Operating the SIM Application Toolkit AT Commands

Application Note

For GM862-QUAD, GM862-QUAD-PY, GM862-GPS, GE863-QUAD, GE863-PY, GE863-GPS, GE864-QUAD, GE864-PY, GC864-QUAD, GC864-PY, GT863-PY,GT864-QUAD, GT864-PY, GE863-SIM, GE863-PRO^3, GE864-QUAD AUTOMOTIVE, GE864-QUAD ATEX and GE864-QUAD ANTENNA

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Making machines talk.

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This document is applicable to the following products:

APPLICABLE PRODUCTS

PRODUCT
GT863-PY
GT864-QUAD
GT864-PY
GM862-QUAD-PY
GM862-QUAD
GM862-GPS
GC864-PY
GC864-QUAD
GC864-PY w/ SIM holder
GE863-PY
GE863-QUAD
GE863-GPS
GE863-SIM
GE863-PRO^3
GE864-PY
GE864-QUAD
GE864-QUAD AUTOMOTIVE
GE864-QUAD ATEX
GE864-QUAD ANTENNA

Applicable from SW Version:
7.03.01 / 7.02.06

Contents

1. Introduction

1.1. Scope

The aim of this application note is to provide indications about using AT Commands to interact with the SIM Application toolkit feature.

1.2. Audience

This document is intended for Telit customers developing SIM Toolkit functionalities on their applications.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit's Technical Support Center (TTSC) at:

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Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.
Telit appreciates feedback from the users of our information.

1.4. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.5. Related Documents

[1] 3GPP TS 27.007: "AT command set for User Equipment (UE)"

[2] 3GPP TS 11.11: "Specification of the Subscriber Identity Module - Mobile Equipment (SIM-ME) Interface"

[3] 3GPP TS 11.14: "Specification of the SIM Application Toolkit (SAT) for the Subscriber Identity Module - Mobile Equipment (SIM-ME) Interface"

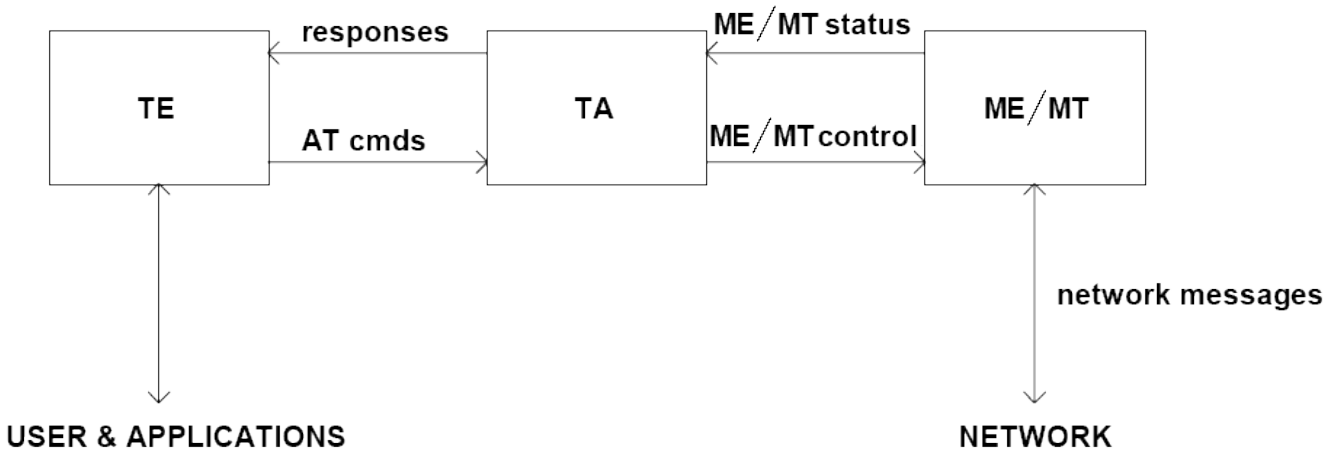
[4] Telit Communications S.p.A. 80000ST10025a: "AT Commands Reference Guide", Rev. 6

1.6. Document History

Revision	Date [yyyy-mm-dd]	Changes
ISSUE #1	2009-08-07	First Issue

2. General concepts

Based on Specification [1], **AT Commands** are recommended to be used for controlling **ME / MT** functions and GSM network services from a **TE** through **TA**. The abstract architecture to be considered is the following



TELIT MODULEs physical implementation of this abstract architecture integrates the TA under the ME cover, and implements the TE as a separate entity.

