Easy GPRS User Guide

80000ST10028 Rev. 8 – 2010-07-26

Making machines talk.

This document is relating to the following products:

APPLICABILITY TABLE

PRODUCT
GT863-PY
GT864-QUAD
GT864-PY
GM862-GPS
GM862-QUAD-PY
GM862-QUAD
GC864-QUAD
GC864-PY
GC864-QUAD V2
GC864-DUAL V2
GE863-QUAD
GE863-PY
GE863-GPS
GE863-SIM
GE863-PRO^3
GE863-PRO^3 with Linux
GE864-PY
GE864-QUAD
GE864-QUAD V2
GE864-DUAL V2
GE864-QUAD Automotive
GE864-QUAD Automotive V2
GE864-QUAD Atex
GE865-QUAD

SW Version
7.02.xx7 / 7.03.xx2
10.00.xx3

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Contents

1 Introduction

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1.1 Scope

Scope of this document is to provide a broad description of the new Easy GPRS feature functionalities and details.

1.2 Audience

The reader is expected to have gained sound experience in GPRS technologies as well as in Telit's AT Commands interface.

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:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:
http://www.telit.com/en/products/technical-support-center/contact.php
For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:
http://www.telit.com
To register for product news and announcements or for product questions contact Telit's Technical Support Center (TTSC).

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 Document Organization

This document contains the following chapters:

"Chapter 1: "Introduction" provides a scope for this document, target audience, contact and support information, and text conventions.

"Chapter 2: "GPRS Operations" is about context setting, activation and data states.

"Chapter 3: "Enhanced GPRS Extention" provides a broad description of The Easy GPRS feature, which allows the Telit module users to contact a device on internet and establish with it a raw data flow over the GPRS and Internet networks.

"Chapter 4: "Easy GSM" This new feature allows the Telit module users to connect to an Internet Service Provider through a GSM CSD call and to use the embedded TCP/IP stack, such as in Easy GPRS, to contact a device in Internet and establish with it a raw data flow over the Internet networks.

"Chapter 5: "Command mode connection" is about the ability for Telit's modules to establish a socket connection in command mode.

"Chapter 6: "List of Acronyms"

1.5 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.

1.6 Related Documents

The following is a list of applicable documents downloadable from the Download Zone section of Telit's website http://www.telit.com

- AT Command Reference Guide, 80000ST10025a
- Telit GSM/GPRS SW User Guide, 1vv0300784

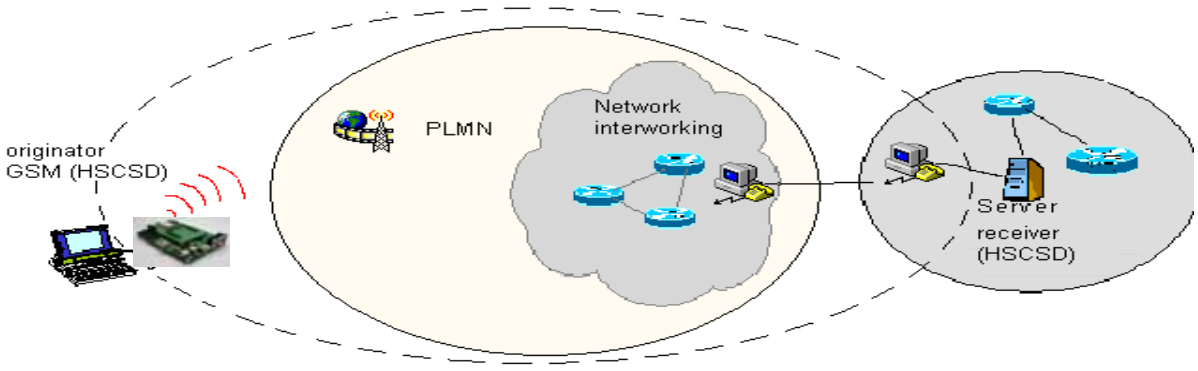
1.7 Document History

Revision	Date	Changes
ISSUE #0	2007-02-01	Initial release
ISSUE #1	2007-03-14	2.3.2 Easy GPRS – Email sending application: added new examples
ISSUE #2	2007-09-03	updated applicability table new disclaimer
ISSUE #3	2007-11-29	This document has been integrated with Multisocket User Guide and is valid from the 7.02.03 SW release
ISSUE #4	2008-07-16	Added new features related to sw release 7.03.00 or 7.02.05 such as: command mode connections and Easy GPRS over GSM
ISSUE#5	2009-07-20	Added new features related to sw release 7.03.01 or 7.02.06 such as: FTP in command mode (par. 3.3.4.2, 3.3.5, 3.3.6)
ISSUE#6	2009-07-31	Applied new layout – shifted paragraphs accordingly Added explanation about escape sequence guard time
ISSUE#7	2009-08-24	Added new features related to sw release 7.03.01 or 7.02.06 such as: • automatic context activation, • direct control on TCP/IP settings, • Listen auto-response, UDP Listen, • command mode data sending in Hex format, • ICMP/PING handling.
ISSUE#8	2010-07-26	Added new features related to sw release 7.03.02 or 7.02.07 such as: • added new socket configuration parameters (see new #SCFGEXT2 command) • added new command #SSENDEXT for sending data in command modeAdded new features related to sw release 7.03.02 , 7.02.07 or 10.0.02 such as: • AT#PADFWD and AT#PADCMD commands Removed parameter no more present in #EMAILD command from the example(pag. 61) Added new features related to SW release 10.0.03 such as: • AT#BASE64 command • AT#SGACTCFGEXT command Added note in Easy GSM chapter, about COPS and CSURV commands

2 GPRS Operations

2.1 Introduction

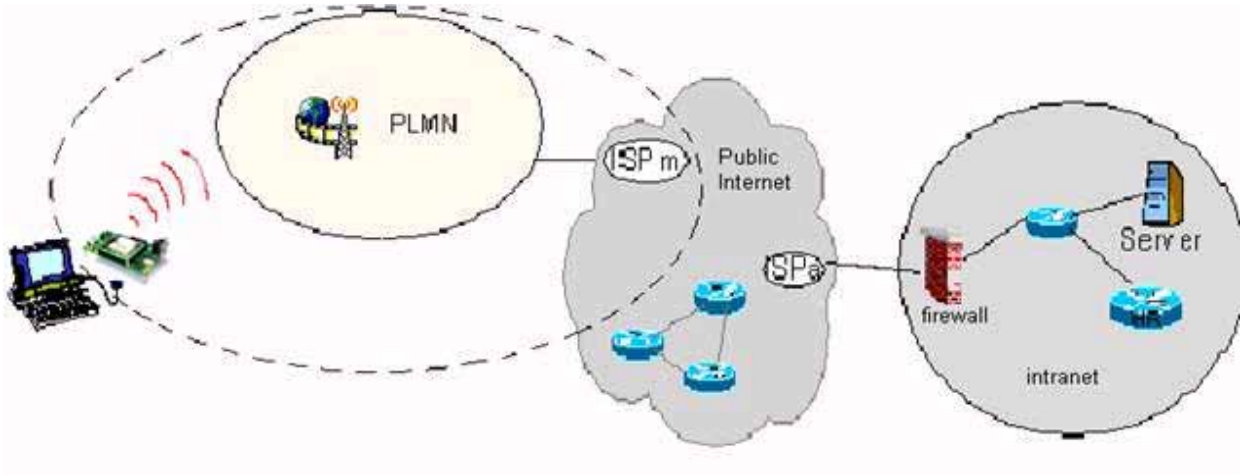
The General Packet Radio Services (GPRS) standard permits data transfers in a completely different way from previous point to point communications made using Circuit Switch Data (CSD) GSM modems.
As far as CSD modems, the connection with the other party is established in such a way that all the network devices involved are transparent to the data exchanged, as in a faked point to point connection, where the other party is not actually directly connected with the controlling application of the modem, but acts as it would. The other party can be either an Internet Service Provider (ISP) or a private server, connected through a modem (Landline, ISDN or GSM CSD). The connection procedure defines the specific and exclusive path that the information exchanged between the two peers has to follow, as long as the connection is active.
The drawback of this approach is the time consuming procedure (up to a minute) to set up the link between the two peers; the resources are kept reserved even when no data is exchanged, and this might result in high costs to pay for the line. Furthermore, the speed of the data transfer is limited to 14400 bps.
An example for this solution is shown in the following picture, where the point to point connection between the two peers takes place transparently to all the devices involved, inside the dashed line.



CSD interconnectivity

As far as GPRS instead, the connection is made towards the internet, as if the GPRS modem was a network IP socket interface. There's no data path reserved for the data

exchange between the two peers, while the resources are allocated dynamically on demand and the data exchanged is organized into packets (typically using TCP/IP); furthermore, the maximum transfer speed can be much faster than GSM CSD.
An example of GPRS connection is shown in the following picture, where the GPRS connection is between the GPRS modem and the internet, as if all the devices inside the dashed line are not present:



GPRS interconnectivity

To activate a GPRS connection, there's no need of a phone number to be dialled, but of the network parameters to connect to the internet point of the GPRS network ISP (Internet Service Provider); therefore, it is not possible to establish a direct point to point GPRS connection between two modems as in the CSD case; to achieve a point to point connection between two peers it is used *internet tunnelling*.

This approach has the immediate advantage of shifting the control of the application through the GPRS modem directly on the internet, making it readily accessible virtually from anywhere in the world at the same cost of the GPRS. At the moment, GPRS connections are billed on the amount of data exchanged (number of packets transferred) and not on the time spent connected, or the distance the packets have to cover, so it is plausible for the controlling application to always stay connected and ready to receive/send data on demand.

There's a drawback with the GPRS connection in the controlling application compelled to have its own embedded TCP/IP protocol stack, to decode the packets that arrive from GPRS and encode the ones to be sent through the internet.

There are few considerations to make on GPRS connections:

- the GPRS connection speed with a GPRS class 10 multislot device is asymmetrical; 3 time slots in reception (43200 bps max) and 2 time slots in sending

(28800 bps max) or 4 time slots in reception (57600 bps max) and 1 time slot in sending (14400 bps max).

- The controlling application of the module must have a TCP/IP - PPP software stack to interface with the GPRS modems.
- The controlling application must rely on some ISP -- may this be the Network Operator of the SIM -- to gain access to the internet through the GPRS connection.
- Therefore, the receiving application must have internet access.
- Since the connection is based upon TCP/IP packets, it is possible to communicate contemporarily with more than one peer.
- When required, the data security on the internet shall be guaranteed by security protocols over TCP/IP, managed by the controlling application.

One modem can be in 4 different states:

- GPRS DETACHED, which corresponds to the "not reachable" condition for the GPRS service;
- GPRS ATTACHED, which corresponds roughly to the "registered" condition for the GPRS service;
- GPRS context activated, which corresponds to the "reachable on the network" condition with IP address assigned (this is possible via AT commands e.g. `AT#GPRS=1`)
- CONNECTED, which roughly corresponds to the connected status;

If the module IP address (the internet address) is assigned by the ISP dynamically, then it has no address when the GPRS context of the device is not activated, and therefore it cannot be reached by internet requests. The same thing occurs when the GPRS device has a static IP address assigned to it by the ISP, but it is DETACHED.
In such cases there's no possibility for the internet peer to "call" the GPRS device through internet, if not to alert it in GSM mode (either via data or voice). The GPRS module application must recognize the caller, abort the GSM call, and connect to the internet in GPRS to receive the packets from the internet peer.

NOTE:

Devices can be reachable from the internet network only if the IP assigned by the operator is public; not all operators offer this service.

What follows is an example application made using both solutions to explain further differences between CSD and GPRS.

2.1.1 CSD application example

Let's consider several remote meteorological measurement units spread around the territory, and we want to access them wirelessly through a GSM module in CSD operation.
For each remote unit, there's a modem to connect with the server application, with its own SIM card and unique phone number.
Now there are two possibilities:

- the server application calls on demand the remote units, provided it has stored their phone numbers in a private database.
- the remote units call the server application modem when needed and eventually retry in the case they found it busy; this time the phone number to be stored is only one, the server number which must be stored on the remote units.

In both cases, once connected, the remote unit sends the meteorological data to the server, which places it in a central database for further reading, e.g. by anyone who accesses the meteorological internet site.
The drawback of this approach is that the CSD modem needs about 30 seconds to establish the connection and, depending on the amount of data to be transferred -- usually few hundreds of bytes -- some seconds to transfer them. So let's say we pay a 40s call while we need only 10s to transfer data.

