 Codec

Part 8 Radio conformance tests

Part 9 Air interface protocol conformance tests

Part 10 Inter System Interface

Part 11 Gateway to PABX, ISDN, PDN

Part 12 Network Management Centre interface

Part 13 User Data Terminal to System Terminal interface

Part 14 System Simulator

Part 15 Gateway to External Data Terminal

Part 16 Security

TTR 1 Guide to TETRAPOL features

Part 18 Base station to Radioswitch interface

Part 19 Stand Alone Dispatch Position interface

1. Scope

The purpose of this part is to describe the protocols which are used at the ST-UDT R2 reference connection point when a "type 2" UDT is connected: the "UDT-ST open interface".

2. Normative references

This PAS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this PAS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] PAS 0001-1-1: "TETRAPOL Specifications; General Network Design; Reference Model".

[2] PAS 0001-11-3: "TETRAPOL Specifications; Gateway to External Networks; Gateway to IP Networks".

[3] PAS 0001-13-1: "TETRAPOL Specifications; UDT and ST interface; Overview of UDT architecture".

[4] PAS 0001-13-2: "TETRAPOL Specifications; UDT and ST interface; Submit / Delivery Protocol".

[5] PAS 0001-13-3: "TETRAPOL Specifications; UDT and ST interface; STUTEL Profile for the UDT".

[6] PAS 0001-13-4: "TETRAPOL Specifications; UDT and ST interface; TCP-UDP/IP protocols".

[7] PAS 0001-13-5: "TETRAPOL Specifications; UDT and ST interface; Control and Supervision".

[8] PAS 0001-19-1: "TETRAPOL Specifications; Stand Alone Dispatch Position Interface".

[9] PAS 0001-3-1: " TETRAPOL Specifications: AIR INTERFACE PROTOCOL; AIR INTERFACE APPLICATION MESSAGES

[10] Microsoft Development Network Library (July 96): "Win NT DDK Network Drivers".

3. Definitions and abbreviations

3.1. Definitions

For the purposes of this PAS, the following definitions apply:

Downlink message: message transmitted by the ST to the UDT.

Uplink message: message transmitted by the UDT to the ST.

3.2. Abbreviations

For the purposes of this PAS, the following abbreviations apply:

API	Applicative Programming Interface
BN	Base Network
BSC	Base Station Controller
CS	Control and Supervision driver
DLL	Dynamic Link Library
DTAP	Data Transmission Applicative Protocol
FBM	Fall Back Mode
IP	Internet Protocol
MPAP	Mobile PC Asynchronous Protocol
MSW	Main radio SWitch
NDIS	Network Driver Interface Specification
NIC	Network Interface Card
NREA	Negative Radio Emission Acknowlegement
NRTA	Negative Radio Transmission Acknowlegement
PREA	Positive Radio Emission Acknowlegement
PRTA	Positive Radio Transmission Acknowlegement
REA	Radio Emission Acknowlegement
RSW	Radio SWitch
RTA	Radio Transmission Acknowlegement
SDP	Submit and Delivery Protocol
ST	System Terminal
TCP	Transport Connected Protocol
UDP	User Data Protocol
UDT	User Data Terminal

4. UDT-ST interface overview

At reference point R2, the TETRAPOL system provides several levels of interfaces in relation with UDT architectures:

- the first type based on protocol STUTEL is not available

- the second type of UDT is built in a Windows architecture including a NDIS low layer driver, various NDIS protocol drivers and Windows applications.

4.1. Type 1 UDT architecture overview

This type of UDT architecture is described in PAS 0001-13-2 [4] which describes the SDP protocol and in PAS 0001-13-3 [5] which describes the STUTEL Profile for the UDT.

The SDP protocol is not available.

4.2. Type 2 UDT architecture overview

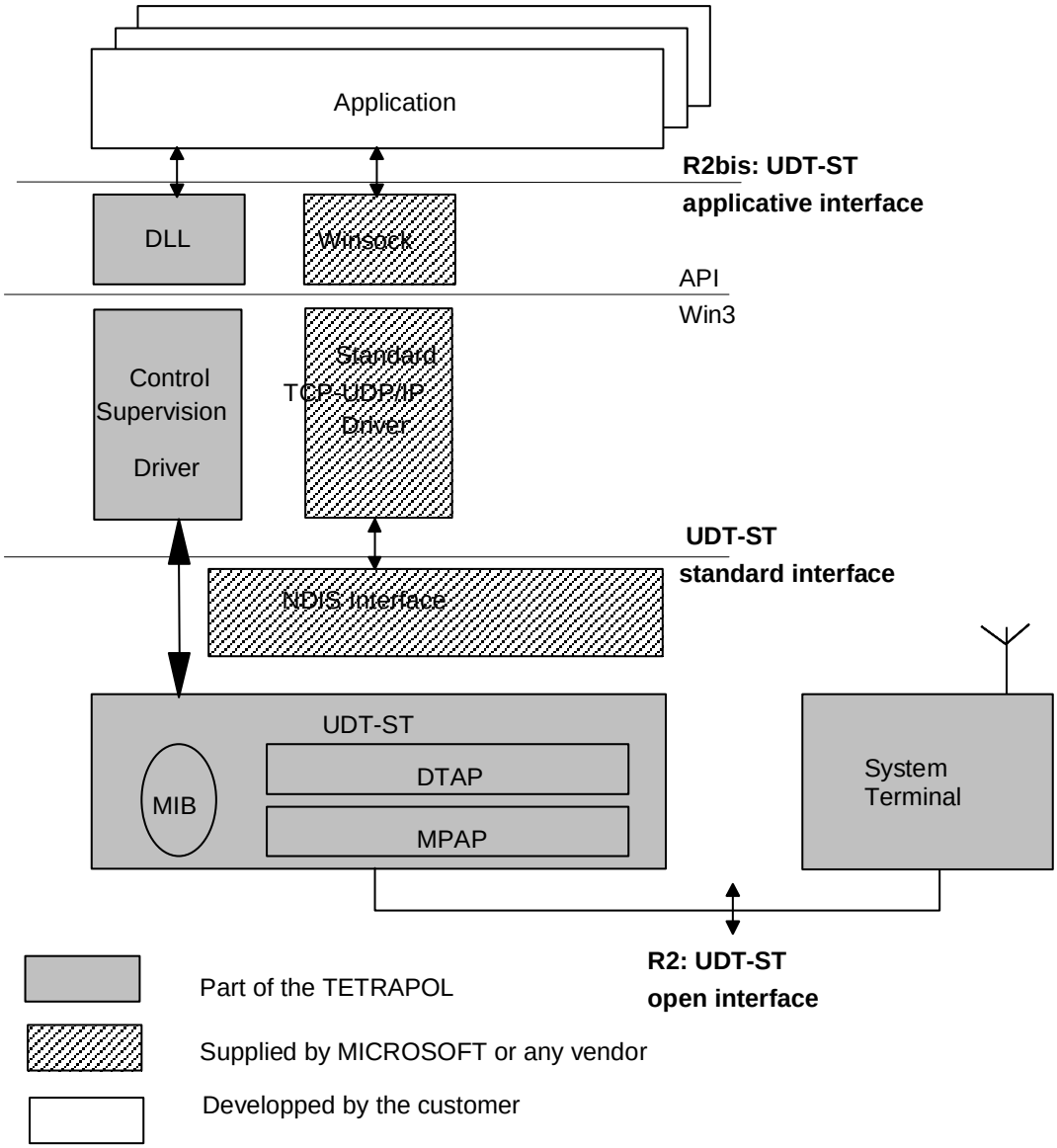


Figure 1: Type 2 UDT architecture

This scheme shows three levels for the external data interface in the UDT:

- **UDT-ST open interface**: the interface on the link between UDT and ST. This interface enables to connect to the ST a dedicated UDT (for example an on-board computer);

- **UDT-ST standard interface**: the interface on the NDIS layer. This interface is compliant with the NDIS 4.0 standard;

- **UDT-ST applicative interface**: For TCP-UDP/IP protocol, the most usual interface is a Socket type Interface, supplied by a Winsock DLL. For the proprietary Control and Supervision protocol, the applicative interface is a set of primitives, grouped in a Win32 DLL.

The UDT-ST Driver is implemented as a Miniport NIC driver (in respect with Microsoft terminology). The NIC is defined as the physical link between UDT and ST, the ST and the access to the radio link. The NIC is in fact, a "wireless" adapter.

The UDT-ST open interface implements three different levels:

- physical level;
- link level: MPAP protocol;
- application level: DTAP protocol.

These levels are described below.

4.3. Identification of the type of connected UDT

A terminal is able to work both with a "type 1" UDT and with a "type 2" UDT. It identifies at the physical connection the type of connected UDT and adjusts itself to the supported protocols.

As described in [5], the physical connection is made on the initiative of the ST, which periodically sends a polling signal on the asynchronous link (T_N1 = 4s period), until the UDT acknowledges this signal.

Note: when the ST is switched on, T_N1 is reduced to 120ms for the five first attempts of physical connections (to speed up the connection between the ST and UDT when they are approximately simultaneously switched on).

The ST's polling signal is formed of two ENQ characters (ASCII code = 0x05).

The UDT's presence signal is formed of a succession of ACK characters (ASCII code = 0x06) when a "type 1" UDT is connected (STUTEL connection), of a succession of BEL characters (ASCII code = 0x07) when a "type 2" UDT is connected (MPAP connection).

The UDT shall guarantee it sends its presence signal in less than 80ms (after this delay, the ST idles and consequently ignores the signals from the UDT; it will transmit the polling signal 4s later).

On receipt of the UDT’s presence signal, the ST sends a single XOFF character (ASCII code = 0x13) to stop the UDT's presence signal emission.

Each side then reinitializes the link according to the mode of the upper protocol.

In the case of the Stutel protocol, the terminal starts an "association" transaction, then establishes an "access regime" in which it plays the master role.

In the case of the MPAP protocol, each side opens a link level service in normal mode. Yet, the link level connection will be completed only after the first request to transmit data (whatever the side).

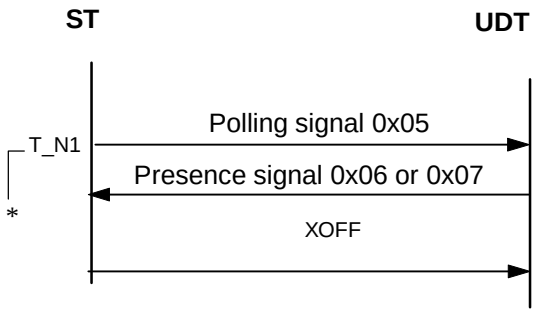


Figure 2: Physical connection

5. Physical level

The physical level is enabled by a serial line in asynchronous mode according to V28 / V24 ITU specification. The only signals handled are "send data" (SD) and "receive data" (RD).

The asynchronous line features are listed below:

- transmission speed (4800 baud)
- 8 bit character mode
- no parity
- one START bit
- one STOP bit
- leading LSB

6. Link level: MPAP Protocol

See [8] chapter 8.3.2.

7. Application level: DTAP Protocol

The dedicated access service is not available for this version (all items concerning this service are greyed)

7.1. Presentation

The application level uses the link level MPAP services to exchange applicative information between UDT and ST.

The data transmitted to the link level are formatted as below:

- the application identifier, on one byte: 0x01 for the "DTAP" application;
- the DTAP header with, in this version, four fields:

  EXT: this field is used to indicate if the header goes on the next byte; so this field is set to 1 for all the bytes of the header except for the last one;
  SEG: this field is used to indicate an applicative segmentation of a message; this field is set to 1 for all segments except for the last one where the field is set to 0;
  RESERVED: this field is reserved for a future usage and is set to 0;
  STATUS BIT FIELD: this field gives the status vector of the sending side: this field is not used in this interface version and is set to 0; it will be used in a future version to transmit the main states of the terminal;

- the message type on 2 bytes (least significant, most significant, therefore Intel format). The message type is only present in the first segment of a segmented message;
- information elements depending on the message type.