SIM Application Toolkit (SAT) is a set of applications and related procedures, existing in the SIM, which may be used during a GSM session.

SAT provides mechanisms which allow applications, existing in the SIM, to interact and operate with any ME which supports the specific mechanism(s) required by the application.

NOTE:

USER can issue AT Commands to know the status of the interaction SAT←→ME and to provide the SIM with any requested response.

Scope of this document is providing USER with simple "How-To"-explanations and -examples regarding his operativeness through "SIM Toolkit AT Commands".

3. "How-to" Description

NOTICE:

This document has to be considered complementary to [4]

3.1. SAT mechanisms

The SIM Application Toolkit provides mechanisms which allow applications, existing in the SIM, 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 Application Toolkit in [2].
What follows is the list of SAT mechanisms with a slightly in-depth vision of that more related to our aims.

- *Profile Download*
» *The profile download instruction is sent by te ME to the SIM as part of the SIM initialization procedure ([2])*
» *Profile downloading provides a mechanism for the ME to tell the SIM what is capable of.*
- *Proactive SIM*
» *Proactive SIM gives a mechanism whereby the SIM can initiate actions to be taken by the ME. These actions include:*
- *displaying text from the SIM to the ME;*
- *sending a short message;*
- *setting up a voice call to a number held by the SIM;*
- *setting up a data call to a number and bearer capabilities held by the SIM;*
- *sending a SS control or USSD string;*
- *playing tone in earpiece;*
- *initiating a dialogue with the user;*
- *SIM initialization request and notification of changes to EF(s);*
- *providing local information from the ME to the SIM;*
- *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, and returning the result to the SIM (if class "b" is supported); (currently NOT IMPLEMENTED)*

- *sending DTMF;*
- *requesting the ME to launch the browser corresponding to a URL. (if class "c" is supported);(currently NOT IMPLEMENTED)*

- *establishing and managing a bearer independent protocol (if class "e" is supported). (currently NOT IMPLEMENTED)*

- *Data download To SIM*
- *Menu selection*
  - » *A set of possible menu entries is supplied by the SIM in a proactive SIM command. The menu selection mechanism is used to transfer the SIM application menu item which has been selected by the user to the SIM.*
- *Call control by SIM*
  - » *When this service is activated by the SIM, 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*
  - » *When this service is activated by the SIM, all MO short messages are first passed to the SIM before the ME sends the short message. (...)*
- *Event download*
- *Security (currently NOT IMPLEMENTED)*
- *Multiple card (currently NOT IMPLEMENTED)*
- *Timer Expiration*
- *Bearer Independent Protocol(currently NOT IMPLEMENTED)*
  - » *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 to establish a data channel with the ME, and through the ME to a remote Server in the Network. The SIM provides information for the ME to select an available bearer at the time of channel establishment. The ME then allows the SIM and the Server to exchange data on this channel, transparently. The SIM 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*

3.2. SIM Application Toolkit AT Commands

NOTE:

A set of SAT specific AT Commands has been coded in the MODULE so that USER has mechanisms through which activate the SAT and provide the right TERMINAL RESPONSE to any SAT proactive command.

In what follows we're considering more deeply this argument.

3.2.1. Proactive SIM, proactive commands and the dialogue ME←→SAT

ME communicates to the SIM using a specific protocol in which ME is always the "master" and initiates commands to the SIM, and therefore in this protocol there is no mechanism for the SIM to initiate a communication with the ME.

The **proactive SIM service** provides a mechanism which stays within the above mentioned protocol, but it also allows the SIM to say to the ME "I have some information to send to you". This mechanism permits the SIM to initiate a communication with the ME and the SIM can issue a variety of commands through this mechanism, the **proactive commands**.
ME tells the SIM if the command was successful or not using a specific command result procedure.

NOTE:

There's a **subset of proactive commands** that require USER to interact with SAT through AT Commands, either because USER has to know the status of the dialog ME←→SAT, or because USER is the recipient of some URC sent by TA indicating the occurrence of some event of interest in the dialog ME←→SAT (i.e. SAT sent a proactive command to ME), or because USER has to issue to SAT the right terminal response to a proactive command.