2.1.2 GPRS application example

The same application can be performed with all the Telit modules using the GPRS feature.

The remote unit is always connected to the internet taking advance of the features of the GPRS system. When it needs to send data to the server application, it simply packs the meteorological data into TCP/IP packets and sends them to the Telit module to deliver. The central server, which has a single modem connected to the internet, receives the TCP/IP packets from all the remote units and stores the data in the central database.

There's an advantage using GPRS in the remote unit being always connected and reachable in terms of costs, because only the (small) amount of data transferred is to be paid, not the connection time as in CSD operations. Furthermore, the call billing is the same for devices placed anywhere in the Network Operator State and the server can be anywhere in the world.

Plus, in the CSD operation the server shall have a set of modems and multiple phone lines to ensure that the calling units will not find the server busy, while for GPRS operation a single modem is enough, and the packets can be downloaded at up to 57600 bps (class 10 device working at 4+1), which is 4 times faster than CSD.

In the following paragraphs more detailed information will be given on how to establish a GPRS connection.

2.2 Preliminary GPRS context parameters setting

2.2.1 Context parameter setting

The context parameters consists in a whole set of information identifying the internet entry point interface provided by the ISP. Using these parameters, the GPRS network identifies the ISP to be used to gain access to the internet, and defines the value of the IP address for the GPRS device, once connected.

- Send command

AT+CGDCONT[=[<cid>[,<PDP_type>[,<APN>[,<PDP_addr>[,<d_comp>[,<h_comp>[,<pd1>[,...[,pdN]]]]]]]]]<cr>

where:

<cid> - (PDP Context Identifier) numeric parameter which specifies a particular PDP context definition.
Values:
1..*max* - where the value of *max* is returned by the Test command

<PDP_type> - (Packet Data Protocol type) a string parameter which specifies the type of packet data protocol
Values:
"IP" - Internet Protocol
"PPP" - Point to Point Protocol

<APN> - (Access Point Name) a string parameter that represents logical name used to select GGSN or external packet data network. If the value is null or omitted, then the subscription value will be requested.

<PDP_addr> - a string parameter that identifies the terminal in the address space applicable to the PDP. The allocated address may be read using the **+CGPADDR** command.

<d_comp> - numeric parameter that controls PDP data compression
Values:

0 - off (default if value is omitted)
1 - on

<h_comp> - numeric parameter that controls PDP header compression
Values:
0 - off (default if value is omitted)
1 - on

<pd1>, ..., **<pdN>** - zero to N string parameters whose meanings are specific to the **<PDP_type>**

NOTE:

A special form of the Set command, **+CGDCONT=<cid>**, causes the values for context number **<cid>** to become undefined.

NOTE:

Issuing **AT+CGDCONT<CR>** is the same as issuing the Read command.

NOTE:

Issuing **AT+CGDCONT=<CR>** returns the **OK** result code.

- Wait for response:

Response	Reason	Action
OK	context parameters have been successfully stored	proceed ahead
ERROR	some error occurred	check parameters and retry

For example:

1- Let's assume you want to set-up the GPRS context number 1(cid) with your GPRS connection parameters:

APN: ibox.tim.it
IP address: dynamically assigned by the ISP
Packet Data Protocol type: Internet Protocol (IP)
Data compression: OFF
Header compression: OFF

command:

```
AT+CGDCONT= 1,"IP","ibox.tim.it","0.0.0.0",0,0 <cr>
```

response

```
OK
```

2.2.2 Minimum Quality of the Service Requested

The minimum quality of service requested parameters represent the boundary under which the connection quality is not anymore acceptable and will be terminated.

- send command

AT+CGQMIN=<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><cr>

where:

<cid> - is the index number of the desired context to be written (up to 5 different context).
<precedence> - is the precedence class. It is applied when the network has a heavy duty and user precedence must be followed to ensure operations, the higher the priority the better the service.
Values:
0 - subscribed (default)
1 - High priority
2 - Normal priority
3 - Low priority

<delay> - is the delay class. It represents the maximum allowable time delay class between the sending and the reception of a packet.
Values:
0 - subscribed (default)
1 - delay class 1
2 - delay class 2
3 - delay class 3

4 - delay class 4 (best effort)

<reliability> - is the connection reliability class. It represents the connection reliability requested, the higher is the number the less reliable is the data exchanged.
Values:
0 - subscribed (default)
1 - reliability class 1 (acknowledged GTP,LLC and RLC; protected data)
2 - reliability class 2 (unacknowledged GTP, acknowledged LLC and RLC; protected data)
3 - reliability class 3 (unacknowledged GTP and LLC, acknowledged RLC; protected data)
4 - reliability class 4 (unacknowledged GTP,LLC and RLC; protected data)
5 - reliability class 5 (unacknowledged GTP,LLC and RLC; unprotected data)

<peak> - is the peak data transfer throughput
Values:
0 - subscribed (default)
1 - up to 7,8 kbps
2 - up to 15,6 kbps
3 - up to 31,3 kbps
4 - up to 62,5 kbps
5 - up to 125 kbps
6 - up to 250 kbps
7 - up to 500 kbps
8 - up to 1000 kbps
9 - up to 2000 kbps
<mean> - is the mean data transfer throughput
Values:
0 - subscribed (default)
1 - up to 0,8 kbps
2 - up to 1,6 kbps
3 - up to 3,9 kbps
4 - up to 7,8 kbps
5 - up to 15,6 kbps
6 - up to 39 kbps
7 - up to 78 kbps
8 - up to 156 kbps
9 - up to 390 kbps
10 - up to 7,6 Mbps
11 - up to 15.2 Mbps
12 - up to 38.2 Mbps
13 - up to 76.3 Mbps
14 - up to 152 Mbps
15 - up to 381 Mbps

16 - up to 762 Mbps
17 - up to 1525 Mbps
18 - up to 3815 Mbps
31 - Best Effort

- wait for response:

Response	Reason	Action
OK	context parameters have been successfully stored	proceed ahead
ERROR	some error occurred	check parameters and retry.

NOTE:

If your minimum requirements are too high, then it can happen that it is impossible to establish a GPRS connection, because the network has not enough resources to guarantee that quality of service. If does this happen, then you shall try reducing your minimum quality requirements.

For example:

1- Let's assume you want to set-up the GPRS context number 1(cid) written before with your GPRS min QoS parameters:

Precedence class: Normal priority
Delay class: subscribed
Reliability class: subscribed
Peak throughput: not less than 15,6 kbps
Mean throughput: not less than 7,8 kbps

command:
```
AT+CGQMIN= 1,2,0,0,5,4 <cr>
```
response
```
OK
```

NOTE:

Telit suggests to setup `AT+CGQMIN=1,0,0,0,0,0`

2.2.3 Requested Quality of the Service

The requested quality of service parameters represents the connection quality that is requested to the network on GPRS context activation.

- send command

AT+CGQREQ=<cid>,<precedence>,<delay>,<reliability>,<peak>,<mean><cr>

where:

<cid> - is the index number of the desired context to be written (up to 5 different context).

<precedence> - is the precedence class

<delay> - is the delay class

<reliability> - is the connection reliability class

<peak> - is the peak data transfer throughput

<mean> - is the mean data transfer throughput

Parameters assume the same values as in the previous section.

- wait for response:

Response	Reason	Action
OK	context parameters have been successfully stored	proceed ahead
ERROR	some error occurred	check parameters and retry

For example:

1- Let's assume you want to set-up the GPRS context number 1(cid) written before with your GPRS requested QoS parameters:

Precedence class: High priority
Delay class: subscribed
Reliability class: subscribed
Peak throughput: subscribed
Mean throughput: best effort

command:

```
AT+CGQREQ= 1,1,0,0,0,31 <cr>
```

response

```
OK
```

NOTE:

Telit suggests to setup `AT+CGQMIN=1,0,0,3,0,0`

2.3 GPRS context activation and data state entering

This operation corresponds to the dial and connect of a CSD GSM data call issued to an internet service provider.

- send command

ATD*99***<cid>#<cr>

where:

<cid> - is the index number of the desired context to be used (up to 5 different context)

- wait for response:

Response	Reason	Action
CONNECT	GPRS connection is being processed	proceed ahead with the authentication & Packed data protocol
ERROR	some error occurred	check context parameters and retry. See par.2.2.1, 2.2.2, 2.2.3 check also Network registration status.
+CME ERROR: <error code>	some error occurred	check context parameters and retry. See par.2.2.1, 2.2.2, 2.2.3 check also Network registration status.

For example:

1- Let's assume you want to activate and enter the GPRS state with context number 1(cid) written before with your GPRS requested QoS parameters:

command:
```
ATD*99***1# <cr>
```
response
```
CONNECT
```

At this point, your application should start the PPP protocol with the LCP Exchange phase:

➔ LCP Configure Request
➔ LCP Configure Acknowledge

➔ PAP Authentication
➔ PAP-Ack

➔ NCP (IP) Configure Request
➔ NCP (IP) Configure Acknowledge

At this point the TCP/IP - PPP protocol stack is up and data packets can be exchanged.

NOTE:

Explanation of TCP/IP and PPP protocol stack is beyond the scope of this document. Further information on the LCP protocol and PPP protocol definition can be found in the RFC1661. Further information on the PAP protocol definition can be found in the RFC1334. Further information on the IPCP protocol definition can be found in the RFC1332.

NOTE:

The CONNECT result code is raised before complete GPRS connection establishment.

2.4 GPRS data state exit

➔ LCP Terminate Request
➔ LCP Terminate Acknowledge

- Wait for NO CARRIER response.

or in alternative:

- send escape sequence:

+++

- wait for 2s (default silence time)
- wait for response:

Response	Reason	Action
OK	Telit module is in command mode now	proceed ahead
ERROR	some error occurred	check command syntax and timing and retry
NO CARRIER	connection has been closed	proceed ahead

- send command

ATH<cr>

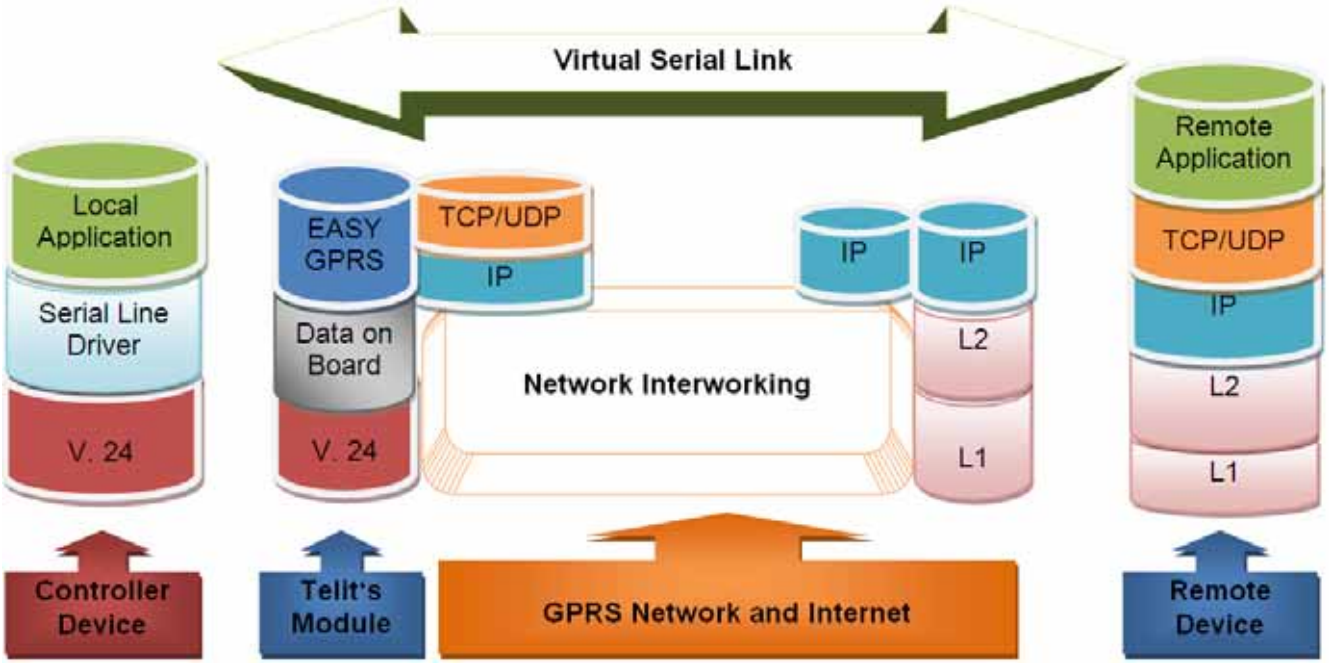
- wait for response:

Response	Reason	Action
OK	GPRS connection has been closed	
ERROR	some error occurred	check command syntax and retry

3 Enhanced Easy GPRS Extension

3.1 Overview

The Easy GPRS feature allows the **Telit module** users to contact a device on internet and establish with it a raw data flow over the GPRS and Internet networks.
This feature can be seen as a way to obtain a "virtual" serial connection between the Application Software on the Internet machine involved and the controller of the **Telit module**, regardless of all the software stacks underlying.
An example of the protocol stack involved in the devices is reported:

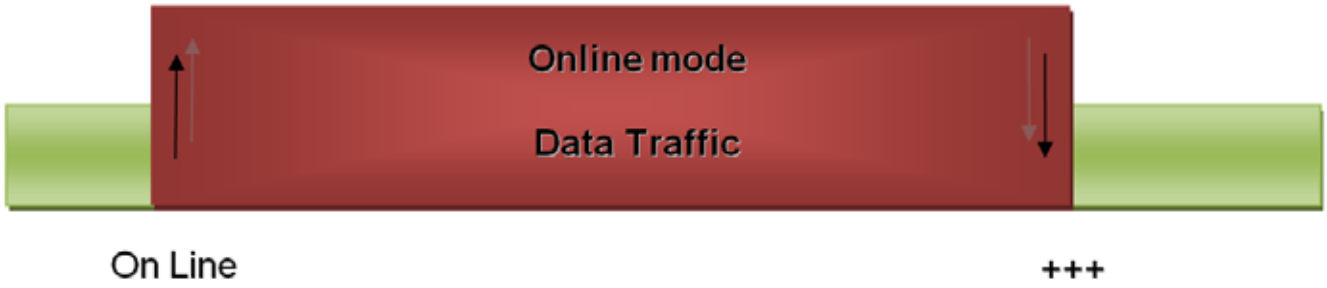


This specific implementation allows the devices to interface to the **Telit module** via GPRS and Internet packets without the need of an internal TCP/IP stack since this function is already embedded inside the module.

As a new functionality of Telit modules, multisocket is an extension of the Telit Easy GPRS feature, which allows the user to have two activated contexts (this means two different IP address), more than one socket connection -- with a maximum of 6 connections -- and simultaneous FTP client and EMAIL client services.

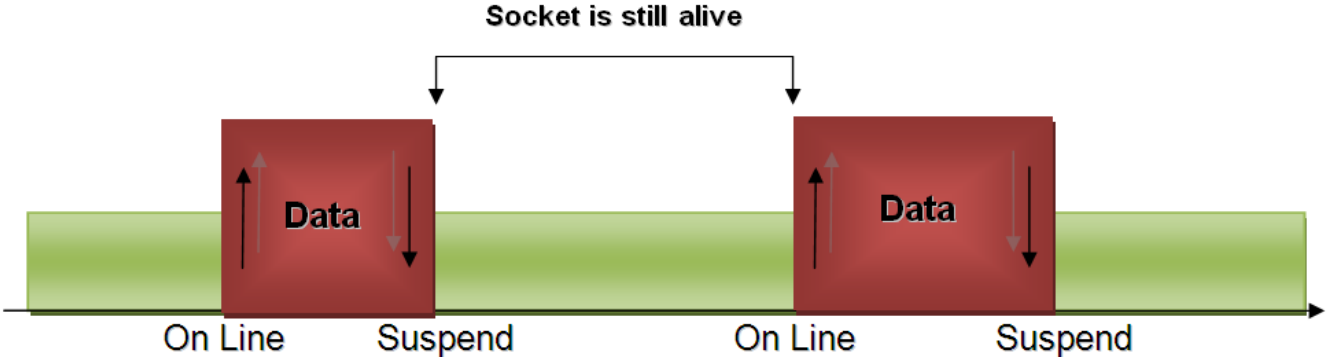
The basic idea behind multisocket is the possibility of suspend a socket connection with the escape sequence +++.

With the #SKTD command it is possible to open a socket connection and get online. When the online activities are concluded, the +++ sequence is used to close the connection (see the figure below).



The green part represents the module command mode while the red part is the online mode.

Now, the online mode can be suspended with the escape sequence +++ by using the multisocket feature. During suspend mode the data received by the socket will be buffered, which data will be displayed after socket resumption, as shown in the figure below:



This new feature allows users to switch between online mode and command mode without closing the connection or even opening another socket (or resuming the suspended one), FTP or EMAIL connection.

Another new feature is the possibility to associate any socket connection to a specific context. This means that we can use different IP addresses for connections (max 2). The Socket Identifier is called Connection Id -- selects which socket we want to use from 1 up to 6 -- and every Connection Id is associated to a context.

3.2 Commands Overview

What follows are new AT command sequences that activate GPRS context, sets and opens the socket connection. There will be explained a new listen command and how to use FTP and Easy GPRS at the same time.

NOTE:

For more detailed AT commands and parameters definitions please consult the AT Commands Reference Guide.

3.2.1 Easy GPRS Outgoing Connection

The Easy GPRS feature provides a way to place outgoing TCP/UDP connections and keep the same IP address after a connection is made, leaving the GPRS context active. The steps required to open a socket and close it without closing the GRPS context are:

- configuring the GPRS Access
- configuring the embedded TCP/IP stack behaviour
- defining the Internet Peer to be contacted
- request the GPRS context to be activated
- request the socket connection to be opened
- exchange data
- close the TCP connection while keeping the GPRS active

All these steps are achieved through AT commands. As far as the common modem interface, two logical statuses are involved: command mode and data traffic mode.

- In Command Mode (CM), some AT commands are provided to configure the Data Module Internet stack and to start up the data traffic.

- In data traffic mode (Socket Mode, SKTM), the client can send/receive a raw data stream which will be encapsulated in the previously configured TCP / IP packets which will be sent to the other side of the network and vice versa. Control plane of ongoing socket connection is deployed internally to the module.

3.2.1.1 Configuring the GPRS access

The GPRS access configuration is done by setting:

- the GPRS context number 1 parameters (see +CGDCONT command)
- the Authentication parameters: User Name and Password (see command #SGACT)

3.2.1.2 Configuring the embedded TCP/IP stack

The TCP/IP stack behaviour must be configured by setting:

- the packet default size
- the data sending timeout
- the socket inactivity timeout

Before opening a connection we have to set the socket parameters with the new #SCFG command. It is possible to set all the timeout values and packet size for each socket connection with a single AT command. The command syntax is:

AT#SCFG = <Conn Id>, <Cntx Id>, <Pkt sz>, <Global To>, <Conn To>, <Tx To>

Where:

- Conn Id -the connection identifier
- Cntx Id -the context identifier
- Pkt sz -the minimum data packet sent to the net (default 300 bytes)
- Global To -inactivity timeout (default 90 sec.)
- Conn To -connection timeout (default 60 sec, expressed in tenths of second)
- Tx To -data sending timeout (default 5 sec, expressed in tenths of second)

The first two parameters are new and they represent the association between the socket connection and the context set with +CGDCONT. It means that we can have socket connection working on different IP addresses.
The other parameters replace the old Easy GPRS commands #DSTO, #SKTTO, #SKTCT and #PKTSZ.

If we try to modify the socket configuration of an online connection, an error will appear. So it's recommended to set the socket configuration at the beginning. It is strongly recommended to leave the first Connection Id associated to context one to allow simultaneous FTP, SMTP and Easy GPRS services.
The values set with this command are saved in NVM.

Example:

We want to associate the Connection Id number 2 to the context number 3 with a minimum packet size of 512 bytes, global timeout of 30 sec, connection timeout of 30 sec and transmission timeout of 10 sec.

Command:

```
AT#SCFG = 2, 3, 512, 30, 300,100
```

Answer:

OK *if command execution is correct*
ERROR *if a parameter is wrong or the connection Id is working online*

3.2.1.3 Request the GPRS context to be activated

This command allows activation of one of the contexts defined with AT command +CGDCONT. With multisocket it is possible to activate simultaneously two contexts of the five that have been set. We can write username and password directly from command line (if required). At least one Connection Id must be associated to the context we want to activate; otherwise an error will be appear.

The command syntax is:

#SGACT= <Cntx Id>,<Status>, [<Username>],[<Password>]

Where:

- **Cntx Id** is the context that we want to activate/deactivate.
- **Status** is the context status (0 means deactivation, 1 activation).

Example:

We want to activate context number two defined with +CGDCONT.

Command:

```
AT#SGACT = 2,1
```

Answer:
`#SGACT: "212.195.45.65"`
`OK` *if activation success.*

`ERROR` *if activation fails.*

The response code to the AT#SGACT=1 command reports the IP address obtained from the network, allowing the user to report it to his server or application.
Deactivating the context implies freeing the network resources previously allocated to the device.

NOTE:

Also the command AT+CGACT activates a context, but in this case the context cannot be used for Easy GPRS.

It's also possible to set authentication type through the command AT#SGACTAUTH.
The command syntax is:

AT#SGACTAUTH=<type>

0 – no authentication
1 – PAP authentication(factory default)
2 - CHAP authentication

It's also possible to enable automatic activation/reactivation of a specified PDP context in case of switching off/on, in case of deactivation from Network and in case of SIM removal.
NOTE: at least one IPEasy socket has to be previously associated to this context by command AT#SCFG. The command syntax is:

AT#SGACTCFG=<Cntx Id>,<retry>[,<delay>[,<urcmode>]]

Where:

- <Cntx Id>(1-5) is the context that we want to automatic activate/reactivate
- <retry>(0-15) is the number of activation/reactivation attempts(if it fails)
- <delay>(180-3600) is the delay(sec) between two successive attempts
- <urcmode>(0-1) enable unsolicited result code of the local IP address obtained from the network

Example:

AT#SGACTCFG=1,3 - activation/reactivation set on context 1 with 3 attempts.

No previous setting through #SCFG is needed in this case, because socket connection identifiers <Conn Id> 1,2,3 are already associated to <Cntx Id> 1 by default.

Furthermore it is possible to abort a context activation attempt, while waiting for AT response, by sending a char on the serial port.
To enable this feature on a <cid> new #SGACTCFGEXT command has been implemented.

The command syntax is:
AT#SGACTCFGEXT=<cid>,<abortAttemptEnable>

By setting <abortAttemptEnable> on <cid>, attempt pre-emption
is allowed.

For more details, please refer to refer to the AT Commands Reference Guide.

3.2.1.4 Open the connection with the internet host

With the AT command #SD (socket Dial) the TCP/UDP request to connect with the internet host starts:

- DNS query is done to resolve the IP address of the host name internet peer if required
- Telit module establishes a TCP/UDP (depending on the parameter request) connection with the given internet host
- Once the connection is up the module reports the code: CONNECT

The command syntax is:

AT#SD = <Conn Id>,<Protocol>, <Remote Port>, <IP address> [, <Closure Type> [, <Local Port>]]

Where:

- **Conn Id** is the connection identifier.
- **Protocol is** 0 for TCP and 1 for UDP.
- **Remote Port** is the port of the remote machine.
- **IP address** is the remote address.

To open the remote connection the context to which the Connection Id is associated must be active, otherwise an error will appear.

For example, if we want to connect to a web server with Connection Id number 3 the command is:

```
AT#SD = 3 , 0 , 80 , “www.telit.com”
```

If the command is successful we'll have a CONNECT message, and the socket number 3 will be connected to the Telit webserver.
From this moment the data incoming in the serial port is packet and sent to the Internet host, while the data received from the host is serialised and flushed to the Terminal Equipment.
The +++ sequence does not close the socket, but only suspends it.

NOTE:

Check guard time/S12 parameter before and after escape sequence.

We can suspend the connection and open another one with a different Connection Id.

A typical command sequence is:

```
AT#SD = 3 , 0 , 80 , “www.telit.com”
CONNECT
```
(send, receive data….)

```
(+++)
OK
```

OK is returned after the escape sequence, it means that the socket has been suspended correctly.
Now the connection number 3 is suspended and the module is in command mode so we can give another #SD command.

```
AT#SD = 2 , 0 , 80 , “www.google.com”
CONNECT
```
(send, receive data….)

(+++)
OK

If we try to open a connection while the **ConnId** is in suspended state or online an error will be occur.