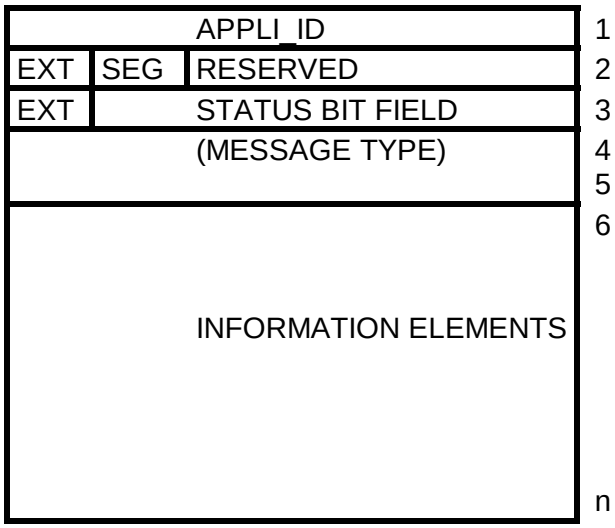


Figure 3: format of an applicative message

In this interface version, the DTAP header includes two bytes (byte 2 and 3): EXT = 1 for the byte 2 and EXT = 0 for the byte 3. However, the status vector is optional for the messages UDT towards ST. In this case, the byte 3 is absent and EXT = 0 for the byte 2.

The maximum length n of a message is conveyed in the connection opening phase by the ST.

The DTAP interface is made of two streams:

- an internal signalling stream UDT-ST;
- a data message exchange stream between the ST and the UDT.

The message exchanged in the different streams are defined in the following chapters. The messages are named in the following way to indicate the direction in which they are sent:

- STUxxxx for a message sent by the ST towards the UDT;
- UTSxxxx for a message sent by the UDT towards the ST.

All erroneous or unknown messages are ignored upon receiving.

A message may be bigger than expected: in this case, all unknown fields in a message are ignored upon receiving.

All the messages including several bytes are coded with the least significant bytes first (therefore Intel format).

7.1.1. Signalling stream

7.1.1.1. Overview

This stream is used to establish the DTAP connection, to manage its supervision and the transmission of different signalling and control information between the ST and the UDT.

In case of detection of a problem on the DTAP connection, the detecting side closes its link level service (MPAP service). When the MPAP protocol is only used by the DTAP application, this closing involves the return to the physical connection described in 4.3. When the MPAP protocol is used by several applications, the return to the physical connection only happens when **all** the opened services by the different applications are closed.

7.1.1.2. Description of the messages

7.1.1.2.1. STU_CONNECT

Direction: ST towards UDT

Short description: DTAP connection request

Parameters:

- ST's DTAP interface version

- information about the ST's identity:

    - RFSI address

    - ST's country

    - ST's network

- timer duration for polling message (STU_ST_PRESENCE) emission by the ST (T_Presence)

- maximum number of bytes of an applicative message (corresponds to n in figure 13); an applicative message with a greater size has to be segmented; all the segments have a size n except the last one.

- N_stum_max: maximum number of uplink messages which may be simultaneously managed by the ST (see also 7.1.1.2.11, 7.1.2.2.1 and 7.1.2.2.2). This number does not apply to the “polling” service described in 7.1.2.2.4 and 7.1.2.2.5 nor to the periodic service and nor to the “dedicated access” service described in 7.1.2.2.6 and 7.1.2.2.7.

- N_stum: number of uplink messages currently managed by the ST. Therefore, the UDT is allowed after this applicative connection to send (N_stum_max - N_stum) uplink messages without having received any radio acknowledgements. This number does not apply to the “polling” service described in 7.1.2.2.4

and 7.1.2.2.5 nor to the periodic service and nor to the “dedicated access” service described in 7.1.2.2.6 and 7.1.2.2.7.

Notes:

- the notion of DTAP interface version was created to solve interface compatibility problems. It is increased each time the interface is modified; the value corresponding to this document is given in chapter 7.1.4. With the knowledge of the ST supported interface version, the UDT can use with an optimal way the ST messages and not undertake services which would be unknown by the ST. The ST and UDT versions nevertheless may be sometimes incompatible (for instance, if the ST's version is lower than the lowest version supported by the UDT): if it happens, the UDT closes its link level service.

- if the ST's country and/or network are different from those owned by the UDT, the UDT closes its link level service.

- after the transmission of this message, the ST is waiting (duration T1) for the acknowledgement message UTS_CONNECT_ACK from the UDT. If the ST does not receive this message within T1, the ST closes its link level service.

Encoding:

. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1 .	
VERSION	1
RFSI ADDRESS	2 3 4 5 6
COUNTRY CODE	7
NETWORK CODE	8
POLLING TIMER DURATION	9
MAXIMUM MESSAGE LENGTH	10 11
ST MAXIMUM UPLINK MESSAGES NUMBER	12
ST CURRENT UPLINK MESSAGES NUMBER	13

Information Element (IE)	K	Values	Length
VERSION	M		1 byte
RFSI ADDRESS	M		5 bytes
COUNTRY CODE	M	All values reserved: see PAS 0001-3-1 et 0001-3-2	1 byte
NETWORK CODE	M	All values reserved: see PAS 0001-3-1 et 0001-3-2	1 byte
POLLING TIMER DURATION	M	Time in seconds	1 byte
MAXIMUM MESSAGE LENGTH	M		2 bytes
ST MAXIMUM UPLINK MESSAGES NUMBER	M		1 byte
ST CURRENT UPLINK MESSAGES NUMBER	M		1 byte

Figure 4: STU_CONNECT message format

The field K means: kind of information element: (M) Mandatory, (C) Conditional

7.1.1.2.2. UTS_CONNECT_ACK

Direction: UDT towards ST

Short description: acknowledgement for a DTAP connection request from the ST.

Parameters:

- UDT's DTAP interface version

- information about the UDT's identity:

    - UDT's country

    - UDT's network

- presence / absence of opened SDP application into the UDT

Notes:

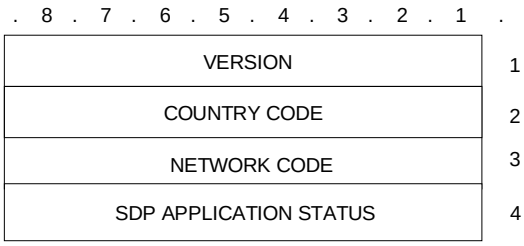
- after the receipt of this message, the ST is authorised to send the messages described below.

- with the knowledge of the UDT supported interface version, the ST can use with an optimal way the UDT messages and not undertake services which would be unknown by the UDT. The ST and UDT versions nevertheless may be sometimes incompatible (for instance, if the UDT's version is lower than the lowest version supported by the ST): if it happens, the ST closes its link level service.

- if the UDT's country and/or network are different from those owned by the ST, the ST closes its link level service.

- when no SDP application is opened on the UDT, the ST denies all SDP messages from the air interface, which allows the SDP "secured delivery service".

Encoding:



Information Element (IE)	K	Values	Length
VERSION	M		1 byte
COUNTRY CODE	M	All values reserved: see PAS 0001-3-1 et 0001-3-2	1 byte
PROJECT CODE	M	All values reserved: see PAS 0001-3-1 et 0001-3-2	1 byte
SDP APPLICATION STATUS	M	0x01 = SDP application presence 0x00 = SDP application absence	1 byte
Note 1 : in SDP_APPLICATION_STATUS field, only SDP application absence is used			

Figure 5: UTS_CONNECT_ACK message format

7.1.1.2.3. STU_ST_PRESENCE

Direction: ST towards UDT

Short description: ST presence indication

Parameters:

- none

Notes:

- after the transmission of this message, the ST is waiting (duration T5) for the acknowledgement message UTS_ST_PRESENCE_ACK from the UDT. If the ST does not receive this message within T5, the ST considers the UDT absent and closes its link level service. Note: the ST can also detect the absence of the UDT because of the link level deconnection (indication of closing for the link level service).

- the UDT is waiting for this message and detects the absence of the ST either because of its own timer expiry, either because of the link level deconnection (indication of closing for the link level service).

- the ST sends this polling message when its timer T_Presence expires (its duration is sent to the UDT in the message STU_CONNECT -polling timer duration-). The UDT expects such a polling message within a duration of 2*T_Presence. if its timer expires, the UDT closes its link level service.

- any other DTAP message sent by the ST is also considered as a polling message and involves the reset of the two timers.

Encoding:

STU_ST_PRESENCE has no information field.

7.1.1.2.4. UTS_ST_PRESENCE_ACK

Direction: UDT towards ST

Short description: UDT presence indication

Parameters:

- none

Notes:

- the UDT sends this message to acknowledge the message STU_ST_PRESENCE.

Encoding:

UTS_ST_PRESENCE_ACK has no information field.

7.1.1.2.5. STU_NETWORK_INFORMATION

Direction: ST towards UDT

Short description: "network" information indication: location of the ST in the network (registration cell -switch and base station-, registration base network), system operating mode, R field of the registration base network, registration state of the ST.

Parameters:

- system operating mode: normal mode, BN disconnected mode (fall back mode 1), MSW disconnected mode (fall back mode 2), RSW disconnected mode (fall back mode 3.1), BSC disconnected mode (fall back mode 3.2) or unknown mode (the terminal is not registered)

- R field of the registration base network; this parameter is set to "unknown" when the terminal is not registered.

- cell registration parameters of the terminal: switch, base station and base network; when the terminal is not registered, these parameters may be absent or may be set to "unknown"

- registration state of the terminal : not registered terminal, registered terminal, differed registration ; this field is allowed to be sent only if the ST's DTAP interface version is equal or higher than 4.

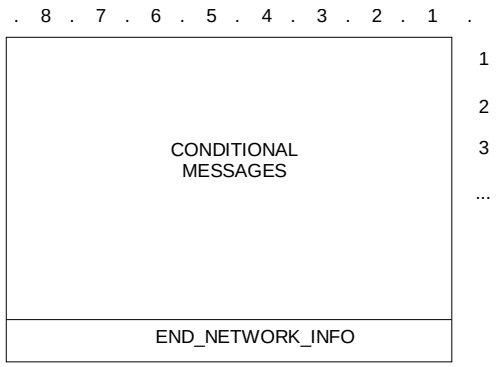
Notes:

- every parameter of this message is sent in TLV format (type, length, value). All the parameters are not always present.

- each change in one parameter initiates a new emission of the message including, at least, the modified parameter.

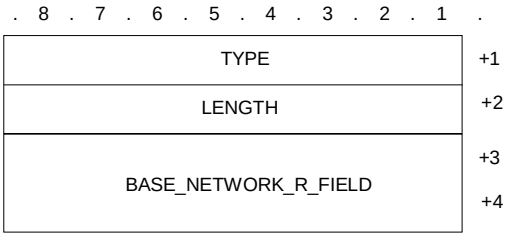
- after each DTAP connection, the message is sent again.

Encoding:



TYPE = 0x00 (R value of the registration base network)

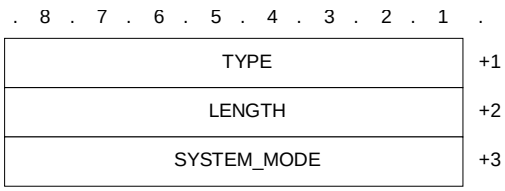
LENGTH = 2



0xFFFF = Unknown BN R field

TYPE = 0x01 (system operating mode)

LENGTH = 1

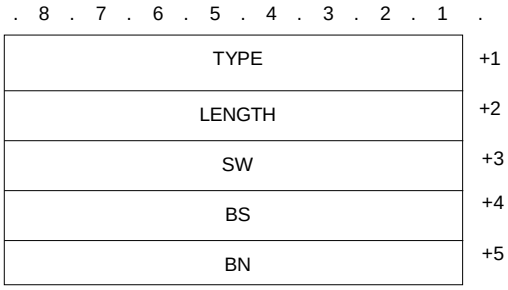


Values:

0x00 = Normal mode
0x01 = BN disconnected mode (FBM 1)
0x02 = MSW disconnected mode (FBM 2)
0x03 = RSW disconnected mode (FBM 3.1)
0x04 = BSC disconnected mode (FBM 3.2)
0xFF = Unknown mode

TYPE = 0x02 (registration cell parameters of the terminal)

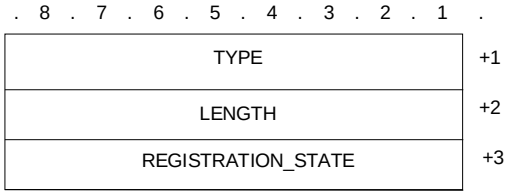
LENGTH = 3



0xFF = Unknown SW
0xFF = Unknown BS
0xFF = Unknown BN

TYPE = 0x03 (registration state of the terminal)

LENGTH = 1



0x00 = Not registered
0x01 = Registered
0x02 = Deferred registration

Information Element (IE)	K	Values	Length
CONDITIONAL MESSAGES	C	One or several of the above conditional messages may be used and concatenated	x byte
END_NETWORK_INFO	M	0xFF (last byte of the message)	1 byte

Figure 6: STU_NETWORK_INFORMATION message format

7.1.1.2.6. UTS_ST_CONTROL

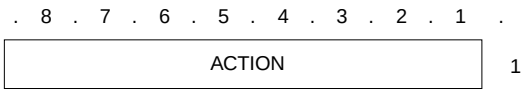
Direction: UDT towards ST

Short description: request to launch some specific action on the ST.

