

SIM/USIM Application Toolkit Application Note

80000NT10030A Rev. 1 – 2011-03-08



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APPLICABLE PRODUCTS

PRODUCT
GT863-PY
GT864-QUAD
GT864-PY
GM862-GPS
GC864-PY
GC864-QUAD
GC864-QUAD V2
UC864-E
UC864-E-AUTO
UC864-E-DUAL
UC864-G
UC864-WD
GE863-GPS
GE863-SIM
GE863-PRO ³
GE864-PY
GE864-QUAD
GE864-QUAD V2
GE864-QUAD AUTOMOTIVE V2
GE864-QUAD ATEX
GE865
GL865

SW Version

7.03.01 / 7.02.06

8.01.xx6



3. “How-to” Description



NOTICE:

This document has to be considered complementary to [7][10]

3.1. SAT/USAT mechanisms

The SIM/USIM Application Toolkit provides mechanisms which allow applications, existing in the SIM/USIM, to interact and operate with any ME which supports the specific mechanisms required by the application.

The following mechanisms have been defined. These mechanisms are dependent upon the commands and protocols relevant to SIM/USIM Application Toolkit in [3][4].

What follows is the list of SAT/USAT mechanisms with a slightly in-depth vision of that more related to our aims.

- *Profile Download*
 - » *The profile download instruction is sent by the ME to the SIM/USIM as part of the SIM/USIM initialization procedure ([2][5])*
 - » *Profile downloading provides a mechanism for the ME to tell the SIM/USIM what is capable of.*
- *Proactive SIM/USIM*
 - » *Proactive SIM/USIM gives a mechanism whereby the SIM/USIM can initiate actions to be taken by the ME. These actions include:*
 - *displaying text from the SIM/USIM to the ME;*
 - *sending a short message;*
 - *setting up a voice call to a number held by the SIM/USIM;*
 - *setting up a data call to a number and bearer capabilities held by the SIM/USIM;*
 - *sending a SS control or USSD string;*
 - *playing tone in earpiece;*
 - *initiating a dialogue with the user;*
 - *SIM/USIM initialization request and notification of changes to EF(s);*
 - *providing local information from the ME to the SIM/USIM;*
 - *communicating with the additional card(s) (if class "a" is supported);*
 - *providing information about the additional card reader(s) (if class "a" is supported);*
 - *managing timers running physically in the ME;*
 - *running an AT command received from the SIM/USIM, and returning the result to the SIM/USIM (if class "b" is supported);*



SIM/USIM Application Toolkit Application Note

80000NT10030A Rev. 1 – 2011-03-08

- *sending DTMF;*
- *requesting the ME to launch the browser corresponding to a URL. (if class "c" is supported);*
- *establishing and managing a bearer independent protocol (if class "e" is supported).*
- *Data download To SIM/USIM*
- *Menu selection*
 - » *A set of possible menu entries is supplied by the SIM/UISM in a proactive SIM/USIM command. The menu selection mechanism is used to transfer the SIM/USIM application menu item which has been selected by the user to the SIM/USIM.*
- *Call control by SIM/USIM*
 - » *When this service is activated by the SIM/USIM, all dialled digit strings, supplementary service control strings and USSD strings are first passed to the SIM before the ME sets up the call, the supplementary service operation or the USSD operation. (...)*
- *MO Short Message control by SIM/USIM*
 - » *When this service is activated by the SIM/USIM, all MO short messages are first passed to the SIM/USIM before the ME sends the short message. (...)*
- *Event download*
- *Security (currently NOT IMPLEMENTED)*
- *Multiple card (currently NOT IMPLEMENTED)*
- *Timer Expiration*
- *Bearer Independent Protocol*
 - » *The set of proactive commands (OPEN CHANNEL, CLOSE CHANNEL, SEND DATA, RECEIVE DATA and GET CHANNEL STATUS) and events (Data available, Channel status) allows the SIM/USIM to establish a data channel with the ME, and through the ME to a remote Server in the Network. The SIM/USIM provides information for the ME to select an available bearer at the time of channel establishment. The ME then allows the SIM/USIM and the Server to exchange data on this channel, transparently. The SIM/USIM uses service of ME lower layer to send data by providing Service Data Unit to ME. The default lower layer is the higher layer of selected bearer*



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

AT-related proactive commands

Only one proactive command can be ongoing at any one time.