If a suspended connection receives some data the user will receive an unsolicited SRING indication from the module. In case we receive some data from the suspended connection with Telit server we'll receive this unsolicited message:

```
SRING: 3
```

where 3 is the number of the **ConnId** with data pending.

NOTE:

The unsolicited SRING indication appears only in command mode.

New commands #PADFWD and #PADCMD have been implemented:

with #PADFWD it is possible to choose a char that, if received from serial port and if #PADCMD is set, enables flushing of pending data on the socket.

Example:

AT#PADFWD=65
OK

AT#PADCMD=1
OK

```
AT#SD = 3 , 0 , 80 , “www.telit.com”
CONNECT
// data are not sent on the socket till <Pkt sz>
// is reached or <Tx To> is expired….
```

.....

reserved char(65) set through #PADFWD is sent =>
flushing of all data on the socket follows
(including reserved char)

3.2.1.5 Resuming a suspended connection with #SO

This is the new command to resume a suspended connection, the command syntax is:

AT#SO = <Conn Id>

Example:

```
AT#SD = 2 , 0 , 80 , “www.google.com”
CONNECT
```
data sending

(+++)

```
OK

SRING: 2

AT#SO = 2
CONNECT
```
data sending

(+++)

In case there is data pending on this socket -- you can know this the unsolicited message SRING has appeared before--, issuing command AT#SO these pending data will be displayed after the CONNECT string.

It is possible to resume a suspended socket without waiting for SRING message or data pending on that connection.

Using AT#SO on a Connection Id in idle state (no socket open or suspended) we obtain a NO CARRIER message.

3.2.1.6 Close the Socket without deactivating the context

The connection can be closed for the following reasons:

- remote host TCP connection close
- socket inactivity timeout
- Terminal Equipment by issuing the escape sequence "+++" and AT#SH that specifies the Connection Id
- Network deactivation

With the new management of the escape sequence we need a command to close the socket connection. The AT command syntax to use is:

AT#SH = <conn Id>

Example:

```
AT#SD = 2 , 0 , 80 , “www.google.com”
CONNECT
data sending

(+++)

OK

AT#SH = 2
OK
```

Now the connection is closed. If we send this command with an idle Connection Id we obtain in any case an OK message.

NOTE:

If there is an escape sequence in the raw data to be sent, then the TE must work it out and sent it in a different fashion to guarantee that the connection is not closed.
The pause time is defined in the parameter S12. To avoid sending of the escape sequence a command AT#SKIPESC should be set at the beginning.

3.2.1.7 Specific settings for TCP/IP options

If needed, it's possible to have direct control on particular TCP/IP settings:

- Enabling of TCP reassembly feature.
  The command syntax is:

  AT#TCPREASS=<n>
  0 – disable TCP reassembly feature(default)
  1 – enable TCP reassembly feature

- Maximum TCP/IP payload size accepted in one single TCP/IP datagram.
  The command syntax is:

  AT#TCPMAXDAT=<size>(bytes) –
  maximum TCP payload size accepted in one single TCP/IP datagram received from the peer

  <size> will be sent by the module(TCP stack) to the peer when the socket connection will be opened.

Example:

AT#TCPMAXDAT=1000 – maximum TCP payload size accepted from peer set to 1000 bytes

Then, if we open a TCP socket connection we will advice the peer that we will not accept TCP/IP datagrams with a payload bigger than 1000 bytes.

3.2.1.8 Sending and receiving base64 encoded data

Through new #BASE64 command is possible to enable base64 encoding/decoding of data sent/received on a socket.

The command syntax is: AT#BASE64=<connId>,<enc>,<dec>
where <enc> and <dec> enable respectively encoding and/or decoding on <connId> socket.

<enc> and <dec> can be set to 1 or 2 depending on MIME line feeds setting required(please refer to the AT Commands Reference Guide)

Encoding: if enabled, all data are encoded base64 while they are received from serial port, before to be sent on <connId> socket.
Decoding: if enabled, all data are decoded base64 while they are received from <connId> socket, before to be sent on the serial port.

Example:

```
at#skipesc=1
OK

AT#SD=1,0,<port>,"IP"
CONNECT
// Data received from serial port are sent
// directly on the socket
+++ (suspension)

at#base64=1,1,0
OK

AT#SO=1
CONNECT
// Data received from serial port are encoded
// base64 before to be sent on the socket
+++ (suspension)

at#base64=1,0,1
OK



AT#SO=1
CONNECT
```


```
// Data received from socket are decoded
// base64 before to be sent on the serial port
+++ (suspension)
.....
```

Note: it is also possible to use new feature in command mode (please refer to AT Commands Reference Guide).

3.2.2 Easy GPRS Incoming Connection

The Easy GPRS feature provides a way to accept incoming TCP/UDP connections and keep the same IP address after a connection, leaving the GPRS context active.
The steps that will be required to open a socket in listen, waiting for connection requests from remote hosts and accept these request connections only from a selected set of hosts, then close it without closing the GRPS context are:

- configuring the GPRS Access
- configuring the embedded TCP/IP stack behaviour (see par. 3.2.1.2)
- defining the Internet Peer that can contact this device (firewall settings) (see par.3.2.2.1)
- request the GPRS context to be activated (see par.3.2.1.3)
- request the socket connection to be opened in listen (see par. 3.2.2.2)
- receive connection requests (see par.3.2.2.3)
- exchange data
- close the TCP connection while keeping the GPRS active (see par.3.2.1.6)

All these steps are achieved through AT commands. As for common modem interface, two logical statuses are involved: command mode and data traffic mode.

- In Command Mode (CM), some AT commands are provided to configure the Data Module Internet stack and to start up the data traffic.
- In data traffic mode (Socket Mode, SKTM), the client can send/receive a raw data stream which will be encapsulated in the previously configured TCP / IP packets which will be sent to the other side of the network and vice versa. Control plane of ongoing socket connection is deployed internally to the module.

3.2.2.1 Defining the Internet Peer that can contact this device (firewall settings)

The Telit module has an internal Firewall that controls the behaviour of the incoming connections to the module. The firewall applies for INCOMING (listening) connections; OUTGOING connections will be always done regardless of the firewall settings.

Firewall General policy is DROP, therefore all packets that are not included into an ACCEPT chain rule will be silently discarded.

When packet incomes from the IP address <incoming IP>, the firewall chain rules will be scanned for matching with the following criteria:

<incoming IP> & <net mask> = <ip_address> ?

if the result is yes, then the packet is accepted and the rule scan is finished, otherwise the next chain is taken into account until the end of the rules when the packet is silently dropped if no matching was found.

For example, let's assume we want to accept connections only from our devices which are on the IP addresses ranging from 197.158.1.1 to 197.158.255.255

We need to add the following chain to the firewall:

```
AT#FRWL=1,"197.158.1.1","255.255.0.0"
```

3.2.2.2 Request the socket connection to be opened in listen

The new listen command is now extended to 6 connections; it's possible to set from 1 to 6 socket listening on a specific port for the incoming connections. Another difference with the old Easy GPRS is that now we receive an unsolicited indication when someone tries to connect, so we can decide to accept **(AT#SA)** or refuse **(AT#SH)** the incoming connection.

NOTE:

In case you decide to reject an incoming connection request the listening socket will be closed and if you want to re-open it the AT command AT#SL needs to be re-issued.

The command syntax is:

AT#SL = <Conn Id>, <Listen state>, <Listen port>[, <Closure Type>]

It's not possible to have two **ConnId** listening on the same port.

Example:

Suppose that we want to listen on port 6543 Connection Id number 2


```
AT#SL = 2, 1, 6543
OK
```

Now the module is listening for incoming connection on port 6543 with Connection Id number 2, if a remote host is trying to connect we'll receive a SRING unsolicited indication with the listening Connection Id:

```
SRING: 2
```

3.2.2.3 Accept an incoming connection with #SA

After receiving the SRING indication for an incoming connection we can decide to refuse the remote host connection with #SH command or accept the connection with #SA command.
The command syntax is:

AT#SA = <conn Id>

Example:

We are listening on Connection Id 3 and port 6543

```
AT#SL = 3, 1, 6543
OK
```

A remote host is trying to connect, we receive the unsolicited indication.

```
SRING: 3
```

Now we accept the connection

```
AT#SA = 3
CONNECT
```

We pass in online mode and the connection is established. With the escape sequence we suspend the socket and the module is back to command mode. To resume the suspended connection we can use the #SO command described above.

NOTE:

It's also possible to accept automatically the incoming connection if the <ListenAutoRsp> parameter has been set through the command AT#SCFGEXT(for the specific connId);
see also par. 5.2.2.

In this case no unsolicited indication is received, but the connection is automatically accepted:
the CONNECT indication is given and the modem goes into online data mode.

It's also possible to open a socket listening for an incoming UDP connection on a specified port.

The command syntax is:

```
AT#SLUDP=<connId>, <listenState>, <listenPort>
```

Also in this case it's possible to receive SRING unsolicited and decide to accept(AT#SA) or refuse
(AT#SH) or accept automatically incoming connection depending on <ListenAutoRsp> setting.

3.2.2.4 Checking the socket status with #SS

With the old Easy GPRS socket connection the possible states were: online state or closed, while with multisocket suspension we have other socket states. With the new command AT#SS we can see the status of all the six sockets.

The command syntax is:

AT#SS
[=<connId>]
Suppose that we have suspended some sockets and we are in command mode, in order to verify which Connection Id has been opened, we can use AT#SS command to have a snapshot of sockets status.

The command result is:

#SS: <ConnId>,<Status>,<Local IP>,<Local Port>,<Remote IP>,<Remote Port>

For every Connection Id with have the information about our local IP address, local port, remote IP and port if we are connected.
The Status field represents the socket status:

0 – Socket Closed.
1 – Socket with an active data transfer connection.
2 – Socket suspended.
3 – Socket suspended with pending data.
4 – Socket listening.
5 – Socket with an incoming connection. Waiting for the user accept or shutdown command.

Example:

```
AT#SS
#SS: 1,4,217.201.131.110,21
#SS: 2,2,217.201.131.110,1033,194.185.15.73,10510
#SS: 3,3,217.201.131.110,1034,194.185.15.73,10510
#SS: 4,1,217.201.131.110,1035,194.185.15.73,10510
#SS: 5,0
#SS: 6,0

OK
```

In this case we can see Connection Id 1 in listen mode on port 21, number 2 suspended with no data pending, number 3 suspended with pending data and number 1 is online. The last two connections are closed

By issuing AT#SS=<connId> it's possible to get status only of the corresponding socket.

3.2.2.5 Using FTP and Easy GPRS together

Another new functionality of multisocket is the simultaneous FTP client service with socket connections. We can use socket suspension mode to give FTP commands as in the old Easy GPRS, keeping socket alive and eventually resuming socket connections when we need to.

NOTE:

It is recommended to leave Connection Id 1 associated to context 1 for using this functionality. (for more explanation see also paragraph 3.2.1.2)

3.2.2.6 Using CMUX and Multisocket

Using CMUX we can have up to three virtual port to execute normal AT commands; if we join CMUX with multisocket we can share the six connections on the three ports (six is the total number in any case) and we can have up to three sockets active (online) at the same time.
FTP with CMUX is locked on the opening port. So if we try to open an FTP client connection on another virtual port the FTP commands will show an error message until the first connection with FTP server is not closed. When the connection is closed we can open another FTP session on another virtual port. In any case we can always have only one FTP session opened at the time.

3.2.2.7 4.1 Using old interface command on Multisocket

The old commands like #SKTD or #SKTL are available also on multisocket platform and they work like in the old Easy GPRS platform. If we open a connection with #SKTD we can't suspend the connection, and the +++ sequence will close definitively the connection.
In particular with #SKTD command we have the possibility to open three simultaneous connections using CMUX virtual ports. They are closed using the +++ sequence.

NOTE:

#SKTOP has some limitations. It is available only on the first virtual port of CMUX and it is recommended not to use it with the new multisocket commands because #SKTOP deactivates the context when the connection is closed. This can generate the closure of suspended sockets. It's strongly recommended in any case to avoid using old Easy GPRS command with new multisocket commands.

3.2.2.8 5.1 Dial Up with Multisocket

With multisocket we recommend you to use the first context for a dialup connection and use the other available context for Easy GPRS socket connection.

The first context must be deactivated to make dialup connection work correctly, if we activate Easy GPRS and dialup at the same time the performance get worse. It is possible to make web browsing and Easy GPRS socket connection at the same time.