Parameters:

- action: 2 possibilities in this interface version: begin / stop to ring

Encoding:



Information Element (IE)	K	Values	Length
ACTION	M	0x00 begin to ring 0xFF stop to ring	1 byte

Figure 7: UTS_ST_CONTROL message format

7.1.1.2.7. STU_SERVICE_MESSAGE

Direction: ST towards UDT

Short description: indication of a service message

Parameters:

- length of the service message

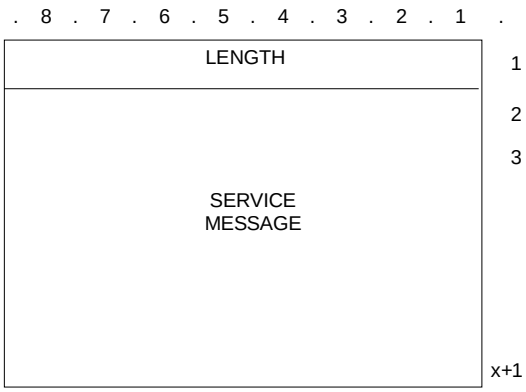
- service message

Notes:

- the service message function is not present on all projects. According to the project, the switch prevents or not from sending service messages to the terminals. No control is done by the terminal.

- a service message can not be longer than 253 bytes.

Encoding:



Information Element (IE)	K	Values	Length
LENGTH	M	x <= 253	1 byte
SERVICE MESSAGE	M		x bytes

Figure 8: STU_SERVICE_MESSAGE message format

7.1.1.2.8. UTS_PERIODIC_ACCESS_SUBSCRIPTION

Direction: UDT towards ST

Short description: request to ask for a subscription to the "periodic access" service or to cancel it

Parameters:

- MSB byte of UDP source port

- Characteristics of the “periodic access” radio service:

- Data length: this length defines the number of byte (only applicative byte) which is allocated to the terminal. In this version, maximum length is 9 bytes.

- Access profile on air interface: this profile determines the period, which is used to send messages on Air interface.

- Access class: this class is used to define the right to have a withdrawn service and to manage the DDCH congestion

Notes:

- The “ access class ” defines the mode of the “periodic access” service; the service can take values between 0 and 7:

0: meaning "periodic access service stop"

1: meaning that all the radio characteristics of the “periodic access” are given in the message with the class 1.

2: meaning that all the radio characteristics of the “periodic access” are given in the message with the class 2.

3: meaning that all the radio characteristics of the “periodic access” are given in the message with the class 3.

The other values are not used in this version (ST control).

- After the transmission of this message, the UDT is waiting (duration T2) for the acknowledgement message STU_PERIODIC_ACCESS_SUBSCRIPTION_ACK from the ST. If the UDT does not receive this message within T2, it locally considers that its request has failed.

    - The application can request a subscription to the "periodic access" service or cancel it;

    - The application can ask a modification of the parameter subscription after a subscription request

- in case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for a subscription or a cancellation acknowledgement, the UDT has to consider locally that its request has failed: the ST will not send the acknowledgement message STU_PERIODIC_ACCESS_ SUBSCRIPTION_ACK.

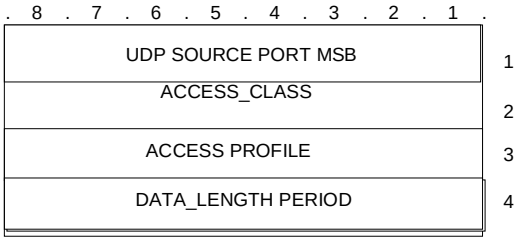
- in case of ST-UDT link failure, the periodic subscription is erased from the ST, that implies that the subscription has to be done at each DTAP connection opening.

- For a given UDP source port (MSB), the UDT is not allowed to modify its subscription to the "periodic access" service or to cancel it while its previous request is not acknowledged (unless T2 expires).

- in this version, the ST does not accept a second subscription to the "periodic access" service (for another UDP source port than the first one) but the interface has to authorise another subscription

- The UDT is allowed to send this request only if the ST's DTAP interface version is equal or higher than 5.

Encoding:



Information Element (IE)	K	Values	Length
SOURCE PORT MSB	M		1 byte
ACCESS_CLASS	M	0x00<= a <= 0x0F 0x00 = "no periodic access service subscription" 0x01 = "periodic access service subscription with all the radio characteristics given for access class 1" 0x02 = "periodic access service subscription with all the radio characteristics given for access class 2" 0x03 = "periodic access service subscription with all the radio characteristics given for access class 3"	1 byte
ACCESS _PROFILE	M	0x00 : profile P0 0x01 : profile P1 0x02 : profile P2 0x03 : profile P3 0x0F = not significant	1byte
DATA LENGTH	M	Size in number of byte Maximum number for this version : 9	1 byte

Figure **9** : UTS_PERIODIC_ACCESS_SUBSCRIPTION message format

7.1.1.2.9. UTS_POLLING_SUBSCRIPTION

Direction: UDT towards ST

Short description: request to take out a subscription to the “polling” service or to cancel it

Parameters:

- MSB byte of UDP source port

- polling service profile

Notes:

- the “polling” service profile defines both the polling frequency and the polling message format on the air interface; the profile can take values between 0 and 7, 0 meaning "polling service stop". The number of the authorised profiles varies according to the project and therefore some values between 1 and 7 may not be allowed (ST control).

- after the transmission of this message, the UDT is waiting (duration T2) for the acknowledgement message STU_POLLING_SUBSCRIPTION_ACK from the ST. If the UDT does not receive this message within T2, it locally considers that its request has failed.

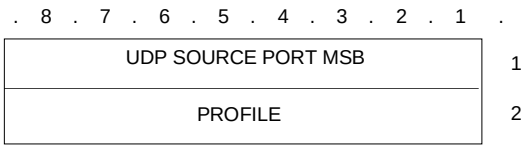
- the application can take out a subscription to the “polling” service or can cancel it; it can dynamically modify its “polling” service profile as well: in this case, it does not need to cancel at first the subscription.

- in case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for a subscription or a cancellation acknowledgement, the UDT has to consider locally that its request has failed: the ST will not send the acknowledgement message STU_POLLING_ SUBSCRIPTION_ACK.

- the UDT is not allowed to take out a subscription to the “polling” service or to cancel it while its previous request is not acknowledged (unless T2 expires).

- the UDT is allowed to send this request only if the ST's DTAP interface version is equal or higher than 2.

Encoding:



Information Element (IE)	K	Values	Length
SOURCE PORT MSB	M		1 byte
PROFILE	M	0<= x <= 7 0 = "no polling service subscription"	1 byte

Figure 10: UTS_POLLING_SUBSCRIPTION message format

7.1.1.2.10. STU_PERIODIC_ACCESS_SUBSCRIPTION_ACK

Direction: UDT towards ST

Short description: acknowledgement for a subscription to the "periodic access" service or cancellation request from the UDT

Parameters:

MSB byte of UDP source port

- Subscription result: ok / nok

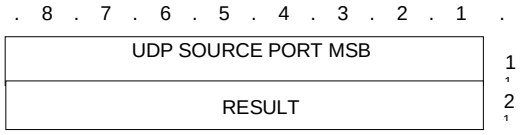
- Failure family (only if result = nok)

- Failure type of cause (only if result = nok)

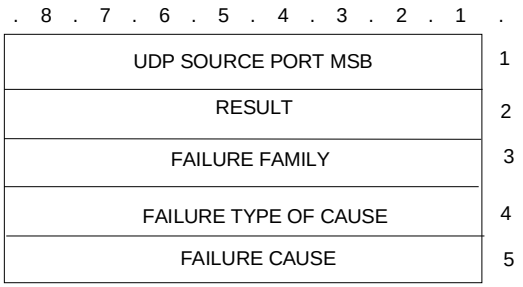
    - Failure cause (only if result = nok)

Encoding:

Result ok:



Result nok:



Information Element (IE)	K	Values	Length
REFERENCE	M		1 byte
RESULT	M	Subscription OK 0x01 Subscription NOK 0x02	1 byte
FAILURE FAMILY	C	Exceptional problem 0x01 Temporary problem 0x02 Network overload problem 0x03 Network problem 0x04 Subscriber problem 0x05	1 byte
FAILURE TYPE OF CAUSE	C	Protocol type 0x00 Internal application type 0x01 External application type 0x02	1 byte
FAILURE CAUSE	C	This information is only present for EADS investigation in case of malfunction.	1 byte

Figure 11:STU_PERIODIC_ACCESS_SUBSCRIPTION_ACK message format

7.1.1.2.11. STU_POLLING_SUBSCRIPTION_ACK

Direction: ST towards UDT

Short description: acknowledgement for a subscription to the “polling” service or cancellation request from the UDT

Parameters:

- subscription result: ok / nok

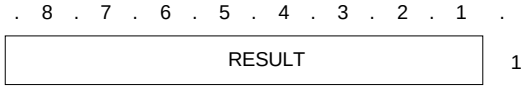
- failure family (only if result = nok)

- failure type of cause (only if result = nok)

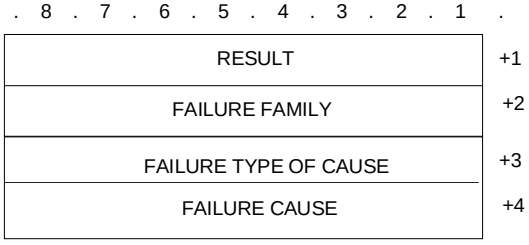
- failure cause (only if result = nok)

Encoding:

result ok:



result nok:



Information Element (IE)	K	Values	Length
RESULT	M	Subscription OK 0x01 Subscription NOK 0x02	1 byte
FAILURE FAMILY	C	Exceptional problem 0x01 Temporary problem 0x02 Network overload problem 0x03 Network problem 0x04 Subscriber problem 0x05	1 byte
FAILURE TYPE OF CAUSE	C	Protocol type 0x00 Internal application type 0x01 External application type 0x02	1 byte
FAILURE CAUSE	C	This information is only present for EADS investigation in case of malfunction.	1 byte

Figure 12: STU_POLLING_SUBSCRIPTION_ACK message format

7.1.1.2.12. UTS_DEDICATED_ACCESS_SUBSCRIPTION

Direction: UDT towards ST

Short description: request to take out a subscription to the "dedicated access" service or to cancel it

Parameters:

- MSB byte of UDP source port

- “dedicated access” service profile

- characteristics of the “dedicated access” radio service :

  - cell parameters : switch, base station and base network for the dedicated access

  - channel number : radio channel number (corresponding to a pair of radio frequencies) for the dedicated access

  - first super frame : first super frame number in the hyper frame for the dedicated access

  - first radio slot : first radio slot number in the first super frame for the dedicated access

  - access size : this size defines the number of slots (synchronization slot included) which are allocated to the terminal. In this version, the only allowed size is three slots (one synchronization slot and two data slots)

  - access period on air interface : the unit is 20 ms. In this version, all the allowed periods are multiple of 60 ms in accordance with the access size. The minimal period is 2 seconds. Moreover some values between 2 and 10 seconds are forbidden to guarantee the ST mobility function efficiency. The maximal period varies according to the project (is linked to the air interface hyper frame size which is a project parameter).

Notes:

- the “dedicated access” service profile defines the mode of the “dedicated access” service; the profile can take values between 0 and 7, 0 meaning "dedicated access service stop" and 1 meaning that all the radio characteristics of the “dedicated access” are given in the message. The other values are not used in this version (ST control).

- after the transmission of this message, the UDT is waiting (duration T2) for the acknowledgement message STU_DEDICATED_ACCESS_SUBSCRIPTION_ACK from the ST. If the UDT does not receive this message within T2, it locally considers that its request has failed.

- the application can take out a subscription to the "dedicated access" service or can cancel it; it can dynamically modify its characteristics as well (on the same port and same profile): in this case, it does not need to cancel at first the subscription.

- the application can take out a subscription regardless of the ST state registration and location but a data transmission request (UTS_DEDICATED_ACCESS_DATA_U message) will nevertheless be accepted only when the ST becomes registered under the indicated cell.

- in case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for a subscription or a cancellation acknowledgement, the UDT has to consider locally that its request has failed: the ST will not send the acknowledgement message STU_DEDICATED_ACCESS_ SUBSCRIPTION_ACK.