We've already said the tools provided by the AT Interface permit USER to get information from SAT/USAT and to provide the correct RESPONSE for SAT/USAT. They are:

WHAT	DIRECTION	DESCRIPTION
#STIA	TE → TA (…→ SAT/USAT)	AT Command to activate the SAT/USAT interface
#STGI	TE → TA (…→ SAT/USAT)	AT Command to get information about ongoing proactive command
#STSR	TE → TA (…→ SAT/USAT)	AT Command letting USER provide RESPONSE to SAT/USAT
#STN	(SAT/USAT →…) TA → TE	Multipurpose URC to notify TE of what happens in the SIM/USIM Application

SIM/USIM Toolkit AT Commands and URC

3.2.2. Facing SAT/USAT

First of all USER could get information about SAT/USAT interface. It should be interesting to have an answer to the following questions:

1. Is SAT/USAT already running?
2. Is the URC #STN enabled? If yes, which is the mode it has been enabled?
3. What is the timeout interval for USER to answer to a proactive command that requires user interaction?
4. What is the current **SAT/USAT Terminal Profile** (i.e. what SAT/USAT facilities are currently supported by ME)

USER can get this information issuing the Read Command

AT#STIA?

This command returns always four values:



SIM/USIM Application Toolkit Application Note

80000NT10030A Rev. 1 – 2011-03-08



NOTE:

USER must be informed that

- a) *at every power cycle just one CMUX instance (See [7][10], "Multiplexing Mode - +CMUX") can exploit SAT/USAT: it is the CMUX instance that first issued the SAT/USAT activation AT Command.*
- b) *if the ENS functionality has been enabled SAT/USAT is always activated on CMUX instance number 0 only (See [7][10], "Enhanced Network Selection - #ENS")*
- c) *(XGold chipset only) for the proactive commands **RUN AT COMMAND (52)**, **OPEN CHANNEL (64)**, **CLOSE CHANNEL (65)**, **RECEIVE DATA (66)** and **SEND DATA (67)** to be executed the right way, it is mandatory that user previously and successfully ran the command **AT#STTA=1** (See [7][10], "SIM Toolkit Terminal Attach - #STTA"). Otherwise an error is raised.*



NOTE:

Before activating SAT/USAT, USER is strongly recommended:

- a) *to tell TA that SMS messages format be 'TEXT MODE' (issuing **AT+CMGF=1**); to enable unsolicited indications for incoming SMS messages (issuing **AT+CNMI=3,1** or **AT+CNMI=2,1** or **AT+CNMI=2,2**).*

USER has nine different SAT/USAT activation modes:

- a) **AT#STIA=1[,<Timeout>]** activates SAT/USAT without unsolicited indication #STN; the SIM will determine the alphabet to use when displaying text (either GSM 7 bit Default Alphabet, see [8], or UCS2 Alphabet, see [9]).
- b) **AT#STIA=2[,<Timeout>]** activates both SAT/USAT and unsolicited indication #STN; it activates the URC in extended mode (this is the activation mode suggested by TELIT); the SIM will determine the alphabet to use when displaying text (either GSM 7 bit Default Alphabet, see [8], or UCS2 Alphabet, see [9]).
- c) **AT#STIA=3[,<Timeout>]** activates both SAT/USAT and unsolicited indication #STN; it activates the URC in reduced mode; the SIM will determine the alphabet to use when displaying text (either GSM 7 bit Default Alphabet, see [8], or UCS2 Alphabet, see [9]).
- d) **AT#STIA=17[,<Timeout>]** activates SAT/USAT without unsolicited indication #STN; GSM 7 bit Default Alphabet (see [8]) is always used when displaying text.
- e) **AT#STIA=18[,<Timeout>]** activates both SAT/USAT and unsolicited indication #STN; it activates the URC in extended mode (this is the activation mode suggested by TELIT; GSM 7 bit Default Alphabet (see [8]) is always used when displaying text.



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

3 - AT&P0	To load at next start-up the configuration stored on profile <0>
4 - Reboot	So that the previous settings be effective and SAT/USAT be not activated

What does it happen after reboot?

- a) If SAT/USAT has been activated with <mode> 2, 3, 18, 19, 34 or 35 (therefore URC #STN activated as well) a typical SAT/USAT session starts after TE received the unsolicited indication #STN: 37: it means the SAT/USAT main menu is ready.
- b) If SAT/USAT has been activated with <mode> 1, 17 or 33 (therefore the unsolicited #STN has not been activated) it is necessary for USER to poll the SAT/USAT Main Menu State (AT#STGI?) until the response #STGI: 1, 37 is received.