*This set of **AT-related proactive commands** is going to be of major interest.*

*In the rest of the document: the term **proactive command** will actually indicate such an **AT-related proactive command**.*

In the dialogue ME←→SAT each proactive command is identified by its numerical code. Next table shows the list of proactive commands of interest for the document (i.e. the AT-related proactive commands) and their numerical code.

Proactive command	Numerical code
REFRESH	1
SET UP EVENT LIST	5
SET UP CALL	16
SEND SS	17
SEND USSD	18
SEND SM	19
SEND DTMF	20
PLAY TONE	32
DISPLAY TEXT	33
GET INKEY	34
GET INPUT	35
SELECT ITEM	36
SET UP MENU	37
SET UP IDLE MODE TEXT	40

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 and to provide the correct RESPONSE to SAT. They are:

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

SIM Toolkit AT Commands and URC

3.2.2. Facing SAT

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

1. Is SAT 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 Terminal Profile** (i.e. what SAT facilities are currently supported by ME)

USER can get this information issuing the Read Command

AT#STIA?

This command returns always four values:

#STIA: <SATMainMenuState>, <URCEnablingStatus>,<Timeout>,<SatTerminalProfile>
(See [4], "§3.5.7.11.1 SIM Toolkit Interface Activation - #STIA" for the right syntax and interpretation)

Query example

```
AT#STIA?
#STIA: 0,0,10,7fffffff7f00005f96000000000000000000

OK
'The result tells that the SAT main menu has not been created, the SAT unsolicited indications are not enabled, the timeout for user responses is 10 min. It follows the SAT Terminal Profile
```

3.2.3. Exploiting SAT

3.2.3.1. SAT Activation / Deactivation → #STIA

When USER wants to exploit SAT he has first to activate it (if SAT has not been activated yet, every issues of commands **#STGI** or **#STSR** returns an error code).

NOTE:

USER must be informed that

a) *at every power cycle just one CMUX instance (See [4], "§3.5.4.1.8 Multiplexing Mode - +CMUX") can exploit SAT: it is the CMUX instance that first issued the SAT activation AT Command.*

if the ENS functionality has been enabled SAT is always activated on CMUX instance number 0 only (See [4], "§3.5.7.1.75 Enhanced Network Selection - #ENS")

NOTE:

Before activating SAT, 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).

There are three possible modes for USER to activate SAT:

a) **AT#STIA=1[,<Timeout>]** activates SAT without unsolicited indication #STN;

b) **AT#STIA=2[,<Timeout>]** activates both SAT and unsolicited indication #STN; it activates the URC in extended mode (this is the activation mode suggested by TELIT);

c) **AT#STIA=3[,<Timeout>]** activates both SAT and unsolicited indication #STN; it activates the URC in reduced mode.

(See [4], "§3.5.7.11.1 SIM Toolkit Interface Activation - #STIA" for the right syntax and interpretation)

To be more precise, every SAT activation request (SAT deactivation as well) is actually a sequence of both AT Commands and actions that USER has to carry out successfully.

Next two tables show both procedures.

SAT Activation		
1 -	**AT#STIA=n[,<timeout>]** n is in (1..3)	So that at the next SIM initialization procedure the **SIM ←→ ME** information exchange will cause the SAT to be activated
2 -	**AT&W0**	To store the complete device configuration on profile **<0>**
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 be activated

SAT Activation Procedure

SAT Deactivation		
1 -	**AT#STIA=0**	So that at the next SIM initialization procedure the **SIM ←→ ME** information exchange will cause the SAT not to be activated
2 -	**AT&W0**	To store the complete device configuration on profile **<0>**
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 be not activated

SAT Deactivation Procedure

What does it happen after reboot?

a) If SAT has been activated with **<mode> 2** or **3** (therefore URC **#STN** activated as well) a typical SAT session starts after TE received the unsolicited indication **#STN: 37**: it means the SAT main menu is ready.

b) If SAT has been activated with **<mode> 1** (therefore the unsolicited **#STN** has not been activated) it is necessary for USER to poll the SAT 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 activation example

```
AT#STIA?
#STIA: 0,0,10,7fffffff7f00005f96000000000000000000

OK
AT#STIA=2,1
OK
'SAT 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 has been activated but main menu has not been created yet

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

OK
'Finally main menu has been created
AT#STIA?
#STIA: 1,2,1,7fffffff7f00005f96000000000000000000

OK
'The result tells that the SAT main menu has been created, the SAT unsolicited indications have been enabled in "Extended" mode, the timeout for user responses is 1 min. It follows the SAT Terminal Profile
```

3.2.3.2. How to get information about the ongoing proactive command → #STGI

Once the SAT has been activated, the **basic tool for USER to know exactly what is the ongoing proactive command**, is the AT Command Query

AT#STGI?