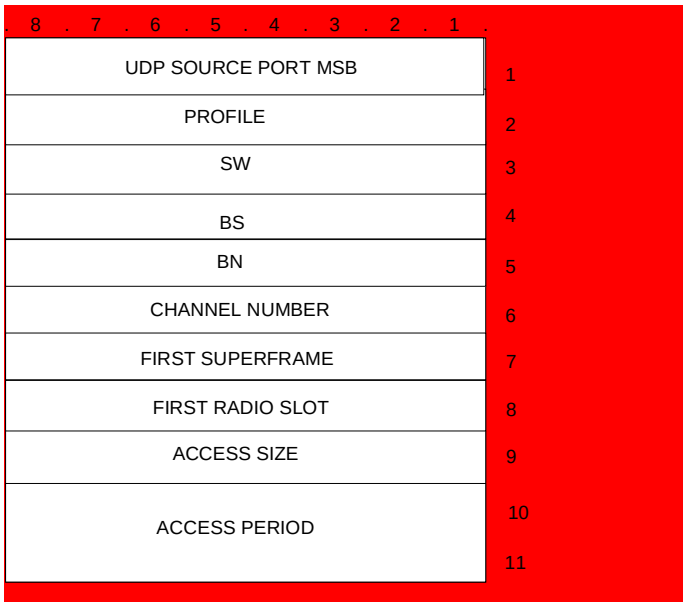
- in case of ST-UDT link failure, the subscription is erased from the ST, that implies that the subscription has to be done at each DTAP connection opening.

- for a given UDP source port (MSB), the UDT is not allowed to modify its subscription to the "dedicated access" service or to cancel it while its previous request is not acknowledged (unless T2 expires).

- in this version, the ST does not accept a second subscription to the "dedicated access" service (for another UDP source port than the first one)

- the UDT is allowed to send this request only if the ST's DTAP interface version is equal or higher than 4.

Encoding:



Information Element (IE)	K	Values	Length
SOURCE PORT MSB	M		1 byte
PROFILE	M	0<= a <= 7 0 = "no dedicated access service subscription" 1 = "dedicated access service subscription with all the radio characteristics given"	1 byte
SW	C		1 byte
BS	C		1 byte
BN	C		1 byte
CHANNEL NUMBER	C	1 <= b <= 11	1 byte
FIRST SUPERFRAME	C	0 <= c <= 255	1 byte
FIRST RADIO SLOT	C	0 <= d<= 199	1 byte
ACCESS SIZE	C	Size in number of slots (1 slot = 20ms) Only one allowed value in this version : 3	1 byte
ACCESS PERIOD	C	Period in number of slots (1 slot = 20ms) See notes for constraints.	2 bytes

Figure 13: UTS_DEDICATED_ACCESS_SUBSCRIPTION message format

7.1.1.2.12.1.STU_DEDICATED_ACCESS_SUBSCRIPTION_ACK

Direction: ST towards UDT

Short description: acknowledgement for a subscription to the "dedicated access" service or cancellation request from the UDT

Parameters:

MSB byte of UDP source port

- subscription result: ok / nok

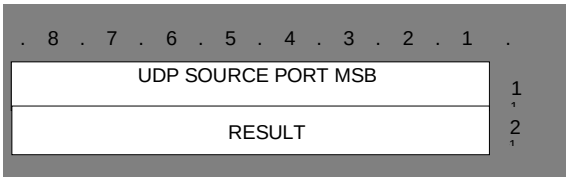
- failure family (only if result = nok)

- failure type of cause (only if result = nok)

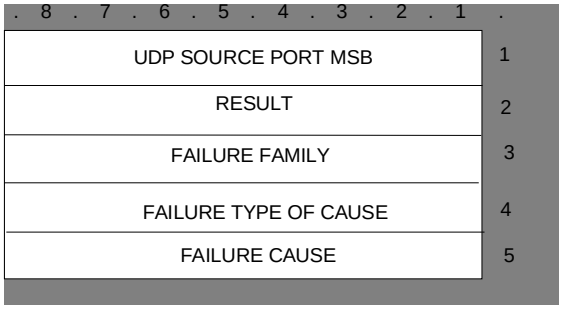
- failure cause (only if result = nok)

Encoding:

result ok:



result nok:



Information Element (IE)	K	Values	Length
RESULT	M	Subscription OK 0x01 Subscription NOK 0x02	1 byte
FAILURE FAMILY	C	Exceptional problem 0x01 Temporary problem 0x02 Network overload problem 0x03 Network problem 0x04 Subscriber problem 0x05	1 byte
FAILURE TYPE OF CAUSE	C	Protocol type 0x00 Internal application type 0x01 External application type 0x02	1 byte
FAILURE CAUSE	C	This information is only present for EADS investigation in case of malfunction.	1 byte

Figure 14: STU_DEDICATED_ACCESS_SUBSCRIPTION_ACK message format

7.1.1.2.13. UTS_UDT_APPLICATION_STATUS

Direction: UDT towards ST

Short description: indication of presence / absence of specific UDT applications.

Parameters:

- presence / absence of opened SDP application into the UDT

Notes:

- when no SDP application is opened on the UDT, the ST denies all SDP messages from the air interface, which allows the SDP "secured delivery service".

Encoding:

. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1 .	
SDP_APPLICATION_STATUS	1

Information Element (IE)	K	Values	Length
SDP APPLICATION STATUS	M	0x01 = SDP application presence 0x00 = SDP application absence	1 byte
Note 1 : in SDP_APPLICATION_STATUS field , only SDP application absence is used			

Figure 15: UTS_UDT_APPLICATION_STATUS message format

7.1.1.2.14. STU_ST_DATA_U_WINDOW_CHANGE

Direction: ST towards UDT

Short description: modification of the maximum number of uplink messages which may be simultaneously managed by the ST.

Parameters:

- N_stum_max: maximum number of uplink messages which may be simultaneously managed by the ST (see also 7.1.1.2.1, 7.1.2.2.1 and 7.1.2.2.2). This number does not apply to the “polling” service described in 7.1.2.2.4 and 7.1.2.2.5, nor to the periodic service and nor to the “dedicated access” service described in 7.1.2.2.6 and 7.1.2.2.7.

Notes:

- the ST is allowed to send this request only if the UDT's DTAP interface version is equal or higher than 3.

Encoding:

. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1 .	
ST MAXIMUM UPLINK MESSAGES NUMBER	1

Information Element (IE)	K	Values	Length
ST MAXIMUM UPLINK MESSAGES NUMBER	M		1 byte

Figure 16: STU_ST_DATA_U_WINDOW_CHANGE message format

7.1.1.2.15. UTS_ST_DATA_U_WINDOW_CHANGE_ACK

Direction: UDT towards ST

Short description: acknowledgement for the modification of the maximum number of uplink messages which may be simultaneously managed by the ST.

Parameters:

- none

Notes:

- the UDT sends this message to acknowledge the message STU_ST_DATA_U_WINDOW_CHANGE. The acknowledgement is compulsory: the UDT cannot deny the window modification.

Encoding:

UTS_ST_DATA_U_WINDOW_CHANGE_ACK has no information field.

7.1.2. Data message exchange stream

7.1.2.1. Overview

This stream allows to exchange the necessary information for a data message uplink transmission (UDT towards ST) or for a data message downlink transmission (ST towards UDT).

The data messages are referenced by an internal identifier of two bytes. Each end has its own internal identifier managed in its sending direction. This identifier is increased by 1 whenever a new message is transmitted.

There are three different streams for the uplink data messages:

- data transmission with the “polling” service: this stream, generally used to transmit short and periodic (or quasi-periodic) messages, allows to transmit data on the air interface with the “polling” radio service (data transmission after network polling).

- data transmission with the “dedicated access” service : this stream, generally used to transmit short and periodic (or quasi-periodic) messages, allows to transmit data on the air interface with the “dedicated access” radio service (data transmission on dedicated slots located on a dedicated radio frequency).

- data transmission with the “periodic service” : this stream, generally used to transmit short and periodic (or quasi-periodic) messages, allows to transmit data on the air interface with the “dedicated access” radio service (data transmission on dedicated slots located on a dedicated radio frequency).

- data transmission with another service

These streams are completely independent (acknowledgement messages, management rules ...).

7.1.2.2. Description of the messages

7.1.2.2.1. UTS_DATA_U

Direction: UDT towards ST

Short description: request for an uplink data transfer

Parameters:

- internal identifier

- length of data

- data in MC9600 data format: header 1 + header 2 + body

Notes:

- The length of data is limited to 1472 bytes plus the length of header : 1486 bytes.

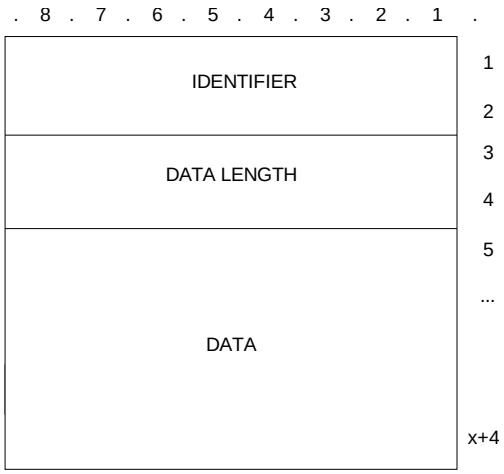
- The ST analyses several fields of the headers 1 and 2: to get the transmission mode of the message on the air interface (connected mode or datagram mode, ...), the transmission priority on the air interface.

- After the transmission of this message, the UDT is waiting (duration T3) for the radio acknowledgement (message STU_RADIO_TRANSMISSION_ACK) from the ST. This radio acknowledgement may be positive or negative. If the UDT does not receive this message within T3, it has to consider that the data transmission on the air interface has failed (same behaviour as on a negative radio acknowledgement). In case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the radio acknowledgement, the UDT has to consider in the same way that the data transmission on the air interface has failed (same behaviour as on a negative radio acknowledgement).

- After the transmission of this message, the number of uplink messages currently managed by the ST (N_stum) is increased by 1. The UDT is then allowed to send (N_stum_max - N_stum) other uplink data transfer request before receiving any radio acknowledgement (message STU_RADIO_TRANSMISSION _ACK) for a previous request, unless the ST-UDT link fails (receipt of an indication of closing for the link level service) or T3 expires.

- In case of mistake on a field of the headers 1 or 2 or on the length of data (greater than 1486 bytes), the ST sends a negative acknowledgement for the request.

Encoding:



Information Element (IE)	K	Values	Length
IDENTIFIER	M		2 bytes
DATA LENGTH	M	x<= 1486	2 bytes
DATA	M		x bytes

Figure 17: UTS_DATA_U message format

7.1.2.2.2. STU_RADIO_TRANSMISSION_ACK

Direction: ST towards UDT

Short description: positive or negative radio acknowledgement for an uplink data transfer request from the UDT

Parameters:

- internal identifier

- radio transmission result: ok / nok

- failure family (only if result = nok)

- failure type of cause (only if result = nok)

- failure cause (only if result = nok)

Notes:

- the radio acknowledgement is a radio transmission acknowledgement: it means, when it is positive, that the base station has received the data. It is not a radio emission acknowledgement like the messages STU_POLLING_EMISSION_ACK or STU_PERIODIC_ACCESS_EMISSION_ACK or STU_DEDICATED_ACCESS_EMISSION_ACK which mean, when they are positive, that the terminal has sent the data.

- the UDT uses the fields "failure family", "failure type of cause" and "failure cause" to report through the Control and Supervision Driver (see chapter 4.2 and [7]) the transmission failures of the uplink data messages.

- After the transmission of this message, the number of uplink messages currently managed by the ST (N_stum) is decreased by 1. The UDT is then allowed to send (N_stum_max - N_stum) other uplink data transfer request.

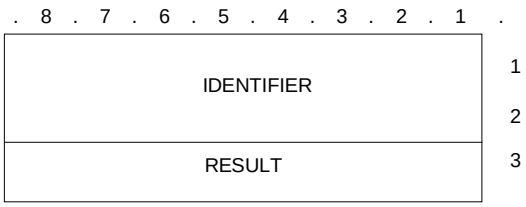
- If the ST receives a new uplink data transfer request while it already currently manages (N_stum = N_stum_max) uplink messages, it sends a negative radio acknowledgement for this new message.

- in case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the radio acknowledgement, the UDT has to consider that the data transmission on the air interface has failed (see note on the message UTS_DATA_U). On the terminal side, the link failure does not affect the radio transmission of the data over the air interface. The radio transmission acknowledgement is either forgotten if the ST-UDT link is still cut when the terminal wants to send it, either sent if the ST and UDT are linked again.