Both these arguments and 'how to proceed' information are detailed in the following chapters.

SAT/USAT activation example

```

AT#STIA?
#STIA: 0,0,10,7fffffffff7f00005f9600000000000000000000000000000000

OK
AT#STIA=2,1
OK
'SAT/USAT activation request with 1 minute timeout
AT&W0
OK
AT&P0
OK
AT#REBOOT
OK
'Reboot request
AT+CPIN?
+CPIN: SIM PIN

OK
AT+CPIN=9603
OK
AT#STGI?
+CME ERROR: operation not allowed
'SAT/USAT has been activated but main menu has not been created yet

#STN: 37
AT#STGI?
#STGI: 1,37
    
```



3.2.3.2.1. Examples

1. #STGI basic use example, if GSM 7 bit Default Alphabet is used for displaying text

```

AT#STGI?
#STGI: 1,37

OK
AT#STGI=37
#STGI: 37,00,12,"SIM i.TIM"
#STGI: 37,1,"SCOPRI SERVIZI"
#STGI: 37,2,"MY TIM"
#STGI: 37,3,"SCRIPTIM"
#STGI: 37,4,"ATTIVA MMS"
#STGI: 37,5,"i.box"
#STGI: 37,6,"LOSAI DI TIM"
#STGI: 37,7,"MilleunaTIM"
#STGI: 37,8,"2 IN 1"
#STGI: 37,9,"TIMC@FE'"
#STGI: 37,10,"TIM PayForMe"
#STGI: 37,11,"TIMSPOT"
#STGI: 37,12,"RICARICA"

OK

```

2. Same basic #STGI example, if UCS2 Alphabet is used for displaying text

```

at#stgi?
#STGI: 1,37

OK
at#stgi=37
#STGI: 37,00,12,"00530049004D00200069002E00540049004D"
#STGI: 37,1,"00530043004F005000520049002000530045005200560049005A0049"
#STGI: 37,2,"004D0059002000540049004D"
#STGI: 37,3,"0053004300520049005000540049004D"
#STGI: 37,4,"0041005400540049005600410020004D004D0053"
#STGI: 37,5,"0069002E0062006F0078"
#STGI: 37,6,"004C004F005300410049002000440049002000540049004D"
#STGI: 37,7,"004D0069006C006C00650075006E006100540049004D"
#STGI: 37,8,"003200200049004E00200031"
#STGI: 37,9,"00540049004D00430040004600450027"
#STGI: 37,10,"00540049004D00200050006100790046006F0072004D0065"
#STGI: 37,11,"00540049004D00530050004F0054"
#STGI: 37,12,"00520049004300410052004900430041"

OK

```



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

3. Basic #STGI example in 'mixed' mode: SIM decides the alphabet to use when displaying text (it can be either 7 Bit Default Alphabet or UCS2 Alphabet)

```

AT+CPIN=9603
OK

#STN: 37
AT#STIA?
#STIA: 1,2,1,7FFFFFFF7F00005F96000000000000000000

OK
'SAT/USAT has been activated with 'mixed' mode
AT#STGI=37
#STGI: 37,00,2,"Fun & Info"
#STGI: 37,1,"Fun & Info"
#STGI: 37,0,2,"05D705D5002205DC002005DE05D505D605DC"
OK
'Either 7 Bit Default Alphabet and UCS2 Alphabet are used for displaying text

```

4. Basic #STGI example when SAT activation mode requires 7 Bit Default Alphabet only (#STIA=18)

```

AT+CPIN=9603
OK

#STN: 37
AT#STIA?
#STIA: 1,18,1,7FFFFFFF7F00005F96000000000000000000

OK
'SAT/USAT has been activated by At#STIA=18
AT#STGI=37
#STGI: 37,00,2,"Fun & Info"
#STGI: 37,1,"Fun & Info"
#STGI: 37,0,2," "
'Last item is a sequence of blanks, because those characters are not displayable by 7 Bit Default Alphabet