This command returns always a couple of values:

#STGI: <SATMainMenuState>,<CmdType>

The first one tells whether the SAT main menu has been already created or not; the second one is the numerical code of the ongoing proactive command.

The basic tool for the USER to know exactly what are the parameters of the ongoing proactive command, is the AT Command

AT#STGI=<CmdType>
*Where **<CmdType>:** numerical code of the ongoing proactive command.*

The **#STGI:** response has multiple formats, because it has to represent the parameter syntax for all the proactive commands.
(See [4], "§3.5.7.11.2 SIM Toolkit Get Information - #STGI" for the right syntax and interpretation)

This command returns the right **#STGI:** response only if **<CmdType>** effectively is the numerical code of the ongoing proactive command, else an error code is raised.

#STGI basic use example

```
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
```

3.2.3.3. The Unsolicited Indication #STN

It is possible to activate an URC indicating occurrence of a SAT-related event

If SAT has been activated either by

```
AT#STIA=2
```

Or

```
AT#STIA=3
```

TA sends to TE the unsolicited indication **#STN** every time SAT issues a proactive command to ME.

#STN is a multipurpose URC: it is actually used with various meanings and with various formats, as it appears in the next chapters.

3.2.3.3.1. #STN to notify USER that SAT has just sent a proactive command requiring USER interaction.

#STN format depends on SAT activation mode

<table>
<tr><th><mode></th><th>URC type</th><th>Description</th></tr>
<tr><td>2</td><td>EXTENDED</td><td>
#STN: <cmdType>[,<α1>[,...]]
URC format has:
a) always a fixed part, reporting the proactive command code <cmdType>
b) a variable part for some proactive command only; this part contains the proactive command parameter list; this list is the same as that resulting from AT#STGI=<cmdType>
the proactive commands for which the unsolicited indication #STN effectively has an extended representation mode are:
<table>
<tr><td>REFRESH</td><td>1</td></tr>
<tr><td>SEND SS</td><td>17</td></tr>
<tr><td>SEND USSD</td><td>18</td></tr>
<tr><td>SEND SM</td><td>19</td></tr>
<tr><td>SEND DTMF</td><td>20</td></tr>
<tr><td>PLAY TONE</td><td>32</td></tr>
<tr><td>DISPLAY TEXT(*)</td><td>33(*)</td></tr>
</table>
These are proactive commands that notify something to USER but don't require USER interaction explicitly.
</td></tr>
</table>

		(*) *SIM can send the proactive command 33 and ask for USER to accept this command too. If this is the case the URC format has only the fixed part, even if SAT has been activated in extended mode.*
3	REDUCED	**#STN: <cmdType>** URC format has only a fixed part, reporting the proactive command code **<cmdType>**

*(See [4], "§3.5.7.11.1 SIM Toolkit Interface Activation - #STIA" for the list of proactive commands whose parameters are notified by mean of URC **#STN** in extended mode)*

See examples in both §4.2.3.3.2 and §4.2.3.3.3.

Example with proactive commands 35, 36, 37

```
AT+CPIN=9603
OK

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

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

#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
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
```

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 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**.

Timeout expiration example

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

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

OK
AT#STIA?
#STIA: 1,2,1,7fffffff7f00005f96000000000000000000

OK
'SAT has been activated with 1 minute timeout
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?
#STGI: 1,36

OK
'Ongoing proactive command is 36 (SELECT ITEM): It requires a USER response
AT#STGI=36
#STGI: 36,00,3
#STGI: 36,1,"Verifica punti"
#STGI: 36,2,"Premi"
#STGI: 36,3,"Informazioni"

OK
'We won't send any request/response for more than 1 minute
AT#STGI?
#STGI: 1,36

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

#STN: 136
'Now timeout has been expired: proactive command 36 has been aborted and SAT
is back to main menu
AT#STGI?
#STGI: 1,37

OK
'Obviously it changes the response to the query
```

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

SAT 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

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 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 is trying to send a SMS message to the network

#STN: 119
'URC notifies that the sending to the network failed

#STN: 254
'URC notifies that SAT is back to main menu
AT#STGI?
#STGI: 1,37

OK
```

3.2.3.3.4. #STN to support the SAT mechanisms "Call control by SIM" and "MO Short Message control by SIM"

Let's start with a brief description of what these SAT mechanisms are:

Call control by SIM

When this service is activated by the SIM, all dialed 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. The ME shall also pass to the SIM at the same time its current serving cell. The SIM has the ability to allow, bar or modify the call, the supplementary service operation or the USSD operation. The SIM also has the ability to replace a call request, a supplementary service operation or a USSD operation by another call request or supplementary service operation or USSD operation.