3.2.3 Known limitations

The implementation of the EASY GPRS feature has the following known limitations:

- #SKTOP is available only on the first virtual port of CMUX
- PPP and Easy GPRS functionalities not on the same IP Address (PPP uses always the first Cntx Id)
- Multi listen only on different IP ports

3.3 FTP OPERATIONS

A set of AT commands is available to support the FTP activities. The first command is called #FTPTO (FTP Time-Out) which defines the time-out for FTP operations. The module has already a factory default time defined that is 10 s.

If it is needed to be modified, the syntax is:

AT#FTPTO[=<tout>]

Parameter:
<tout> - time-out in 100 ms units
Values:
100..5000 - hundreds of ms (factory default is 100)

NOTE:

The parameter is not saved in NVM.

NOTE:

if parameter **<tout>** is omitted the behaviour of Set command is the same as Read command.

Example:
```
AT#FTPTO=1000<cr>  (set the timeout to 100sec)
OK
```

3.3.1 Opening and Closing an FTP Connection

With the command **AT#FTPOPEN=<server:port>,<username>,<password>,<mode>** is possible to open the FTP connection.

The parameters are:
<server:port> - string type, address and port of FTP server (factory default port 21).
<username> - string type, authentication user identification string for FTP.
<password> - string type, authentication password for FTP.
<mode>
Values :
0 - active mode (default)
1 - passive mode

In order to close the FTP connection the AT command **AT#FTPCLOSE** should be used.

3.3.2 Setting the FTP Transfer Type

With the command **AT#FTPTYPE[=<type>]** is possible to configure the file transfer type. The command must be provided during an FTP connection.

Parameter:
<type> - file transfer type:
Values:
0 - binary
1 - ASCII

NOTE:

The command causes an **ERROR** result code to be returned if no FTP connection has been opened yet.

NOTE:

If the parameter is omitted then the behaviour of Set command is the same of Read command.

3.3.3 FTP File transfer to the server

With the command **AT#FTPPUT=<filename> ,** to issued during an FTP connection, is possible to open a data connection and starts sending **<filename>** file to the FTP server.

If the data connection succeeds, a **CONNECT** indication is sent, otherwise a **NO CARRIER** indication is sent.

Parameter:
<filename> - string type, name under which you choose to save the file on the server (must have the right extension: es. if the file you're sending is .txt then the **<filename>** can be test.txt)

NOTE:

Use the escape sequence **+++** to close the data connection.

NOTE:

Check the guard time/S12 parameter before and after escape sequence.

NOTE:

The command causes an **ERROR** result code to be returned if no FTP connection has been opened yet.

Example:

Define PDP context:
```
AT+CGDCONT=1,"IP", "internet.wind.biz"<cr>
OK
```

GPRS Context Activation, as response gives IP of the module:
```
AT#SGACT=1,1 <cr>
#SGACT: 193.199.234.255
OK
```

Opening of FTP connection:
```
AT#FTPTO=1000<cr>          (FTP settings of time-out)
OK
```


```
AT#FTPOPEN=”199.188.25.77”,”user”,”pass”,0<cr>
OK
```

In this case port of FTP server is not specified, which means that it has the default value: 21

```
AT#FTPTYPE=0<cr>          (FTP settings of file type)
OK
```

FTP file transfer to the server in the file named “file.txt”:

```
AT#FTPPUT="file.txt"<cr>
CONNECT
```

(send the file)

```
+++                 (escape sequence +++ to close the data connection)
NOCARRIER
```

```
AT#FTPCLOSE<cr>     (closing FTP connection)
OK
```

Deactivation of GPRS context if required:

```
AT#SGACT=1,0<cr>
OK
```

3.3.4 FTP File download from the server

3.3.4.1 FTP download / online mode

The command **AT#FTPGET=<filename> ,** issued during an FTP connection, opens a data connection and starts getting a file **<filename>** from the FTP server.

If the data connection succeeds, a **CONNECT** indication is sent, otherwise a **NO CARRIER** indication is sent. The file is received on the serial port.

Parameter:
<filename> - file name, string type.

NOTE:

The command causes an **ERROR** result code to be returned if no FTP connection has been opened yet.

Example:

Define PDP context:

```
AT+CGDCONT=1,”IP”, "internet.wind.biz"<cr>
OK
```

GPRS Context Activation, as response it gives the IP of the module:

```
AT#SGACT=1,1 <cr>
#SGACT: 193.199.234.255
OK
```

Open the FTP connection:

```
AT#FTPTO=1000<cr>          (FTP settings of time-out)
OK

AT#FTPOPEN=”199.188.25.77”,”user”,”pass”,0<cr>
OK
```

In this case the port of FTP server is not specified, which means that it has the default value of 21

```
AT#FTPTYPE=0<cr>           (FTP settings of file type)
OK

AT#FTPCWD="incoming"                (change working directory if requiered)
OK
```

In order to get the list of files on the working directory from the server AT command AT#FTPLIST should be used.

Download the FTP file “file.txt” from the server:

```
AT#FTPGET="file.txt"<cr>
CONNECT
```

(receive the file)

Data connection will be closed automatically when the file sending is terminated:

```
NO CARRIER

AT#FTPCLOSE<cr>     (closing FTP connection)
OK
```

Deactivation of GPRS context if required:

```
AT#SGACT=0<cr>
OK
```

TIP:

The #SGACT command activates the context and it is necessary to start the FTP connection.

3.3.4.2 FTP download / command mode

It's possible to start an FTP download while remaining in command mode, buffering data in the module, by issuing #FTPGETPKT command during an FTP connection.

Successive transfer of required data onto the serial port is possible by issuing #FTPRECV command.

The command syntax of #FTPGETPKT is:

AT#FTPGETPKT=<filename>[,<viewMode>]

where the optional parameter <viewMode> permit to choose view mode (text format or Hexadecimal).

If the data connection succeeds, and we get an OK indication, it's possible to check how many buffered bytes are currently available, by issuing #FTPRECV? read command.

Then, with the command AT#FTPRECV=<blocksize> , it's possible to transfer at most <blocksize> bytes onto the serial port. This number is limited to the current number of bytes of the remote file which have been transferred from the FTP server.

After issuing #FTPGETPKT, the application can issue AT commands as usual in command mode -- except for FTP commands that need to open data ports like #FTPLIST, because the data port has been already opened by #FTPGETPKT itself.

Example:

Provided that an FTP connection has already been issued by an FTPOPEN command as indicated in 2.2.4.1, the following applies.

Download the FTP file "file.txt" from the server while still remaining in command mode:


```
AT#FTPGETPKT="file.txt"
OK
```

The data port is opened and the download of the file is started; data is buffered within the module.

By issuing #FTPRECV read command we get the available bytes to read:

```
AT#FTPRECV?
#FTPRECV: 600

OK
```

Read the required part of the available buffered data:

```
AT#FTPRECV=400
#FTPRECV: 400

Text row number 1  * 111111111111111111111111 *
Text row number 2  * 222222222222222222222222 *
Text row number 3  * 333333333333333333333333 *
Text row number 4  * 444444444444444444444444 *
Text row number 5  * 555555555555555555555555 *
Text row number 6  * 666666666666666666666666 *
Text row number 7  * 777777777777777777777777 *
Text row number 8  * 88888888888888888

OK
```

Read the required part of the available buffered data:

```
AT#FTPRECV =200
#FTPRECV: 200
88888 *
Text row number 9  * 999999999999999999999999 *
Text row number 10 * AAAAAAAAAAAAAAAAAAAAAAAA *
Text row number 12 * BBBBBBBBBBBBBBBBBBBBBBBB *
Text row number 13 * CCCCCCCCCCCCCCC

OK
```

NOTE:

to check when you have read the whole file, use AT#FTPGETPKT read command:

```
AT#FTPGETPKT?
#FTPGETPKT: sample.txt,0,1

OK
```

Third parameter indicates <eof>(end of file) current state(first parameter is file name and second
Indicates text or hex mode).

Data port is automatically closed by read command #FTPGETPKT? itself when the whole file has been red(by last #FTPRECV): another FTP download in online/command mode can be started by issuing #FTPGET/#FTPGETPKT.

3.3.5 FTP File download restart

It's possible to restart an FTP download from a specific position(byte) of the file by issuing #FTPREST command before FTPGET(or FTPGETPKT) command.

The syntax is:

AT#FTPREST=<restartposition>(byte).

NOTE:

it's necessary to issue FTPTYPE=0 before FTPGET(or FTPGETPKT) command to set binary file transfer type.

3.3.6 FTP File upload restart

It's possible to restart an FTP upload from a specific position(byte).

If previous FTP upload(FTPPUT) of file <filename> has been interrupted, it's possible to know how many bytes have been received from the server by issuing #FTPFSIZE=<filename>(during an FTP connection).

NOTE:

it's necessary to issue FTPTYPE=0 before FTPFSIZE command to set binary file transfer type.

Then application can append missing part of the file with AT#FTPAPP=<filename>, using FTPFSIZE response to know restart position of the local file.

To get more information for other available commands on the FTP functionality please refer to the AT Commands Reference Guide.

NOTE:

FTP works only on context one (AT#SGACT=1,1)

3.4 AT Commands Compatibility Table

Telit advises all clients that start a new application development with SW version 7.02.03 or higher to use these new Easy GPRS AT commands. Below you can find compatibility table for old and new commands:

Easy GPRS old AT commands	Easy GPRS new AT commands	Operation description
AT#SKTOP	AT#SGACT; AT#SD	socket open
AT#SKTD	AT#SD	socket dial
AT#SKTL	AT#SL	socket listen
AT#SKTSET	not required	
AT#SKTSAV	not required	
AT#GPRS	AT#SGACT	activation of GPRS context
+++ after AT#SKTD	+++; AT#SH	socket close
+++ after AT#SKTOP	+++; AT#SH; AT#SGACT	
AT#USERID	AT#SGACT	authentication
AT#PASSWD	AT#SGACT	
AT#PKTSZ	AT#SCFG	socket configuration
AT#DSTO	AT#SCFG	
AT#SKTTO	AT#SCFG	
AT#SKTCT	AT#SCFG	

It is strongly recommended not to mix the new commands with the old ones.

3.5 Examples[1]

3.5.1 Easy GPRS - HTTP client application

Let's suppose we want to connect our embedded device to an HTTP server and retrieve an HTML page using the EASY GPRS feature.

Initial data:

Server to be contacted	www.telit.com
Application Layer Protocol	HTTP1.0 (RFC1945); HTTP1.1 (RFC2068)
Page to be retrieved	homepage of server
GPRS settings	
APN	internet.gprs
IP of GPRS device	dynamically assigned by the network
DNS	assigned by the network
USERID	EASY GPRS
PASSWORD	EASY GPRS
Socket parameters	
Connection Identifier	1
Packet size (used by TCP/UDP/IP stack for data sending)	300
Socket inactivity timeout	90
Connection timeout	600
Data sending time out	50

Checking on the RFC990 the HTTP service we can found that the port 80 is dedicated for HTTP service, therefore our HTTP server will be waiting for incoming connections on that port and we will fix the EASY GPRS port to be contacted on the remote server exactly to 80.
Second thing we have to discover is whether the transport protocol has to be TCP or UDP; on the RFC1945 we can read that the HTTP Application layer protocol is meant to be on top of TCP/IP protocol, therefore the transport protocol choice will fall on TCP.
Now we have all the information needed to configure our system.

[1] NOTE: For the detailed information about AT commands reported in examples please consult the AT Commands Reference Guide

With our microcontroller we issue to the Telit module the following AT commands:
`AT+CGDCONT = 1,"IP","internet.gprs","0.0.0.0",0,0<cr>` (GPRS context setting)

For all the socket settings the following AT command will be used:

```
AT#SCFG=1,1,300,90,600,50
OK
```

Next step is activation of the GPRS context:
```
AT#SGACT=1,1,“EASY GPRS“,“EASY GPRS“
#SGACT: 193.199.234.255
OK
```

This command replies with the IP address assigned by the network.

Now we can proceed with contacting the server with AT command for socket dial:
`AT#SD=1,0,80,”www.telit.com”,0,0`

When we receive the CONNECT indication, then we are exchanging data with the HTTP server program on the remote host machine.

Now following the HTTP protocol we ask for the homepage by sending the following lines on the serial line:
```
GET / HTTP/1.1<cr><lf>
Host: www.telit.com<cr><lf>
Connection: keep-alive<cr><lf>
<cr><lf>
```

TIP:

Remember that the strings, which are sent to the HTTP server, have to be ended by line feed character. To see the issued commands enable the local echo.