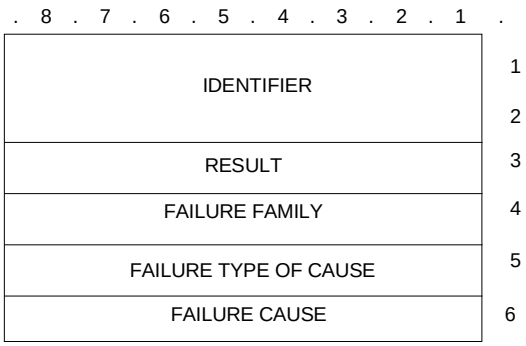
- because of the previously mentioned reason, the UDT may receive a radio acknowledgement message with a wrong internal identifier: if it happens, the UDT ignores the message.

Encoding:

result ok:



result nok:



Information Element (IE)	K	Values	Length
IDENTIFIER	M	Internal identifier	2 bytes
RESULT	M	Radio transmission OK 0x01 Radio transmission NOK 0x02	1 byte
FAILURE FAMILY	C	Exceptional problem 0x01 Temporary problem 0x02 Network overload problem 0x03 Network problem 0x04 Subscriber problem 0x05	1 byte
FAILURE TYPE OF CAUSE	C	Protocol type 0x00 Internal application type 0x01 External application type 0x02	1 byte
FAILURE CAUSE	C	This information is only present for EADS investigation in case of malfunction.	1 byte

Figure 18: STU_RADIO_TRANSMISSION_ACK message format

7.1.2.2.3. STU_DATA_D

Direction: ST towards UDT

Short description: request for an downlink data transfer

Parameters:

- internal identifier

- data length

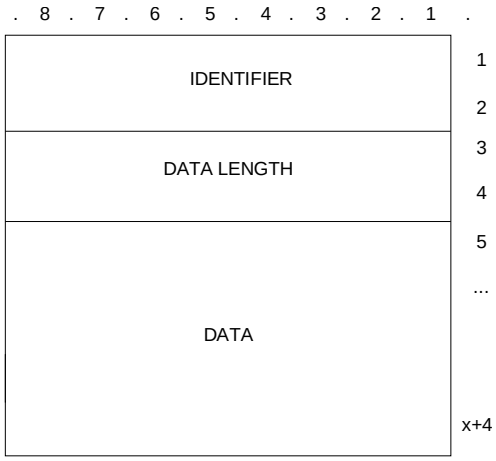
- data in MC9600 data format: header 1 + header 2 + body

Notes:

- the data length is limited to 1472 bytes plus length of header: 1486 bytes.

- the internal identifier allows the UDT to handle cleverly a second transmission of a downlink message after a ST-UDT link failure: if the message has already been received, it is not taken again into account.

- on receipt of the link level acknowledgement (the last one if the message is segmented), the ST erases the data in its saved memory M2 and is able to accept again a downlink data transfer on the air interface.



Information Element (IE)	K	Values	Length
IDENTIFIER	M		2 bytes
DATA LENGTH	M	x<= 1486	2 bytes
DATA	M		x bytes

Figure 19: STU_DATA_D message format

7.1.2.2.4. UTS_POLLING_DATA_U

Direction: UDT towards ST

Short description: request for an uplink data transfer with the “polling” service

Parameters:

- “polling” service profile

- internal identifier

- data length

- data in MC9600 data format: header 1 + header 2 + body

Notes:

- the data length is limited to 255 bytes however it has to be consistent with the “polling” service profile.

- the ST analyses several fields of the headers 1 and 2: to get the transmission mode of the message on the air interface (datagram mode -compulsory for the “polling” service-, ...), the transmission priority on the air interface ...

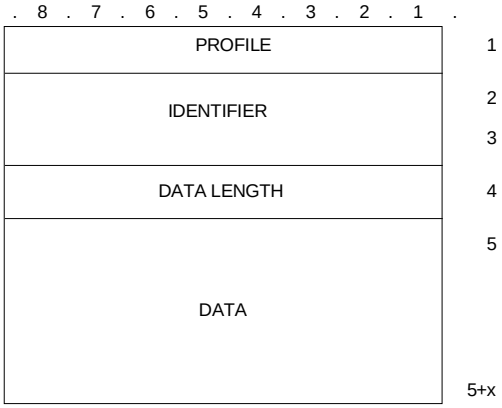
- after the transmission of this message, the UDT is waiting (duration T4) for the acknowledgement (message STU_POLLING_EMISSION_ACK) from the ST. This radio emission acknowledgement may be positive or negative. If the UDT does not receive this message within T4, it has to consider that the data emission on the air interface has failed (same behaviour as on a negative radio emission acknowledgement). In case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the radio emission acknowledgement, the UDT has to consider in the same way that the data emission on the air interface has failed (same behaviour as on a negative radio emission acknowledgement).

- the UDT is allowed to send another uplink data transfer request to the ST before receiving the radio emission acknowledgement (message STU_POLLING_EMISSION_ACK) for its previous request. Nevertheless, as the ST owns only one emission buffer, this new message replaces the previous one.

- in case of mistake on a field of the headers 1 or 2 or on the length of the transmitted data, the ST sends a negative radio emission acknowledgement to the request.

- the UDT is allowed to send this request only if the ST's DTAP interface version is equal or higher than 2.

Encoding:



Information Element (IE)	K	Values	Length
PROFILE	M	1<= y <= 7	1 byte
IDENTIFIER	M		2 bytes
DATA LENGTH	M	x <= 255	1 byte
DATA	M		x bytes

Figure 20: UTS_POLLING_DATA_U message format

7.1.2.2.5. STU_POLLING_EMISSION_ACK

Direction: ST towards UDT

Short description: positive or negative radio emission acknowledgement for an uplink data transfer request with the “polling” service from the UDT

Parameters:

- internal identifier

- radio transmission result: ok / nok

- failure family (only if result = nok)

- failure type of cause (only if result = nok)

- failure cause (only if result = nok)

Notes:

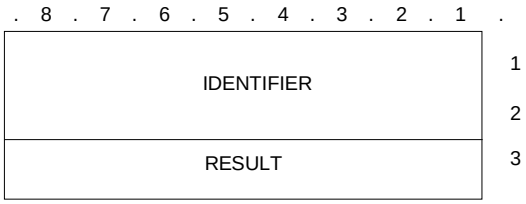
- this acknowledgement is a radio emission acknowledgement: it means, when it is positive, that the terminal has sent the data on the air interface. It is not a radio transmission acknowledgement like the message STU_RADIO_TRANSMISSION_ACK which means, when it is positive, that the base station has received the data.

- the UDT uses the fields "failure family", "failure type of cause" and "failure cause" to report through the Control and Supervision Driver (see chapter 4.2 and [7]) the transmission failures of the uplink data messages with the “polling” service.

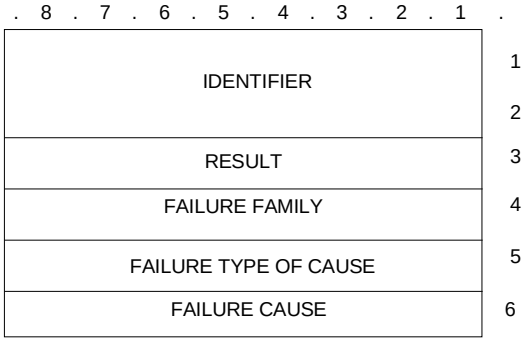
- in case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the acknowledgement, the UDT has to consider that the data emission on the air interface has failed (see note on the message UTS_POLLING_DATA_U). If the ST receives a new uplink data transfer request with the “polling” service while an uplink data transfer with the “polling” service is not yet completed, it sends a negative acknowledgement for the old message.

Encoding:

result ok:



result nok:



Information Element (IE)	K	Values	Length
IDENTIFIER	M	Internal identifier	2 bytes
RESULT	M	Radio emission OK 0x01 Radio emission NOK 0x02	1 byte
FAILURE FAMILY	C	Exceptional problem 0x01 Temporary problem 0x02 Network overload problem 0x03 Network problem 0x04 Subscriber problem 0x05	1 byte
FAILURE TYPE OF CAUSE	C	Protocol type 0x00 Internal application type 0x01 External application type 0x02	1 byte
FAILURE CAUSE	C	This information is only present for EADS investigation in case of malfunction.	1 byte

Figure 21: STU_POLLING_EMISSION_ACK message format

7.1.2.2.6. UTS_DEDICATED_ACCESS_DATA_U

Direction: UDT towards ST

Short description: request for an uplink data transfer with the “dedicated access” service

Parameters:

- “dedicated access” service profile

- internal identifier

- data length

- data in MC9600 data format: header 1 + header 2 + body

Notes:

- the data length is limited to 255 bytes however it has to be consistent with the parameter “access size” specified at the subscription of service.

- the ST analyses several fields of the headers 1 and 2: to get the transmission mode of the message on the air interface (datagram mode -compulsory for the “dedicated access” service-, ...), the MSB byte of UDP source port, the transmission priority on the air interface...

- after the transmission of this message, the UDT is waiting (duration T4) for the acknowledgement (message STU_DEDICATED_ACCESS_EMISSION_ACK) from the ST. This radio emission acknowledgement may be positive or negative. If the UDT does not receive this message within T4, it has to consider that the data emission on the air interface has failed (same behaviour as on a negative radio emission acknowledgement). In case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the radio emission acknowledgement, the UDT has to consider in the same way that the data emission on the air interface has failed (same behaviour as on a negative radio emission acknowledgement).

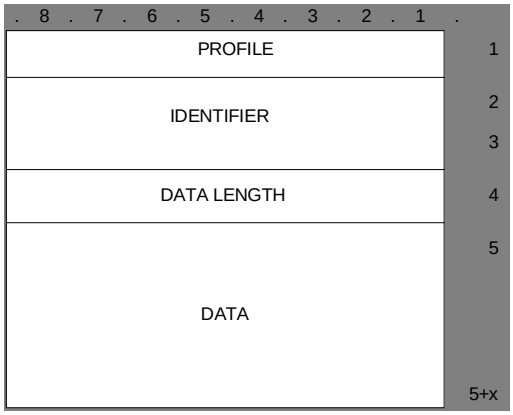
- the UDT is allowed to send another uplink data transfer (on dedicated access) request to the ST before receiving the radio emission acknowledgement (message STU_DEDICATED_ACCESS_ EMISSION_ACK) for its previous request. Nevertheless, as the ST owns only one emission buffer, this new message replaces the previous one.

- in case of mistake on a field of the headers 1 or 2 or on the length of the transmitted data, the ST sends a negative radio emission acknowledgement to the request.

- in case of inconsistency between the ST cell registration capabilities and the parameters defined for the dedicated service (if the ST registration cell parameters are different from the cell parameters defined for the dedicated access radio service or if the channel number defined for the dedicated access radio service doesn’t exist under the cell or if the data size is not compatible with the requested access size), the ST sends a negative radio emission acknowledgement to the request.

- the UDT is allowed to send this request only if the ST's DTAP interface version is equal or higher than 4.

Encoding:



Information Element (IE)	K	Values	Length
PROFILE	M	y = 1	1 byte
IDENTIFIER	M		2 bytes
DATA LENGTH	M	x <= 255	1 byte
DATA	M		x bytes

Figure 22: UTS_DEDICATED_ACCESS_DATA_U message format

7.1.2.2.7. STU_DEDICATED_ACCESS_EMISSION_ACK

Direction: ST towards UDT

Short description: positive or negative radio emission acknowledgement for an uplink data transfer request with the “dedicated access” service from the UDT

Parameters:

- internal identifier

- radio transmission result: ok / nok

- failure family (only if result = nok)

- failure type of cause (only if result = nok)

- failure cause (only if result = nok)

Notes:

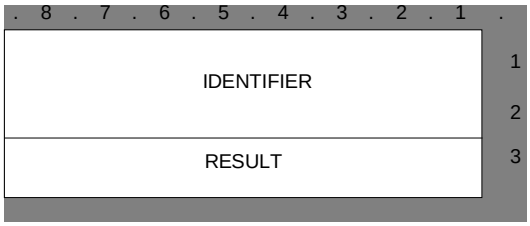
- this acknowledgement is a radio emission acknowledgement: it means, when it is positive, that the terminal has sent the data on the air interface. It is not a radio transmission acknowledgement like the message STU_RADIO_TRANSMISSION_ACK which means, when it is positive, that the base station has received the data.