MO Short Message control by SIM
When this service is activated by the SIM, all MO short messages are first passed to the SIM before the ME sends the short message. The ME shall also pass to the SIM at the same time its current serving cell. The SIM shall have the ability to allow the sending, bar the sending or modify the destination address of the short message before sending it.

If one or both services are activated by the SIM, the **#STN** unsolicited indication could be sent, to indicate either if the outgoing call has been accepted, rejected or modified by the SIM, or if the SMS service centre address has been modified by the SIM or if the MO Short Message destination address has been modified by the SIM.
#STN format is as follows:

#STN: <CmdTerminateValue>,<Result>[,<TextInfo>[,<Number>[,<MODestAddr>]]]
Where
<CmdTerminateValue>=150 for MO Short Message control by SIM
<CmdTerminateValue>=160 for Call control by SIM

(See [4], "§3.5.7.11.1 SIM Toolkit Interface Activation - #STIA" for the right syntax and interpretation of the above parameters)

3.2.3.3.5. #STN to notify USER that SAT enters its main menu again after startup

When SAT enters its main menu again at a certain time after startup, URC **#STN** is sent to TE with the format:

#STN: 254

After receipt of this unsolicited indication the ongoing proactive command actually is:

SET UP MENU → 37

This can be verified issuing the AT Command query #STGI?

AT#STGI?
#STGI: 1,37

See example in §4.2.3.3.3

3.2.3.3.6. #STN to notify USER that SAT main menu has been removed from TA

It is possible that SAT requests to remove the SAT main menu from TA. This is actually an extremely rare event; nevertheless it is object of specific tests. In this case the unsolicited indication **#STN** is sent to TE with the following specific format:

#STN: 237

After such an indication has been received, every issue **AT#STGI=37** will raise an error code.

3.2.3.4. Explicit USER interaction → #STSR

AT Command **#STSR** makes possible the interaction SAT←→USER. It permits USER to send to SAT the right response to those proactive commands that require user interaction, as well it permits USER to send to SAT 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 session terminated by USER
17	Backward move in the proactive SIM 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 call before connection or network release

(See [4], "§3.5.7.11.3 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**
<UserResponse>=0		
AT#STSR=16,0		Call accepted
AT#STSR=33,0		It is possible that the proactive command DISPLAY TEXT ask for user acceptance
	AT#STSR=34,0,<Data>	Command performed successfully, input key has been sent to SAT
AT#STSR=35,0		Command performed successfully, default string has been sent to SAT
	AT#STSR=35,0,<Data>	Command performed successfully, input string has been sent to SAT
	AT#STSR=36,0,<Data>	Command performed successfully, an item has been selected
	AT#STSR=37,0,<Data>	Command performed successfully, an item has been selected
<UserResponse>=16		

AT#STSR=*<cmd>*,16 *<cmd>: any proactive command*		Proactive SIM session terminated by USER
<UserResponse>=17		
AT#STSR=*<cmd>*,17 *<cmd>: any proactive command*		Backward move in the proactive SIM session requested by USER
<UserResponse>=18		
AT#STSR=*<cmd>*,18 *<cmd>: any proactive command*		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 "SETUP MENU" proactive command
<UserResponse>=20		
AT#STSR=18,20		USSD transaction terminated by USER
<UserResponse>=32		
AT#STSR=18,32		TA currently unable to process the command "SEND USSD"
AT#STSR=33,32		TA currently unable to process the command "DISPLAY TEXT"

<UserResponse>=34		
AT#STSR=16,34		USER did not accept the proactive command "CALL SETUP"
<UserResponse>=35		
AT#STSR=16,35		USER cleared down SIM call before connection or network release

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.
	TE and USER are used interchangeably.
SAT	SIM Application Toolkit
SCRIPT	AT Command based script
URC	Unsolicited Result Code