As a response to our query the HTTP server will reply with the HTML code of the homepage and some debugging responses that we will see directly on the serial line:

```
HTTP/1.1 200 OK
Date: Thu, 06 2003 10:21:58 GMT
Server: Apache/1.3.27 (Unix)
Last-Modified: Thu, 06 2003 10:21:58 GMT
Content-Type: text/html
Connection: close

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 FINAL//EN">
```


```
<HTML>
… here is all the HTML code of the page..
</HTML>

<pause>+++<pause>
OK
AT#SH=1
OK
```

The Telit module is now back to command mode and the socket is closed.

3.5.2 Easy GPRS - EMAIL sending application

Let's suppose we want to send with our embedded device an EMAIL by using a SMTP server.

Initial data:

Server to be contacted	smtp.domain.com
SMTP service	port #25
Application Layer Protocol	SMTP (RFC821)
Sender	"module"<module@domain.com>
Receiver	"Receiver"<receiver@server.net>
Subject	Email Test
Message body	This message is sent in order to test Easy GPRS feature. Hello World!
GPRS settings	
APN	internet.gprs
IP of GPRS device	dynamically assigned by the network
DNS	assigned by the network
USERID	EASY GPRS
PASSWORD	EASY GPRS
SMTP settings	
SMTP server address	smtp.domain.com
Email account	
USERID	module@domain.com
PASSWORD	telit
Socket parameters	
Connection Identifier	1
Packet size (used by TCP/UDP/IP stack for data	300

sending)	
Socket inactivity timeout	90
Connection timeout	600
Data sending time out	50

Checking on the RFC990 the SMTP service we can found that the port 25 is dedicated for SMTP service, therefore our SMTP server will be waiting for incoming connections on that port and we will fix the EASY GPRS port to be contacted on the remote server exactly to 25.

Second thing we have to discover is whether the transport protocol has to be TCP or UDP; on the RFC821 we can read that the SMTP Application layer protocol is meant to be on top of TCP/IP protocol, therefore the transport protocol choice will fall on TCP. Now we have all the information needed to configure our system.

The email can be sent following three different procedures:

1) Opening socket with SMTP server and then sending directly SMTP commands. The following AT commands should be issued to the Telit module:

`AT+CGDCONT = 1,"IP","internet.gprs","0.0.0.0",0,0<cr>` (GPRS context setting)

For all the socket settings the following AT command will be used:

```
AT#SCFG=1,1,300,90,600,50
OK
```

Next step is activation of the GPRS context:

```
AT#SGACT=1,1,“EASY GPRS“,“EASY GPRS“
#SGACT: 193.199.234.255
OK
```

The command gives as response the IP address assigned by the network.

Now we can proceed with contacting the server with AT command for socket dial:

```
AT#SD=1, 0,25,"smtp.domain.com",0,0<cr>
```

When we receive the CONNECT indication, then we are exchanging data with the SMTP server program on the remote host machine.

Following the SMTP protocol we proceed with the HELO presentation and mail delivery directly over the serial line (in blu you can find the data sent by us, in violet the one received from host):

220 smtp.domain.com ESMTP Service (7.0.027-DD01) ready

HELO pcprova<cr><lf>

250 smtp.domain.com

AUTH LOGIN<cr><lf> **(authentication method)**

334 VXRlcm8gkXU6

Z204NjJAZG9tYWluLmNvbQ==<cr><lf> **(module@domain.com base64 encoding)**

334 UHFzc6dcvmQ6

dGVsaXQ= <cr><lf> **(telit base64 encoding)**

235 2.0.0 OK Authenticated

MAIL FROM: module@domain.com **<cr><lf>** **(Sender)**

250 2.1.0 module@domain.com... Sender ok

RCPT TO: receiver@server.net **<cr><lf>** **(Receiver)**

250 2.1.5 receiver@server.net... Recipient ok

DATA<cr><lf>

354 Enter mail, end with "." on a line by itself

Return-Receipt-To: < module@domain.com **><cr><lf>**
Reply-To: < module@domain.com **><cr><lf>**
From: < module@domain.com **><cr><lf>**
To: < receiver@server.net **><cr><lf>**
Subject: Email test<cr><lf>
Date: Fri, 19 Sep 2003 11:41:32 +0200<cr><lf>
MIME-Version: 1.0<cr><lf>
X-Priority: 3 (Normal) <cr><lf>

X-MSMail-Priority: Normal<cr><lf>
X-Mailer: GM862 TELIT SW, Build 1.0.1000 (1.0.1111.0) <cr><lf>
Importance: Normal<cr><lf>
X-MimeOLE: Produced By GM862 TEST SW<cr><lf>
<cr><lf>
Content-Type: text/plain; <cr><lf>
charset="iso-8859-1"<cr><lf>
Content-Transfer-Encoding: 7bit<cr><lf>
<cr><lf>
This message is sent in order to test Easy GPRS feature. Hello World!<cr><lf>
<cr><lf>
. <cr><lf>

250 2.0.0 h8J9QNH3008461 Message accepted for delivery

QUIT<cr><lf>

221 2.0.0 smtp.domain.com closing connection

+++
OK
AT#SH=1
OK

The Telit module is now back in the command mode and the socket is closed.

2) Using only AT commands is with the following sequence of commands issued to the Telit module:

```
AT+CGDCONT=1,"IP","internet.gprs","0.0.0.0",0,0<cr> (1-GPRS context setting)
AT#ESMTP = "smtp.domain.com"<cr>                    (2-SMTP server setting)
AT#EUSER = "module@domain.com"<cr>                  (3-Authentication setting)
AT#EPASSW = "telit"<cr>                             (4-Authentication setting)
AT#EADDR= "module@telit.net"<cr>                    (5-Sender address setting)
AT#ESAV                                             (6-save settings)
```

NOTE:

Authentication settings could be different between GPRS and SMTP. This is due to the fact that in the GPRS authentication it is requested user and password of your internet provider, instead of the SMTP authentication where user and password is used to connect to the SMTP server.

Now we need to activate the GPRS context:

```
AT#SGACT=1,1,“EASY GPRS“,“EASY GPRS“
#SGACT: 193.199.234.255
OK
```

This AT command gives as response the IP address of the module assigned by the network.

After receiving the OK indication, we can finally send an EMAIL:

```
AT#EMAILD="receiver@domain.com","Email test"~,0~
> this message is sent in order to test the Easy GPRS feature.  Hello World!
CTRL-Z
```

NOTE:

SMTP works only on context one (AT#SGACT=1,1)

3.5.3 Easy GPRS -EMAIL receiving application

Let's suppose we want to receive with our embedded device an EMAIL by using a POP3 server.

Initial data:

Server to be contacted	POP.mail.server
POP service	port #110
Application Layer Protocol	POP3 (RFC1785)
Receiver	"module"<module@domain.com>
Email account username	module@domain.com
Email account password	telit
GPRS settings	
APN	internet.gprs
IP of GPRS device	dynamically assigned by the network
DNS	assigned by the network
USERID	EASY GPRS
PASSWORD	EASY GPRS
Socket parameters	
Connection Identifier	1
Packet size (used by TCP/UDP/IP stack for data sending)	300
Socket inactivity timeout	90
Connection timeout	600
Data sending time out	50

Checking on the RFC1785, we can found that the port 110 is dedicated for POP3 service, therefore our POP server will be waiting for incoming connections on that port and we will fix the EASY GPRS port to be contacted on the remote server exactly to 110.
Second thing we have to discover is whether the transport protocol has to be TCP or UDP; on the RFC1785 we can read that the POP3 Application layer protocol is meant to be on top of TCP/IP protocol, therefore the transport protocol choice will fall on TCP.
Now we have all the information needed to configure our system.

With our microcontroller we can now issue to the Telit module the following AT commands:

AT+CGDCONT = 1,"IP","internet.gprs","0.0.0.0",0,0<cr> (1-GPRS context setting)

For all the socket settings the following AT command will be used:

```
AT#SCFG=1,1,300,90,600,50
OK
```

Next step is activation of the GPRS context:

```
AT#SGACT=1,1,“EASY GPRS“,“EASY GPRS“
#SGACT: 193.199.234.255
OK
```

The commands gives as response the IP address assigned to the module by the network.

AT#SD=1,0,110,"POP.mail.server",0,0<cr>
When we receive the CONNECT indication, then we are exchanging data with the POP3 server program on the remote host machine.
Following the POP3 protocol we can proceed with the authentication directly over the serial line (in blue you can find the data sent by us, in violet the one received from host):

+OK POP3 PROXY server ready (7.0.027) <A6B4DDEA93433C73A01@pop4.libero.it>

USER module@domain.com**<cr><lf>**
+OK Password required

PASS telit**<cr><lf>**
+OK 1 messages

LIST\r\n
+OK
1 19550
.

RETR 1**<cr><lf>**
+OK 19550 bytes
Return-Path: <module@domain.com>
Received: from smtp5.libero.it (193.70.192.55) by ims2d.libero.it (7.0.028)
id 40DFC49A010E5708 for test@libero.it; Tue, 17 Aug 2004 12:24:02+0200
Received: from smtp.telital.com (194.185.15.65) by smtp5.libero.it (7.0.027-DD01)
.

QUIT<cr><lf>
+OK POP3 server closing connection
+++
OK

AT#SH=1
OK

3.5.4 Remote connection between two modules

Configuration for the module that receives data (server):

Define PDP Context	AT+CGDCONT=1,"IP","ibox.tim.it","0.0.0.0"
GPRS Context Activation	AT#SGACT=1,1
Firewall Setup	AT#FRWL=1,"198.158.1.1","0.0.0.0"
Socket Listen	AT#SL=1,1,0,1024

First you have to define PDP context filling in the information of APN in this example: ibox.tim.it.
Next step is activation of GPRS context which gives as reply the IP of the module assigned by network:

```
AT#SGACT=1,1
#SGACT: 217.201.142.223
OK
```

Before opening socket in listen it is possible to define an accept firewall chain in order to filter IP of the senders.
At the end with AT command AT#SL=1,1,1024,0 the socket will be set in listen on the port #1024.

Configuration for the module that opens connection (client):

Define PDP Context	AT+CGDCONT=1,"IP","ibox.tim.it","0.0.0.0"
GPRS Context Activation	AT#SGACT=1,1
Socket Dial	AT#SD=2,0,1024,"217.201.142.223"

First you have to define PDP context filling in the information of APN in this example: ibox.tim.it.
Next step is activation of GPRS context which gives as reply the IP of the module assigned by network. Now you can open the connection with the remote host with IP address 217.201.142.223 on the port 1024 (as in example).