- the UDT uses the fields "failure family", "failure type of cause" and "failure cause" to report through the Control and Supervision Driver (see chapter 4.2 and [7]) the transmission failures of the uplink data messages with the “dedicated access” service.

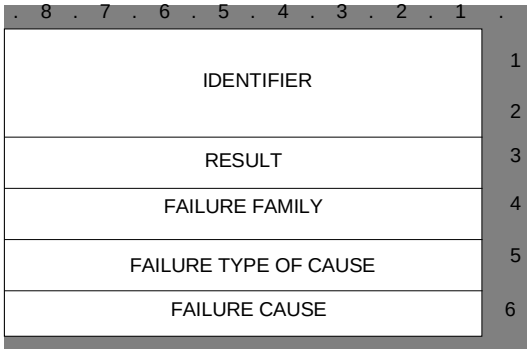
- in case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the acknowledgement, the UDT has to consider that the data emission on the air interface has failed (see note on the message UTS_DEDICATED_ACCESS_DATA_U). If the ST receives a new uplink data transfer request with sending on dedicated access service while an uplink data transfer with sending on dedicated access service is not yet completed, it sends a negative acknowledgement for the old message.

Encoding:

result ok:



result nok:



Information Element (IE)	K	Values	Length
IDENTIFIER	M	Internal identifier	2 bytes
RESULT	M	Radio emission OK 0x01 Radio emission NOK 0x02	1 byte
FAILURE FAMILY	C	Exceptional problem 0x01 Temporary problem 0x02 Network overload problem 0x03 Network problem 0x04 Subscriber problem 0x05	1 byte
FAILURE TYPE OF CAUSE	C	Protocol type 0x00 Internal application type 0x01 External application type 0x02	1 byte
FAILURE CAUSE	C	This information is only present for EADS investigation in case of malfunction.	1 byte

Figure 23: STU_DEDICATED_ACCESS_EMISSION_ACK message format

7.1.2.2.8. UTS_PERIODIC_ACCESS_DATA_U

Direction: UDT towards ST

Short description: request for an uplink data transfer with the “periodic access” service

Parameters:

- Internal identifier

- Data length

- Data in MC9600 data format: header 1 + header 2 + body

Notes:

- The data length is limited to 255 bytes however it has to be consistent with the maximum length determined at the subscription of service - The ST analyses several fields of the headers 1 and 2: to get the transmission mode of the message on the air interface (datagram mode -compulsory for the "dedicated access" service-...), the MSB byte of UDP source port, the transmission priority on the air interface...

  - After the transmission of this message, the UDT is waiting (duration T4) for the acknowledgement (message STU_PERIODIC_ACCESS_EMISSION_ACK) from the ST. This radio emission acknowledgement may be positive or negative. If the UDT does not receive this message within T4, it has to consider that the data emission on the air interface has failed (same behaviour as on a negative radio emission acknowledgement).

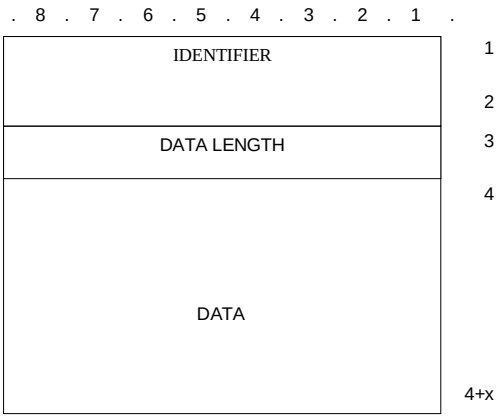
  - in case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the radio emission acknowledgement, the UDT has to consider in the same way that the data emission on the air interface has failed (same behaviour as on a negative radio emission acknowledgement).

- The UDT is allowed to send another uplink data transfer request to the ST before receiving the radio emission acknowledgement (message STU_PERIODIC_ACCESS_ EMISSION_ACK) for its previous request. Nevertheless, as the ST owns only one emission buffer, this new message replaces the previous one for the same application. In case of different application, RT memorises one message for each subscribed application.

- In case of mistake on a field of the headers 1 or 2 or on the length of the transmitted data, the ST sends a negative radio emission acknowledgement to the request.

- The UDT is allowed to send this request only if the ST's DTAP interface version is equal or higher than 5.

Encoding:



Information Element (IE)	K	Values	Length
IDENTIFIER	M		2 bytes
DATA LENGTH	M	x <= 255	1 byte
DATA	M		x bytes

Figure 24: UTS_PERIODIC_ACCESS_DATA_U message format

7.1.2.2.9. STU_PERIODIC_ACCESS_EMISSION_ACK

Direction: ST towards UDT

Short description: positive or negative radio emission acknowledgement for an uplink data transfer request with the "periodic access" service from the UDT

Parameters:

- Internal identifier

- Radio transmission result: ok / nok

- Failure family (only if result = nok)

- Failure type of cause (only if result = nok)

- Failure cause (only if result = nok)

Notes:

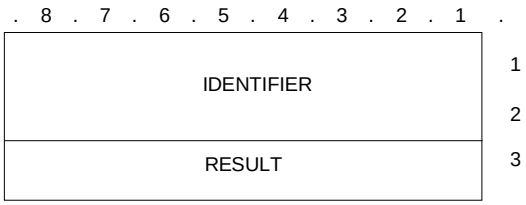
- This acknowledgement is a radio emission acknowledgement: it means, when it is positive, that the terminal has sent the data on the air interface. It is not a radio transmission acknowledgement like the message STU_RADIO_TRANSMISSION_ACK which means, when it is positive, that the base station has received the data.

- The UDT uses the fields "failure family", "failure type of cause" and "failure cause" to report through the Control and Supervision Driver (see chapter 4.2 and [7]) the transmission failures of the uplink data messages with the “dedicated access” service.

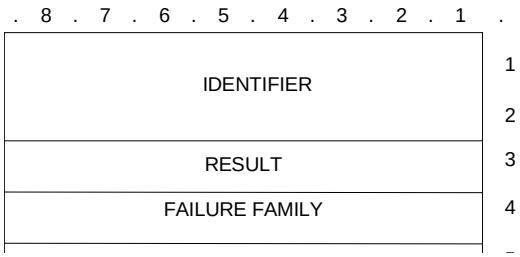
- In case of ST-UDT link failure (receipt of an indication of closing for the link level service) while the UDT is waiting for the acknowledgement, the UDT has to consider that the data emission on the air interface has failed (see note on the message UTS_PERIODIC_ACCESS_DATA_U). If the ST receives a new uplink data transfer request with sending on dedicated access service while an uplink data transfer with sending on dedicated access service is not yet completed, it sends a negative acknowledgement for the old message.

Encoding:

Result ok:



Result nok:



Information Element (IE)	K	Values	Length
IDENTIFIER	M	Internal identifier	2 bytes
RESULT	M	Radio emission OK 0x01 Radio emission NOK 0x02	1 byte
FAILURE FAMILY	C	Exceptional problem 0x01 Temporary problem 0x02 Network overload problem 0x03 Network problem 0x04 Subscriber problem 0x05	1 byte
FAILURE TYPE OF CAUSE	C	Protocol type 0x00 Internal application type 0x01 External application type 0x02	1 byte
FAILURE CAUSE	C	This information is only present for EADS investigation in case of malfunction.	1 byte

Figure 25: STU_PERIODIC_ACCESS_EMISSION_ACK message format

7.1.3. data in MC9600 data format

description of field data for downlink packet:

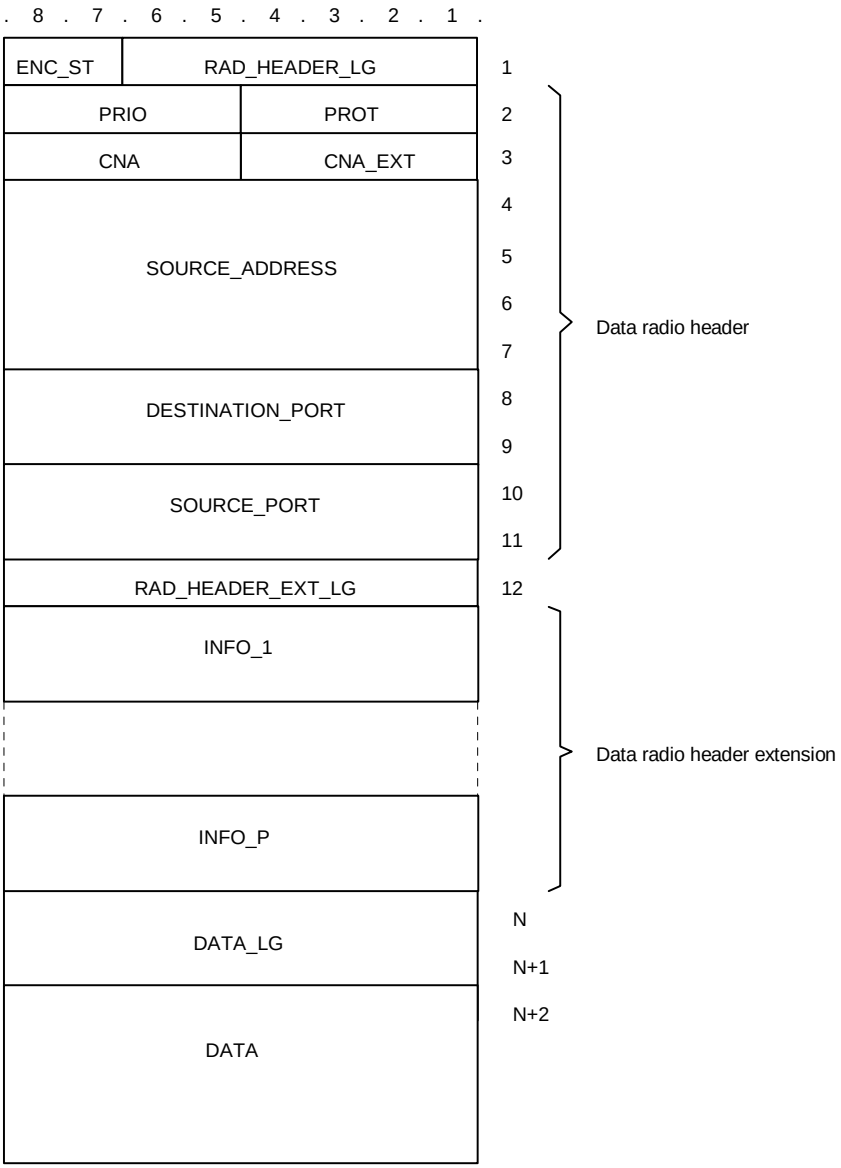


Figure 26:: **DOWNLINK PACKET format**

Table 1: DOWNLINK UDT-ST MESSAGE IP information elements list

IE	K	Condition	F	Length
ENC_ST	M	Shall define the encryption request 01 mandatory encryption 10 facultative encryption	V	2 bits
RAD_HEADER_LG	M	indicates the length of the radio header starting at the following octet 0x0A	V	6 bits
PRIO	M	Shall define the external priority 0011 Routine 0111 Urgent 1011 Flash	V	4 bits
PROT	M	Shall define the supported protocols 1000 UDP	V	4 bits
CNA	M	Shall define the address type 0111 Extension value	V	4 bits
CNA_EXT	M	0001 IP V4 formatting 0010 MC9600 binary formatting	V	4 bits
SOURCE_ADDRESS	M		V	4 octets
DESTINATION_PORT	M		V	2 octets
SOURCE_PORT	M		V	2 octets
RADIO_HEADER_EXT_LG	M	indicates the length of the radio header extension starting at the following octet 0x00	V	1 octet
INFO_1 to INFO_P	O	Not used	TLV	variable
DATA_LG	M	indicates the length of the data field starting at the following octet	V	2 octets
DATA	O		V	variable

description of field data for uplink packet:

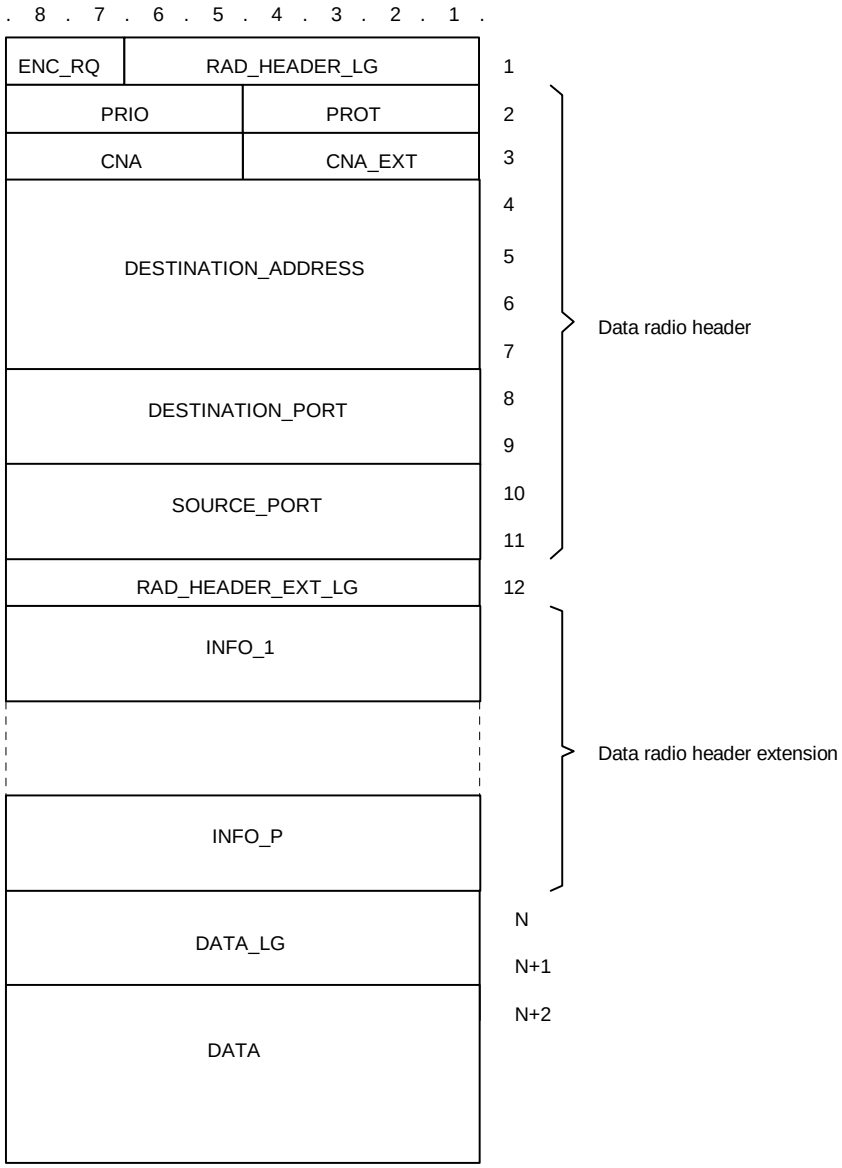


Figure 27: UPLINK PACKET format

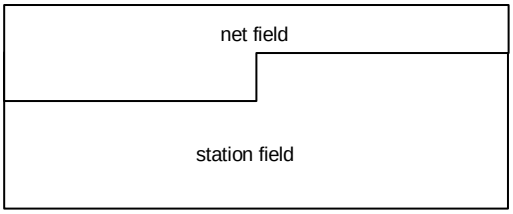
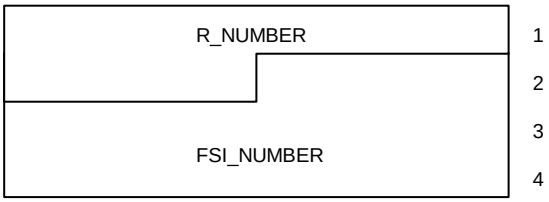
Table 2: UPLINK PACKET information elements list

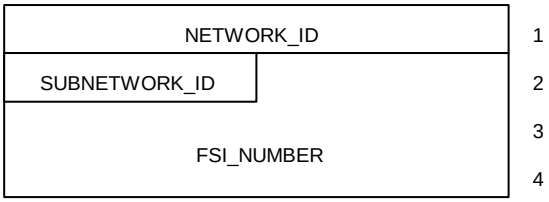
IE	K	Condition	F	Length
ENC_RQ	M	Shall define the encryption request 01 mandatory encryption 10 facultative encryption	V	2 bits
RAD_HEADER_LG	M	indicates the length of the radio header starting at the following octet 0x0A	V	6 bits
PRIO	M	Shall define the external priority 0011 Routine 0111 Urgent 1011 Flash	V	4 bits
PROT	M	Shall define the supported protocols 1000 UDP	V	4 bits
CNA	M	Shall define the address type 0111 Extension value	V	4 bits
CNA_EXT	M	0001 IP V4 formatting 0010 MC9600 binary formatting	V	4 bits
DESTINATION_ADDRESS	M		V	4 octets
DESTINATION_PORT	M		V	2 octets
SOURCE_PORT	M		V	2 octets
RADIO_HEADER_EXT_LG	M	indicates the length of the radio header extension starting at the following octet 0x00	V	1 octet
INFO_1 to INFO_P	O	Not used	TLV	variable
DATA_LG	M	indicates the length of the data field starting at the following octet	V	2 octets
DATA	O		V	variable

7.1.4. address MC9600 data format

<table>
<tr><td>DESTINATION_ADDRESS</td><td>Shall define the destination address format for IP data transmission.</td></tr>
<tr><td>IP external addressing</td><td>For the extra-MC9600 IP addressing, the IP V4 addressing is fully supported. The field address type (CNA/CNA_EXT) shall be set to "IP V4 formatting"

For the intra-MC9600 IP addressing, the following format shall be applied

. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1
 
</td></tr>
<tr><td>IP individual addressing</td><td>CNA/CNA_EXT = "binary formatting"
. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1
 

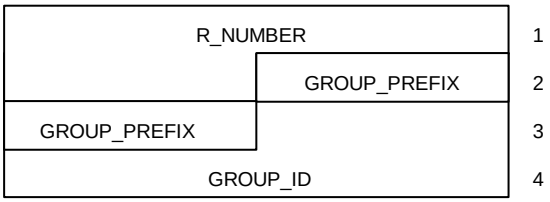
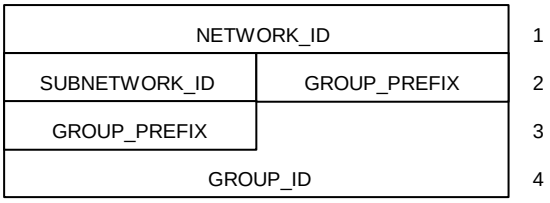
CNA/CNA_EXT = "IP V4 formatting"
. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1
 

R_NUMBERField of 12 bits
R part of the RFSI number. Binary coding, from 0 to 999.

NETWORK_ID Field of 8 bits
From 1 to 8 (A class IP network), defined by the following operation:
NETWORK_ID = Integer part (RN system number / 16) + 1

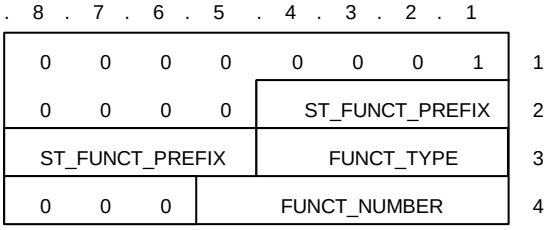
SUBNETWORK_ID Field of 4 bits
From 0 to 15, defined by the following operation:
SUBNETWORK_ID = (RN system number) modulo 16

FSI_NUMBER Field of 20 bits
FSI part of the RFSI number. Binary coding, from 0 to 999 999</td></tr>
</table>

IP group addressing	CNA/CNA_EXT = "binary formatting" . 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1  CNA/CNA_EXT = "IP V4 formatting" . 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1  GROUP_PREFIX Field of 8 bits 11110110 Group address GROUP_ID Field of 12 bits see <R9>

ST dedicated IP functional address

CNA/CNA_EXT = "IP V4 formatting"



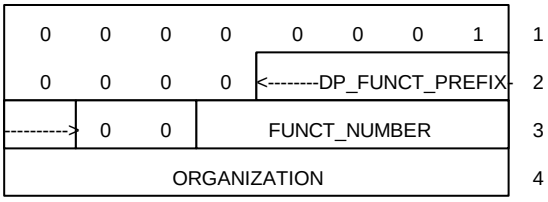
ST_FUNCT_PREFIX Field of 8 bits
11110101 ST dedicated functional address

FUNCT_TYPE Field of 4 bits
0000 local IP functional address
0001 nominal IP functional address

FUNCT_NUMBER Field of 5 bits
From 0 to 31, binary coding

DP dedicated IP functional address

CNA/CNA_EXT = "IP V4 formatting"



DP_FUNCT_PREFIX Field of 5 bits
11111 DP dedicated functional address

FUNCT_NUMBER Field of 5 bits
From 0 to 31, binary coding

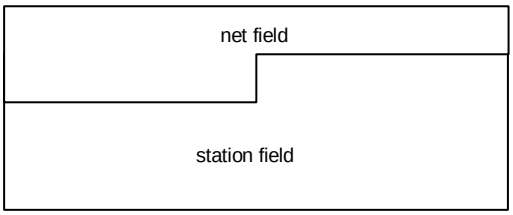
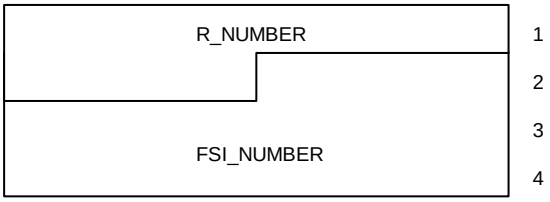
ORGANIZATION Field of 8 bits
From 0 to 255, binary coding

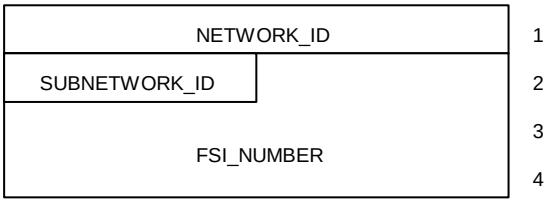
<table>
<tr><td>SOURCE_ADDRESS

IP external addressing</td><td>Shall define the source address format for IP data transmission.

For the extra-MC9600 IP addressing, the IP V4 addressing is fully supported. The field address type (CNA/CNA_EXT) shall be set to "IP V4 formatting"

For the intra-MC9600 IP addressing, the following format shall be applied

. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1
 
</td></tr>
<tr><td>IP individual addressing</td><td>CNA/CNA_EXT = "binary formatting"
. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1
 

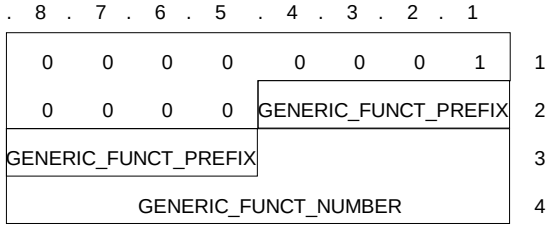
CNA/CNA_EXT = "IP V4 formatting"
. 8 . 7 . 6 . 5 . 4 . 3 . 2 . 1
 

R_NUMBERField of 12 bits
R part of the RFSI number. Binary coding, from 0 to 999.

NETWORK_ID Field of 8 bits
From 1 to 8 (A class IP network), defined by the following operation:
NETWORK_ID = Integer part (RN system number / 16) + 1

SUBNETWORK_ID Field of 4 bits
From 0 to 15, defined by the following operation:
SUBNETWORK_ID = (RN system number) modulo 16

FSI_NUMBER Field of 20 bits
FSI part of the RFSI number. Binary coding, from 0 to 999 999</td></tr>
</table>

IP generic functional address	CNA/CNA_EXT = "IP V4 formatting"  GENERIC_FUNCT_PREFIX Field of 8 bits 11110101 generic functional address GENERIC_FUNCT_NUMBER Field of 12 bits 000000000000 Server generic address 000000000001 Dispatcher generic address

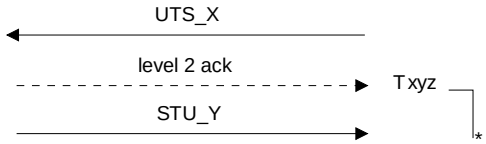
7.1.5. Applicative protocol

The purpose of this chapter is to highlight some significant data flows diagrams between the ST and the UDT.