```

5. Basic #STGI example when SAT activation mode requires UCS2 Alphabet only.

```

AT+CPIN=9603
OK

#STN: 37
AT#STIA?
#STIA: 1,34,1,7FFFFFFF7F00005F96000000000000000000

OK
'SAT/USAT has been activated by At#STIA=34
AT#STGI=37
#STGI: 37,00,2,"00460075006E0020002600200049006E0066006F"
#STGI: 37,1,"00460075006E0020002600200049006E0066006F"
#STGI: 37,2,"05D705D5002205DC002005DE05D505D605DC"

```



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

Examples

- SIM Toolkit activated by AT#STIA=2; proactive commands GET INPUT (35), SELECT ITEM (36) and SET UP MENU (37)***

```

AT+CPIN=9603
OK

#STN: 37
AT#STIA?
#STIA: 1,2,1,7FFFFFFF7F00005F9600000000000000000000

OK
AT#STGI=37
#STGI: 37,00,12,"SIM I.TIM"
#STGI: 37,1,"SCOPRI SERVIZI"
#STGI: 37,2,"MY TIM"
#STGI: 37,3,"SCRIPTIM"
#STGI: 37,4,"ATTIVA MMS"
#STGI: 37,5,"I.BOX"
#STGI: 37,6,"LOSAI DI TIM"
#STGI: 37,7,"MILLEUNATIM"
#STGI: 37,8,"2 IN 1"
#STGI: 37,9,"TIMC@FE'"
#STGI: 37,10,"TIM PAYFORME"
#STGI: 37,11,"TIMSPOT"
#STGI: 37,12,"RICARICA"

OK
AT#STSR=37,0,9
OK

#STN: 36
AT#STGI=36
#STGI: 36,00,8
#STGI: 36,1,"ISCRIVITI"
#STGI: 36,2,"LOG IN"
#STGI: 36,3,"CHI SONO?"
#STGI: 36,4,"INVIA MSG"
#STGI: 36,5,"CERCA AMICI"
#STGI: 36,6,"CHATROOM"
#STGI: 36,7,"FORUM"
#STGI: 36,8,"LOG OUT"

OK
AT#STSR=36,0,1
OK

#STN: 35
AT#STGI=35
#STGI: 35,01,"NICKNAME?",1,12

OK
'Input data is requested
AT#STSR=35,0,"ABCD"
OK
  
```



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

```

#STN: 35
AT#STGI=35
#STGI: 35,01,"PASSWORD?",1,12

OK
'Input data is requested
AT#STSR=35,0,"EFGH"
OK

#STN: 36
AT#STGI=36
#STGI: 36,00,2
#STGI: 36,1,"UOMO"
#STGI: 36,2,"DONNA"

OK
AT#STSR=36,0,1
OK

#STN: 35
AT#STGI=35
#STGI: 35,00,"ET ?",0,2

OK
'Input data is requested
'We won't send any response for more than <timeout> minutes
AT#STGI?
#STGI: 1,35

OK
'Timeout has not been expired yet, the response to the query is the same as before

#STN: 135
'Now timeout has been expired: proactive command 35 has been aborted and SAT/USAT is back to main menu
AT#STGI?
#STGI: 1,37

OK
AT#STGI=37
#STGI: 37,00,12,"SIM I.TIM"
#STGI: 37,1,"SCOPRI SERVIZI"
#STGI: 37,2,"MY TIM"
#STGI: 37,3,"SCRIPTIM"
#STGI: 37,4,"ATTIVA MMS"
#STGI: 37,5,"I.BOX"
#STGI: 37,6,"LOSAI DI TIM"
#STGI: 37,7,"MILLEUNATIM"
#STGI: 37,8,"2 IN 1"
#STGI: 37,9,"TIMC@FE"
#STGI: 37,10,"TIM PAYFORME"
#STGI: 37,11,"TIMSPOT"
#STGI: 37,12,"RICARICA"

OK