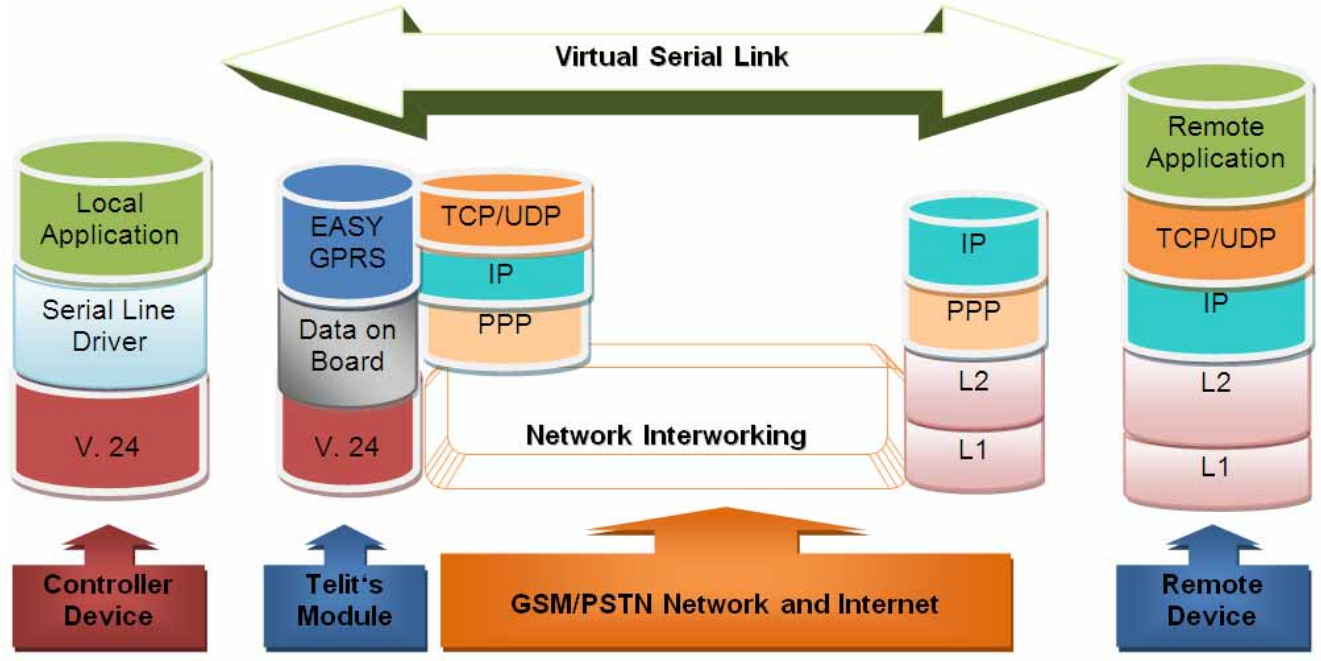
NOTE:

IP of the modules can be verified with the following AT command line: AT#CGPADDR=

4 Easy GSM

4.1 Overview

This new feature allows the **Telit module** users to connect to an Internet Service Provider through a GSM CSD call and to use the embedded TCP/IP stack, such as in Easy GPRS, to contact a device in Internet and establish with it a raw data flow over the Internet networks.
The connection between the module and the Provider is based on PPP protocol over a GSM CSD call.
An example of the protocol stack involved in the devices is reported:



In this case the speed at which packets can be downloaded is limited to the maximum data rate for a data call, 14400 bps.
All the features of Telit multisocket, FTP and EMAIL can be used over the GSM carrier.
In order to enable GSM carrier, a particular context has to be activated with identification number 0. The use of this context is analogue to that of GPRS contexts.

4.2 Commands overview

This paragraph describes the configuration and the activation of the GSM context and the new AT commands implemented to facilitate the use of Easy GSM and Easy GPRS in the same device.
For more information about concerning outgoing and incoming connections, you can refer to the chapter "Enhanced Easy GPRS Extension": there are no differences at sockets level.

NOTE:

For more detailed AT commands and parameters definitions consult the AT Commands Reference Guide.

4.2.1 Configuring GSM access

GSM context definition differs from GPRS one and requires a new command: #GSMCONT, that replaces, just in GSM case, the standard +CGDCONT. The only parameter to set is the number of the Internet Service Provider. The command syntax is:

AT#GSMCONT=0, "IP", <CSD num>

Where

- is the context identifier for the GSM context
- CSD num is the Internet Service Provider number

4.2.2 Configuring the embedded TCP/IP stack

The context identifier reserved to the GSM context is 0.
To use GSM carrier, and before activating the context, you have to configure at least one socket on the connection identifier 0, through the command #SCFG.

4.2.3 Request GSM context to be activated

GSM context activation is done through the same command #SGACT used for GPRS, with 0 as context identifier.
We cannot activate more than one GSM context at the same time.
The activation may require also in this case two Authentication parameters: User Name and Password, depending on the Internet Service Provider that we want to connect to.

So the command syntax is the same as for GPRS:

#SGACT= 0,<Status>, [<Username>],[<Password>]

Where:

- **0** is the context that we want to activate/deactivate.
- **Status** is the context status (0 means deactivation, 1 activation).

Example:

We want to activate GSM context defined with #GSMCONT.

Command:

```
AT#SGACT = 0,1
```

Answer:
`#SGACT: "10.137.93.60"`
`OK` *if activation success.*

`ERROR` *if activation fails.*

The response code to the AT#SGACT=0,1 command reports the IP address obtained from the network, allowing the user to report it to his server or application.
Deactivating the context implies freeing the network resources previously allocated to the device.

4.2.4 IP address information

Once activated the GSM context, to interrogate the module about the IP address assigned by the network, a new command has been implemented: **#CGPADDR.** It reports the all addresses relative to the active contexts, GPRS and GSM; GPRS contexts are displayed exactly like in the case of the standard +CGPADDR.

Example:

We want to activate GSM context defined with #GSMCONT.

Command:
```
AT#SGACT = 0,1
```

Answer:
```
#SGACT: “10.137.93.60”
```

Now we want to display the IP address.

Command:
```
AT#CGPADDR = 0
```

Answer:
```
#CGPADDR: 0,” 10.137.93.60”
```

4.2.5 Limitations and connections with other AT commands

If the GSM context is active, it is not allowed to activate a GPRS context.
This check has been introduced because GPRS activation would fail anyway: Telit module works in Class B, so, if a GSM CSD call is on, no GPRS operation is possible.

GSM context activation is affected, like all CSD calls, by the AT+CBST command. The maximum data rate that can be set through this command is 14400 bps (Network dependent).
Context activation is just allowed with “non transparent” data calls. This property is the default value of one of the AT+CBST command parameters.

The commands AT+COPS=? and AT#CSURV return ERROR if a data call is active. The same commands return ERROR also if a GSM context is active.

4.3 Examples

4.3.1 Easy GSM - HTTP client application

Let's suppose we want to connect our embedded device to an HTTP server and retrieve an HTML page using the EASY GSM feature. This example is analogue to the one given for GPRS carrier.
Suppose to use a sim TIM.

Initial data:

Server to be contacted	www.telit.com
Application Layer Protocol	HTTP1.0 (RFC1945); HTTP1.1 (RFC2068)
Page to be retrieved	homepage of server
GPRS settings	
Provider number	"3359009000"
IP of the device	dynamically assigned by the network
DNS	assigned by the network
USERID	*Userid of the TIM account*
PASSWORD	*Password of the TIM account*
Socket parameters	
Connection Identifier	0
Packet size (used by TCP/UDP/IP stack for data sending)	300
Socket inactivity timeout	90
Connection timeout	600
Data sending time out	50

Our HTTP server will be waiting for incoming connections on port 80 and we will fix the port to be contacted on the remote server exactly to 80.
As transport protocol we choose TCP.

With our microcontroller we issue to the Telit module the following AT commands:
`AT#GSMCONT = 0,"IP","3359009000"<cr>` (GSM context setting)

For the all socket settings, the following AT command will be used:

```
AT#SCFG=1,0,300,90,600,50
OK
```

Next step is activation of the GSM context:

```
AT#SGACT=0,1, “userid“,“password“
#SGACT: 10.137.93.60
OK
```

This command replies with the IP address assigned by the network.

Now we can proceed with contacting the server with AT command for socket dial:

```
AT#SD=1,0,80,”www.telit.com”,0,0
```

When we receive the CONNECT indication, then we are exchanging data with the HTTP server program on the remote host machine.

Now following the HTTP protocol we ask for the homepage by sending the following lines on the serial line:
GET / HTTP/1.1<cr><lf>
Host: www.telit.com<cr><lf>
Connection: keep-alive<cr><lf>
<cr><lf>

As a response to our query, the HTTP server will reply with the HTML code of the homepage and some debugging responses that we will see directly on the serial line:

HTTP/1.1 200 OK
Date: Thu, 06 2003 10:21:58 GMT
Server: Apache/1.3.27 (Unix)
Last-Modified: Thu, 06 2003 10:21:58 GMT
Content-Type: text/html
Connection: close

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 FINAL//EN">
<HTML>
... here is all the HTML code of the page..
</HTML>

<pause>+++<pause>
OK
AT#SH=1

OK

The Telit module is now back to command mode and the socket is closed.

4.3.2 FTP file transfer

Let's suppose we want to send a file to a FTP server.

Define GSM context:
```
AT#GSMCONT=0,”IP”, "3359009000"<cr>
OK
```

GSM Context Activation, as response gives IP of the module:
```
AT#SGACT=0,1 <cr>
#SGACT: 10.137.93.60
OK
```

Opening of FTP connection:
```
AT#FTPTO=1000<cr>          (FTP settings of time-out)
OK

AT#FTPOPEN=”199.188.25.77”,”userid”,”password”,0<cr>
OK
```
In this case the port of the FTP server is not specified, which means that it has the default value: 21

```
AT#FTPTYPE=0<cr>           (FTP settings of file type)
OK
```

FTP file transfer to the server in the file named "file.txt":
```
AT#FTPPUT="file.txt"<cr>
CONNECT
```

(send the file)

```
+++                (escape sequence +++ to close the data connection)
NOCARRIER

AT#FTPCLOSE<cr>    (closing FTP connection)
OK
```

Deactivation of GSM context if required:
```
AT#SGACT=0,0<cr>
OK
```

4.3.3 Remote connection between two modules

In this example we send data from a module using EASY GPRS to a module using EASY GSM.

Configuration for the module that receives data (server):

Define GSM Context	AT#GSMCONT=0,"IP"," 3359009000","0.0.0.0"
GPRS Context Activation	AT#SGACT=0,1

You have to define GSM context filling in the information of the Internet Service Provider Number.
Next step is activation of GSM context which gives as reply the IP of the module assigned by network:

```
AT#SGACT=0,1
#SGACT: 217.200.58.225
OK
```

Configuration for the module that opens connection (client):

Define PDP Context	AT+CGDCONT=1,"IP","ibox.tim.it","0.0.0.0"
GPRS Context Activation	AT#SGACT=1,1

You have to define PDP context filling in the information of APN in this example:
`ibox.tim.it.`
Next step is activation of GPRS context which gives as reply the IP of the module assigned by network.

```
AT#SGACT=1,1
#SGACT: 217.201.142.223
OK
```

Now, on the server side, before opening socket in listen it is possible to define an accept firewall chain in order to filter IP of the senders.
Then with the AT command AT#SL=1,1,1024,0 the socket will be set in listen on the port #1024:

Firewall Setup	AT#FRWL=1," 217.201.142.223","0.0.0.0"
Socket Listen	AT#SL=1,1,1024

On the client side, you can open the connection with the remote host with IP address 217.200.58.225 on the port 1024 (as in example):

Socket Dial	AT#SD=2,0,1024," 217.200.58.225"

NOTE:

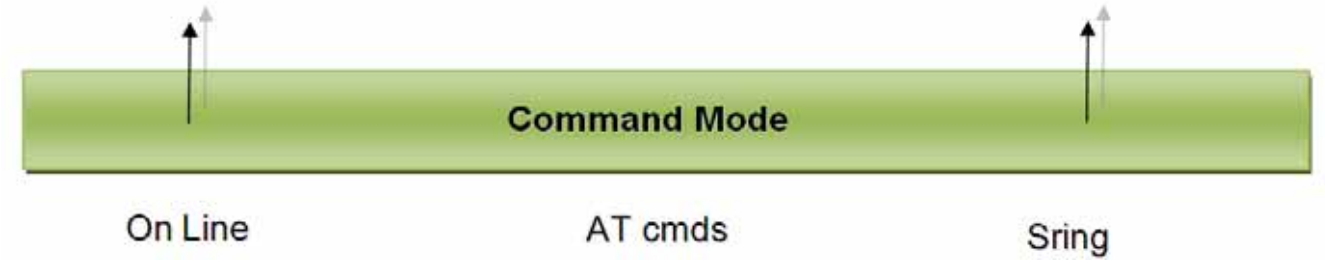
IP of the modules can be verified with the following AT command line: AT#CGPADDR=

5 Command Mode Connections

5.1 Overview

This feature allows Telit's modules to establish a socket connection in command mode. The "classic" online mode connection is described in the figure below:

With command mode feature now we have:



This means that the socket connection is created, but the user can give AT commands as usually in command mode. If we receive some data on a socket a SRING message is raised.

5.2 Commands Overview

This paragraph describes the configuration and the activation of a command mode connection and the AT commands implemented to use the new configuration socket parameters.
For anything concerning outgoing and incoming connections, you can refer to the chapter "Enhanced Easy GPRS Extension": there are no differences at sockets level.

NOTE:
For more detailed AT commands and parameters definitions consult the AT Commands Reference Guide.

5.2.1 Opening a socket connection in command mode

To open a socket in command mode we must use the multisocket commands AT#SD or AT#SA.
After a PDP context activation with AT#SGACT it is possible to open all sockets associated to this PDP context in command mode using:

AT#SD=<connId>,<txProt>,<rPort>,<IPaddr>[,<closure type>[,<lPort>],1]]

In case of listening, after an unsolicited indication for an incoming connection

SRING: <connId>

we have to use:

AT#SA = <connId>,1

where the last parameter of AT#SD and AT#SA is <ConnMode>. Default value is 0 which means "classic" online mode, 1 is used for command mode.