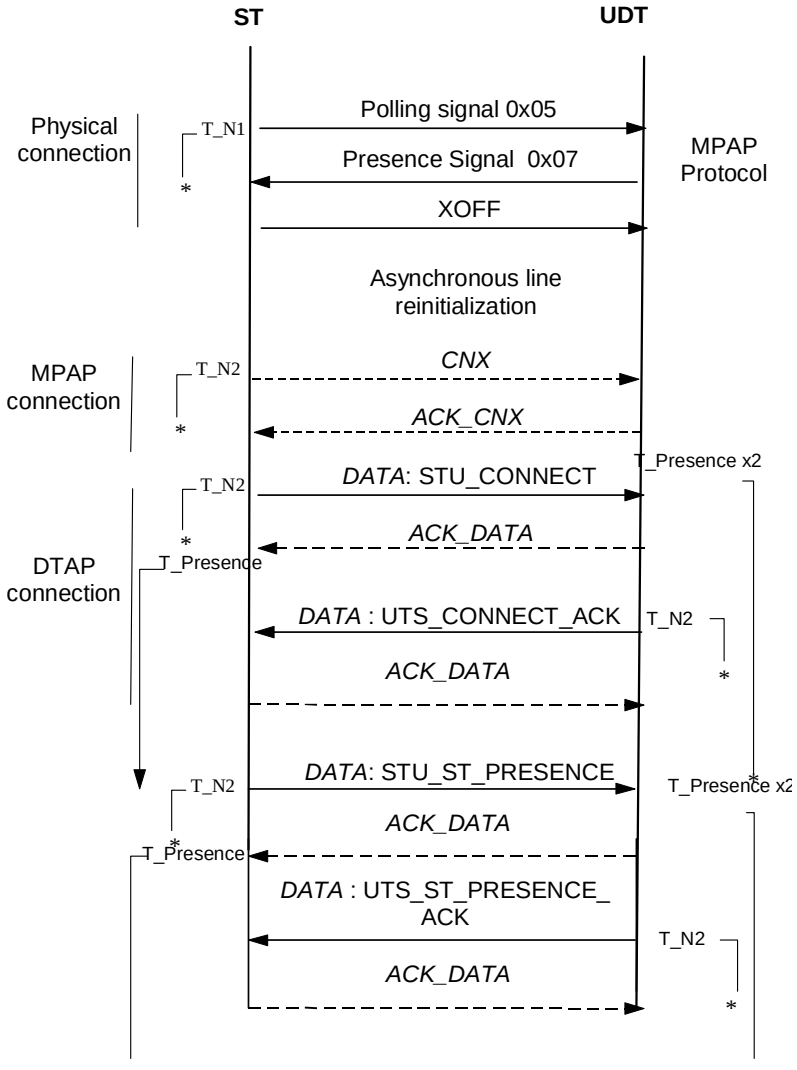
In the first diagram (7.1.3.1.), the three levels (physical, link -MPAP- and applicative -DTAP-) undertaken on the UDT-ST link are shown with the associated timers.

In the next diagrams, we show only the applicative DTAP exchanges and the link level acknowledgements of these DTAP messages. Timers are not shown any more.

Note: the link level exchanges (MPAP) are shown with a dotted line:



7.1.5.1. Connection establishment and supervision



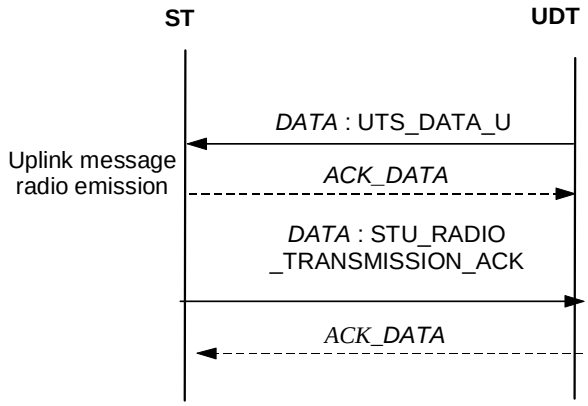
Note: in order not to overload the diagram, timers T1 et T5 are not shown.

T_N1: see chapter 4.3.

T_N2: link level timer for frame acknowledgement: see [8] chapter 7.3.2.

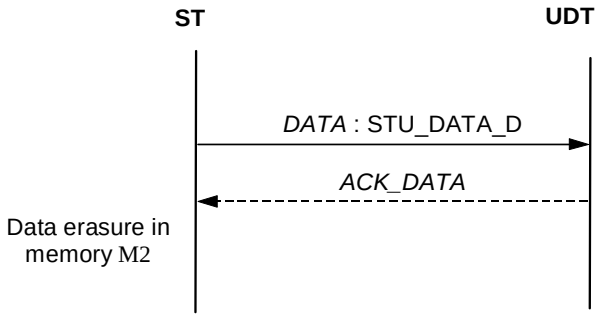
T_Presence: see chapter 7.1.1.2.1.

7.1.5.2. Uplink data transmission



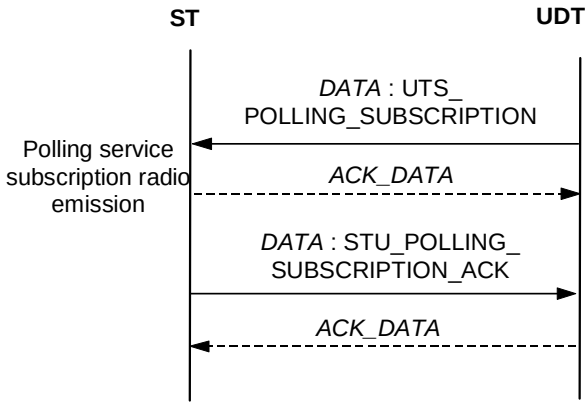
Note: the UTS_DATA_U message may be segmented. The different segments are not shown on the diagram.

7.1.5.3. Downlink data transmission

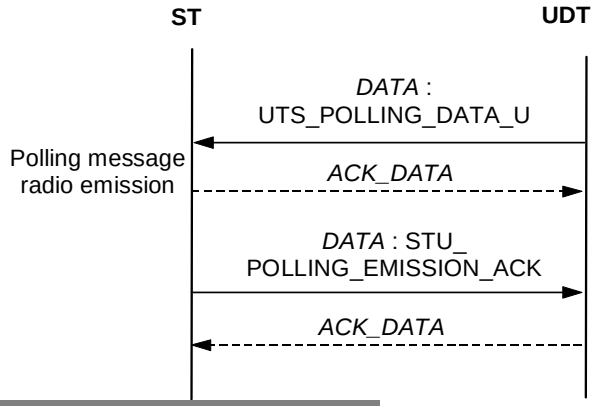


Note: The STU_DATA_D message may be segmented. The different segments are not shown on the diagram. In case of segmentation, the erasure of the message in saved memory M2 happens only on receipt of the last link level acknowledgement (MPAP).

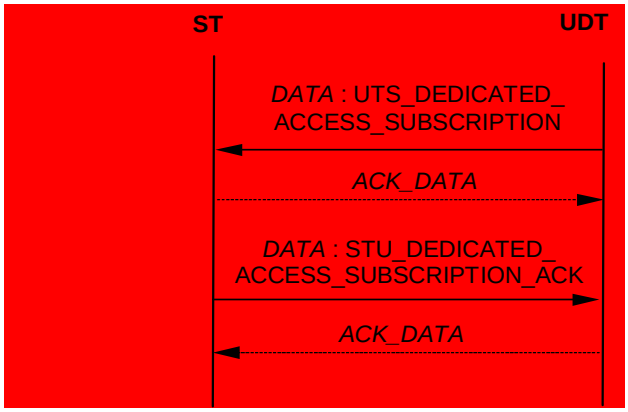
7.1.5.4. Polling service subscription



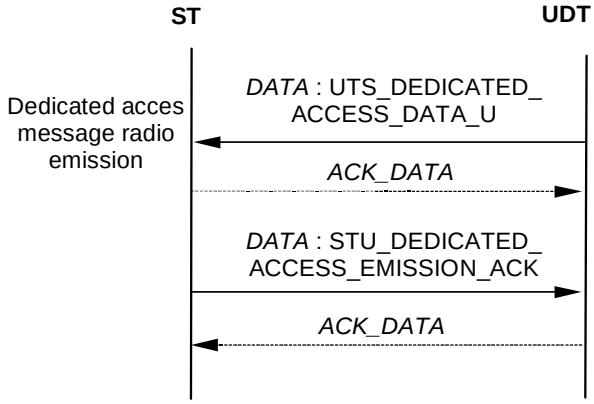
7.1.5.5. Uplink data transmission with the polling service



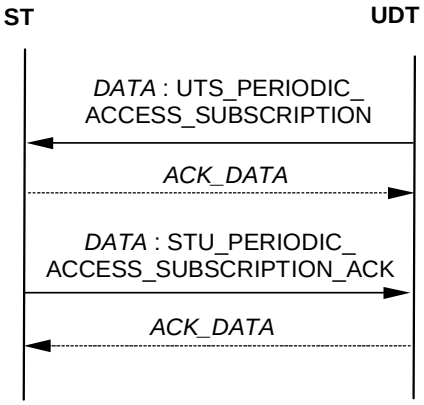
7.1.5.6. "Dedicated access" service subscription



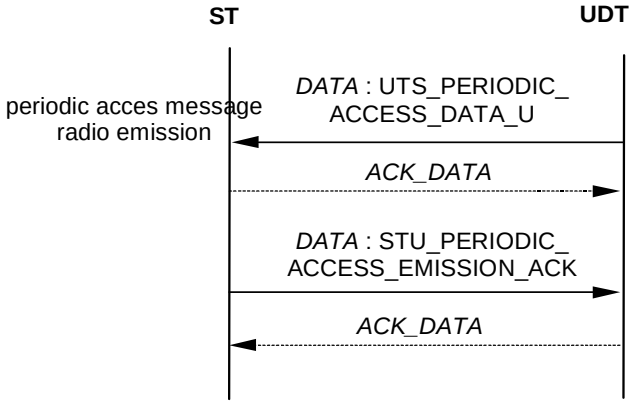
7.1.5.7. Uplink data transmission with the "dedicated access" service



7.1.5.8. "Periodic access" service subscription



7.1.5.9. Uplink data transmission with the "periodic access" service



7.1.6. DTAP parameter values

- ***identifier for the "DTAP" application***
  - value : 0x01
- ***DTAP interface version (of the given interface)***
  - value : 0x06
- ***Timer durations***

- T1 (ST): 10s
- T2 (UDT): 20s
- T3 (UDT): 300s
- T4 (UDT): 420s
- T5 (ST): 10s

➢ ***Messages types***

ST towards UDT messages:

STU_CONNECT	0x0000
STU_NETWORK_INFORMATION	0x0001
STU_ST_PRESENCE	0x0002
STU_SERVICE_MESSAGE	0x0003
STU_RADIO_TRANSMISSION_ACK	0x0004
STU_DATA_D	0x0005
STU_POLLING_SUBSCRIPTION_ACK	0x0006
STU_POLLING_EMISSION_ACK	0x0007
STU_ST_DATA_U_WINDOW_CHANGE	0x0008
STU_DEDICATED_ACCESS_SUBSCRIPTION_ACK	0x0009
STU_DEDICATED_ACCESS_EMISSION_ACK	0x000A
STU_PERIODIC_ACCESS_SUBSCRIPTION_ACK	0x000B
STU_PERIODIC_ACCESS_EMISSION_ACK	0x000C

UDT towards ST messages:

UTS_CONNECT_ACK	0x0050
UTS_ST_CONTROL	0x0051
UTS_DATA_U	0x0052
UTS_POLLING_SUBSCRIPTION	0x0053
UTS_POLLING_DATA_U	0x0054
UTS_ST_PRESENCE_ACK	0x0055
UTS_SDP_APPLICATION_STATUS	0x0056
UTS_ST_DATA_U_WINDOW_CHANGE_ACK	0x0057
UTS_DEDICATED_ACCESS_SUBSCRIPTION	0x0058
UTS_DEDICATED_ACCESS_DATA_U	0x0059
UTS_PERIODIC_ACCESS_SUBSCRIPTION	0x005A
UTS_PERIODIC_ACCESS_DATA_U	0x005B
reserved	0x005C
reserved	0x005D

History

Document history		
Date	**Status**	**Comment**
30 September 1997	Version 0.0.1	First version
28 October 1997	Version 0.1.0	Reviewed
30 January 1998	Version 1.0.0	TETRAPOL Forum approval
30 September 1998	Version 1.0.1	Update: uplink multi messages management, indication of SDP application presence, indication of a loss of registration, rename of the msg uts_ringing
07 November 1998	Version 1.1.0	Reviewed
21 March 2002	Version 1.1.1	Update : dedicated access service messages, indication of the ST registration state.
08-July-2003	Version 1.1.2	Update for correction on dedicated access subscription.
10-December-2003	Version 1.1.3	Update : periodic access service.
12-October-2005	Version 1.1.4	Update :for correction .
02-March-2006	Version 1.1.5	Update : for correction.