```



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

2. SIM Toolkit activated by AT#STIA=34; same example as above

```

AT+CPIN=9603
OK

#STN: 37
AT#STIA?
#STIA: 1,2,1,7FFFFFFF7F00005F960000000000000000

OK
AT#STGI=37
#STGI: 37,00,12,"00530049004D00200069002E00540049004D"
#STGI: 37,1,"00530043004F005000520049002000530045005200560049005A0049"
#STGI: 37,2,"004D0059002000540049004D"
#STGI: 37,3,"0053004300520049005000540049004D"
#STGI: 37,4,"0041005400540049005600410020004D004D0053"
#STGI: 37,5,"0069002E0062006F0078"
#STGI: 37,6,"004C004F005300410049002000440049002000540049004D"
#STGI: 37,7,"004D0069006C006C00650075006E006100540049004D"
#STGI: 37,8,"003200200049004E00200031"
#STGI: 37,9,"00540049004D00430040004600450027"
#STGI: 37,10,"00540049004D00200050006100790046006F0072004D0065"
#STGI: 37,11,"00540049004D00530050004F0054"
#STGI: 37,12,"00520049004300410052004900430041"

OK
AT#STSR=37,0,9
OK

#STN: 36
AT#STGI=36
#STGI: 36,00,8
#STGI: 36,1,"004900730063007200690076006900740069"
#STGI: 36,2,"004C006F006700200069006E"
#STGI: 36,3,"00430068006900200073006F006E006F003F"
#STGI: 36,4,"0049006E0076006900610020004D00730067"
#STGI: 36,5,"0043006500720063006100200041006D006900630069"
#STGI: 36,6,"00430068006100740072006F006F006D"
#STGI: 36,7,"0046006F00720075006D"
#STGI: 36,8,"004C006F00670020006F00750074"

OK
AT#STSR=36,0,1
OK

#STN: 35
AT#STGI=35
#STGI: 35,01,"004E00690063006B006E0061006D0065003F",0,12

OK
`INPUT DATA IS REQUESTED
AT#STSR=35,0,"0065006600670068"
OK

#STN: 35
AT#STGI=35
#STGI: 35,01,"00360038007300730077006F00720064003F",0,12

```



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

```

OK
`INPUT DATA IS REQUESTED
AT#STSR=35,0,"0065006600670068"
OK

#STN: 36
AT#STGI=36
#STGI: 36,00,2
#STGI: 36,1,"0055006F006D006F"
#STGI: 36,2,"0044006F006E006E0061"

OK
AT#STSR=36,0,1
OK

#STN: 35
AT#STGI=35
#STGI: 35,00,"00450074007F003F",0,2

OK
  
```

3.2.3.3.2. #STN to notify USER that the timeout expired to answer to the ongoing proactive command

USER should answer to a proactive command that requires USER response within a fixed interval of time defined by **<timeout>** parameter in **#STIA** command (parameter is optional, default value is 10 minutes).

If timeout expires SAT/USAT will abort the command and, if the unsolicited indication has been activated, USER will be notified by **URC #STN** as follows:

#STN: <CmdTerminateValue>

Where **<CmdTerminateValue> = <CmdType> + TerminationOffset**

Currently **TerminationOffset=100**.

Example

1. Timeout expiration example

```

AT+CPIN=9603
OK
AT#STGI?
+CME ERROR: operation not allowed
`SAT/USAT has been activated but main menu has not been created yet

#STN: 37
  
```



3.2.3.3.3. #STN to notify USER it failed the sending to the network of a MO SMS message

SAT/USAT send to ME/MT the proactive command **19 (SEND SM)** when it has to send to the network a MO SMS message. It is possible that the sending to the network fails. In this case the unsolicited indication **#STN** is sent to TE with the following specific format:

#STN: 119

Example

1. Network failure indication example

```

AT#STGI=37
#STGI: 37,00,12,"SIM i.TIM"
#STGI: 37,1,"SCOPRI SERVIZI"
#STGI: 37,2,"MY TIM"
#STGI: 37,3,"SCRIPTIM"
#STGI: 37,4,"ATTIVA MMS"
#STGI: 37,5,"i.box"
#STGI: 37,6,"LOSAI DI TIM"
#STGI: 37,7,"MilleunaTIM"
#STGI: 37,8,"2 IN 1"
#STGI: 37,9,"TIMC@FE'"
#STGI: 37,10,"TIM PayForMe"
#STGI: 37,11,"TIMSPOT"
#STGI: 37,12,"RICARICA"

OK
AT#STSR=37,0,7
OK

#STN: 36
AT#STGI=36
#STGI: 36,00,3
#STGI: 36,1,"Verifica punti"
#STGI: 36,2,"Premi"
#STGI: 36,3,"Informazioni"

OK
'Selection 36,3 is causing SAT/USAT to send a SMS message to the network in order to have back
informations
AT#STSR=36,0,3
OK

#STN: 19,"Invio Richiesta"
'URC notifies that SAT/USAT is trying to send a SMS message to the network

#STN: 119

```



SIM/USIM Application Toolkit Application Note

80000NT10030A Rev. 1 – 2011-03-08

require user interaction, as well it permits USER to send to SAT/USAT special requests, like anticipated termination, help information, and so on.