Examples:

Open a command mode socket on connection Id number 1:

```
AT#SD =1,0,10510,"88.37.127.146",0,0,1
OK
```

After an unsolicited indication for an incoming connection on a listening connId:


```
SRING: 1

AT#SA = 1,1
OK
```

In "classic" online mode, if the connection is successful we have a CONNECT message, in this case we have only an OK message in case of success and we are still in command mode.

To check if the connection is really established we ca use the AT#SS command to control socket status.

```
AT#SS

#SS: 1,2,217.202.12.22,38158,88.37.127.146,10510
#SS: 2,0
#SS: 3,0
#SS: 4,0
#SS: 5,0
#SS: 6,0
```

We can see that connection Id 1 is opened in suspended state.

5.2.2 Configuring extended socket parameters

Before opening socket connections it is possible to set extended configuration parameters on each of six sockets available with multisocket.
The main feature regards SRING unsolicited messages. These messages inform the user that there are pending data on a specific connection Id.
We have three modes:

- *Classic SRING*: only one message (SRING: <connId>) when some new data arrive on a socket connection (like it was for a socket connection of multisocket). This message is received also when there's an incoming connection on listening connection Id.
- *Data amount SRING*: an unsolicited message is raised for every new packet received on a socket connection. The message gives information on the connection id and on the number of bytes pending in the socket buffer.
- *View data SRING*: in this message we have connection Id, amount of buffered data by the socket and a string (up to 64 chars) with the dump of data extracted from the socket buffer. An unsolicited is raised until the socket buffer is empty. In this specific case we can decide to see data as text or as hex using the <recvDataMode> parameter (default value is 0 – text).

NOTE:

the data amount is updated until the maximum TCP windows size for reception is reached.

The command syntax is:

AT#SCFGEXT = <connId>,<srMode>,<recvDataMode>,<keepalive>
[,<ListenAutoRsp> [,<sendDataMode>]]

Where:

- <connId> is the connection identifier.
- <srMode> is the unsolicited Sring mode.
- <recvDataMode> - sets text or hex data view for received data in command mode
- <KeepAlive> sets TCP keepalive parameter in minutes (up to 240), 0 means keepalive disabled.
- <ListenAutoRsp> - Set the listen auto-response mode, that affects the commands AT#SL and AT#SLUDP
- <sendDataMode> - sets text or hex data mode for sending data in command mode(AT#SSEND)

Examples:

- *AT#SCFGEXT = 1,1,0,0* - Socket 1 set with SRING data amount
- *AT#SCFGEXT = 1,2,1,0* - Socket 1 set with SRING view data mode in hex.
- AT#SCFGEXT = 1,2,1,0,0,1 – Socket 1 set also with hex data mode for sending data

Through AT command #SCFGEXT2 is possible to set other configuration parameters.

The command syntax is:

AT#SCFGEXT2 = <connId>,<bufferStart>,[,<abortConnAttempt> [,<unused_B >[,<unused_C >[,<unused_D>]]]]

Where:

- <connId> is the connection identifier of the socket on which settings take effect

- <bufferStart>, set new behaviour for data sending timer (which timeout <Tx To> is set through #SCFG): restart every time new bytes are received from the serial port.
  Note: when enabled, old behaviour for data sending timer is automatically disabled to avoid overlapping.

- <abortConnAttempt> enables connection attempt abort (#SD/#SKTD/#SKTOP) before CONNECT(online mode) or OK(command mode).
  It is possible to abort attempt and give back control to AT interface by pressing any key.
  As soon as the control has been given to the AT interface the ERROR message will be received on the interface itself.

To get more details on which settings are available on different chipsets, please consult the AT Commands Reference Guide.

5.2.3 Send data in command mode connections

To send data in command mode we can use the command AT#SSEND.

At the prompt we can write data and send immediately on the socket with CTRL-Z sequence. Maximum number of bytes is 1024, if more characters are written they are truncated in upload. The command syntax is:

AT#SSEND = <connId>

Where <connId> is the connection Id of the socket that we want to use to send data (socket must be opened otherwise an error is raised).

Example:

We send the string “hello” on an echo socket with SRING mode set to Data amount.

```
AT#SSEND=1
> hello<CTRL-Z>
OK

SRING: 1,5
```

Through new AT#SSENDEXT command it is possible to include all bytes within data to send, including special characters(ESC, Ctrl-Z and BS) previously reserved with #SSEND.

The command syntax is:

AT#SSEND = <connId>,<bytestosend>

When <bytestosend> bytes have been sent to the serial port, operation is automatically completed.

5.2.4 Receive data in command mode connections

To receive data in command mode it is possible to use the AT#SRECV.

If we receive an unsolicited message SRING we can extract the data from the socket buffer in command mode. The syntax of the command is:

AT#SRECV=<connId>,<maxByte>

Where :

- <connId> is the connection Id of the socket with data pending
- <maxbytes> is the number of pending bytes we want to extract (maximum value is 1500).

Example:

We receive a SRING data amount and then we extract all the five bytes pending with SRECV.

```
SRING: 1,5

at#srecv=1,5
#SRECV: 1,5
hello

OK
```

5.2.5 Socket Information command

It is possible to have additional information on every socket with the AT#SI command.
The command syntax is:

AT#SI [= <connId>]

Where connId is an optional parameter, we can see info on a specific socket or for all sockets.
The information shown by the command are:

- Data sent on the socket.
- Data extracted from the socket buffer.
- Data pending on the socket buffer.
- Data not acknowledged by the remote.

```
at#si

#SI: 1,123,400,10,50
#SI: 2,0,100,0,0
#SI: 3,589,100,10,100
#SI: 4,0,0,0,0
#SI: 5,0,0,0,0
#SI: 6,0,98,60,0

OK
```

Sockets 1,2,3,6 are opened with some data traffic.
For example socket 1 has 123 bytes sent, 400 bytes received, 10 byte waiting to be read and 50 bytes waiting to be acknowledged from the remote side.

5.3 Examples

5.3.1 Open a command mode connection with Classic SRING

Open a connection on an Echo port:

```
AT#SD=2,0,10510,"88.37.127.146",0,0,1
OK

AT#SSEND=2
>hello
OK
```


```
SRING: 2

AT#SSEND=2
>hello
OK
```

...

Only one SRING unsolicited also if we have other data pending, the user is informed only once.

5.3.2 Open a command mode connection with Data amount SRING

Open a connection on an Echo port:

```
AT#SD=2,0,10510,"88.37.127.146",0,0,1
OK
AT#SSEND=2
> hello
OK

SRING: 2,5
AT#SSEND=2
> hello
OK

SRING: 2,10
```

SRing data amount unsolicited is updated every time new data arrives on the socket.

Now we use AT#SI to see info on connection Id 2:

```
AT#SI=2
#SI: 2,10,0,10,0
```

Ten bytes sent and ten pending on the socket.

5.3.3 Open a command mode connection with Data view SRING

We configure connection Id 1 for data view in text mode:

```
AT#SCFGEXT = 1,2,0,0
OK
```

We configure connection Id 2 for data view in hex mode for received data:


```
AT#SCFGEXT = 2,2,1,0
OK
```

Open the two echo connections in command mode:

```
AT#SD=1,0,10510,"88.37.127.146",0,0,1
OK

AT#SD=2,0,10510,"88.37.127.146",0,0,1
OK
```

Send some data on the first, text mode:

```
AT#SSEND=1
> hello
OK

SRING: 1,5,hello
```

Send some data on the second, hex mode for received data:

```
AT#SSEND=2
> hello
OK

SRING: 2,5,68656C6C6F
```

Data are extracted directly from the socket buffer, now we send more than 64 characters, this will cause two unsolicited SRING.

```
AT#SSEND=1
> testtesttesttesttesttesttesttesttesttesttesttesttesttesttesttesttest
OK

SRING: 1,64,testtesttesttesttesttesttesttesttesttesttesttesttesttesttesttest

SRING: 1,4,test
```

The first unsolicited contains the first 64 bytes of the socket buffer, the remaining 4 are extracted with the second unsolicited message.

NOTE:

it's also possible to send data in hex data mode representation.

This is possible through setting #SCFGEXT <sendDataMode> parameter to 1.The data shall be hexadecimal format(each octet of the data is given as two IRA character long hexadecimal number) and given in one line.

Example:

We configure connection Id 1 for data view in hex mode for received data and also for sending data:

```
AT#SCFGEXT = 1,2,1,0,0,1
OK

AT#SD=1,0,10510,"88.37.127.146",0,0,1
OK
```

Send some data in hexadecimal format:

```
AT#SSEND=1
> 68656C6C6F
OK

SRING: 1,5,68656C6C6F
```

5.3.4 Open a command mode connection with AT#SA

After using AT#SL we have a <connId> listening on a specific port (only for TCP connections).
If we receive an incoming connection an unsolicited code is raised.

```
AT#SL = 1,1,1000
```

```
SRING: 1
```

Now we can accept the incoming connection:

```
AT#SA = 1,1
OK
```

and we stay in command mode, but the connection has been opened.

5.3.5 Passing from command mode to online mode interface

It's always possible to come back to online mode interface using the command AT#SO = <connId>.

Open an echo socket in command mode:


```
AT#SD=1,0,10510,"88.37.127.146",0,0,1
OK

SRING: 1,5
```

Now we come back to online mode with:

```
AT#SO = 1
CONNECT
Hello
```

The AT interface is now in online mode and all characters written are interpreted as data to send on the connection Id.

5.3.6 ICMP / PING handling

Through AT#ICMP command it's possible to enable ICMP Ping ECHO_REPLY to a subset
(#FRWL setting) of IP addresses pinging the module.The command syntax is:
AT#ICMP=<mode>

0 – disable ICMP Ping support(default)
1 – enable Ping ECHO_REPLY to the subset of IP addresses set by #FRWL
2 – enable Ping ECHO_REPLY to every IP addresses pinging the module

Through AT#PING command is possible to send PING Echo Request messages to a specified
host(IP address or DNS host name) and to receive the corresponding Echo Reply.
The command syntax is:
AT#PING=<IPaddr>[,<retryNum>[,<len>[,<timeout>[,<ttl>]]]]

Where:

- <IPaddr> remote host address(IP address in dotted decimal notation or DNS host name)
- <retryNum> retries of PING Echo Request
- <len> length of PING Echo Request
- <timeout> - timeout waiting for a single Echo Reply
- <ttl> - time to live

NOTE: to use AT#PING the GPRS context has to be previously activated by AT#SGACT=1,1.

To receive the Echo Replies it's not necessary to use AT#ICMP before AT#PING.

Example:

After #PING command:

```
AT#PING="www.telit.com"
```

The Echo replies will be received like following string:

```
#PING: 01,"xxx.xxx.xxx.xxx",6,50
```

Where:
<Echo Reply number>,<IP address of the remote host>,<replyTime>(100 ms units),<ttl>

Subsequent Echo replies are received as follows:

```
#PING: 02,"xxx.xxx.xxx.xxx",5,50
#PING: 03,"xxx.xxx.xxx.xxx",6,50
#PING: 04,"xxx.xxx.xxx.xxx",5,50

OK
```

6 List of acronyms

Abbreviation	Description
Ack	Acknowledge
APN	Access Point Name
AT	Attention commands
CM	Command mode
CR	Carriage Return
CSD	Circuit Switched Data
CTS	Clear To Send
DCD	Data Carrier Detected
FTP	File Transfer Protocol
GGSN	Gateway GPRS Serving/Support Node
GPRS	General Radio Packet Service
GSM	Global System for Mobile communication
GTP	GPRS Tunnelling Protocol
HTML	Hyper Text Mark-up Language
HTTP	Hypertext Transfer Protocol
HSCSD	High-Speed Circuit-Switched Data
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
LCP	Link Control Protocol
LLC	Logical Link Control
MS	Mobile Station
MT	Mobile Terminated
NCP	Network Control Protocol
OEM	Other Equipment Manufacturer
PAP	Password Authentication Protocol
PDP	Packet Data Protocol
PDU	Protocol Data Unit
PLMN	Public Land Mobile Network
PPP	Point to Point Protocol
QoS	Quality Of Service
RLC	Radio Link Control
RoHS	Reduction of Hazardous Substances
RTS	Ready To Send
SIM	Subscriber Identity Module
SKTM	Socket Mode

SMTP	Simple Mail Transfer Protocol
TCP	Transmission Control Protocol