TELIT software implements the <UserResponse>s listed in the following table

<UserResponse> code	<UserResponse> description
0	Command performed successfully (call accepted in case of call setup)
16	Proactive SIM/USIM session terminated by USER
17	Backward move in the proactive SIM/USIM session requested by USER
18	No response from USER
19	Help information required by USER
20	USSD/SS transaction terminated by USER
32	ME currently unable to process command
34	USER did not accept the proactive command
35	USER cleared down SIM/USIM call before connection or network release

(See [7][10], "SIM Toolkit Interface Activation - #STSR" for the right syntax and interpretation of parameters)

It is possible to issue AT command #STSR with 2 or 3 parameters, but not all the combinations of values are admitted. Next table shows the accepted issues of command #STSR and correspondent meaning, ordered by <UserResponse> first.

2 params only: AT#STSR= <CmdType>, <UserResponse>	3 parameters: AT#STSR= <CmdType>, <UserResponse>, <Data>	Description



SIM/USIM Application Toolkit Application Note
80000NT10030A Rev. 1 – 2011-03-08

<UserResponse>=0		
AT#STSR=1,0		Accepted syntax, no meaning
AT#STSR=5,0		Accepted syntax, no meaning
AT#STSR=16,0		Call accepted
AT#STSR=17,0		Accepted syntax, no meaning
AT#STSR=18,0		Accepted syntax, no meaning
AT#STSR=19,0		Accepted syntax, no meaning
AT#STSR=20,0		Accepted syntax, no meaning
AT#STSR=32,0		Accepted syntax, no meaning
AT#STSR=33,0		It is possible that the proactive command DISPLAY TEXT ask for user acceptance
AT#STSR=34,0		Accepted syntax, no meaning
	AT#STSR=34,0,<Data>	Command performed successfully, input key has been sent to SAT/USAT
AT#STSR=35,0		Command performed successfully, default string has been sent to SAT/USAT
	AT#STSR=35,0,<Data>	Command performed successfully, input string has been sent to SAT/USAT
AT#STSR=36,0		Accepted syntax, no meaning
	AT#STSR=36,0,<Data>	Command performed successfully, an item has been selected
AT#STSR=37,0		Accepted syntax, no meaning
	AT#STSR=37,0,<Data>	Command performed successfully, an item has been selected
AT#STSR=40,0		Accepted syntax, no meaning



SIM/USIM Application Toolkit Application Note

80000NT10030A Rev. 1 – 2011-03-08

AT#STSR=52,0 ^(*)		Accepted syntax, no meaning
AT#STSR=64,0		Command performed successfully
AT#STSR=65,0 ^(*)		Accepted syntax, no meaning
AT#STSR=66,0 ^(*)		Accepted syntax, no meaning
AT#STSR=67,0 ^(*)		Accepted syntax, no meaning
<UserResponse>=16		
AT#STSR=<cmd>,16 <i><cmd>: any proactive command</i>		Proactive SIM/USIM session terminated by USER
<UserResponse>=17		
AT#STSR=<cmd>,17 <i><cmd>: any proactive command</i>		Backward move in the proactive SIM/USIM session requested by USER
<UserResponse>=18		
AT#STSR=<cmd>,18 <i><cmd>: any proactive command</i>		No response from USER
<UserResponse>=19		
AT#STSR=34,19		Help information requested by USER about “GET INKEY” proactive command
AT#STSR=35,19		Help information requested by USER about “GET INPUT” proactive command
AT#STSR=36,19		Help information requested by USER about “SELECT ITEM” proactive command
AT#STSR=37,19		Help information requested by USER about

^(*) Implemented for **Xgold chipset only**; not available for **Elite chipset**; they can be executed only if USER previously and successfully ran the command **AT#STTA=1**



4. Terms and acronyms

TELIT	The company TELIT Communications S.p.A.
MODULE	(generic) TELIT Module
ME	Mobile Equipment
MT	Mobile Termination
TE	Terminal Equipment
TA	Terminal Adaptor
USER	(generic) MODULE User, as well as an external application controlling the MODULE.
	<i>TE and USER are used interchangeably.</i>
SAT/USAT	SIM/USIM Application Toolkit
SCRIPT	AT Command based script
URC	Unsolicited Result Code

