# IP Easy User Guide

80000ST10028A Rev. 19 – 2014-09-03


Making machines talk.

# APPLICABILITY TABLE

| | SW Version |
|---|---|
| **GC Family ( Compact )** | |
| GC864-QUAD | 10.00.xx7 |
| GC864-QUAD V2 | 10.00.xx7 |
| GC864-DUAL V2 | 10.00.xx7 |
| **GE/GL Family ( Embedded )** | |
| GE864-QUAD | 10.00.xx7 |
| GE864-QUAD V2 | 10.00.xx7 |
| GE864-QUAD Automotive V2 | 10.00.xx7 |
| GE864-QUAD ATEX | 10.00.xx7 |
| GE864-DUAL V2 | 10.00.xx7 |
| GE864-GPS | 10.00.xx7 |
| GE865-QUAD | 10.00.xx7 |
| GL865-DUAL | 10.00.xx7 |
| GL865-QUAD | 10.00.xx7 |
| GL868-DUAL | 10.00.xx7 |
| GE910-QUAD | 13.00.xx3 |
| GE910-QUAD AUTO | 13.00.xx5 |
| GE910-GNSS | 13.00.xx4 |
| GL865-DUAL V3 | 16.00.xx3 |
| GL865-QUAD V3 | 16.00.xx3 |
| GL868-DUAL V3 | 16.00.xx2 |
| GE910-QUAD V3 | 16.00.xx3 |
| GE866-QUAD | 16.00.xx3 |
| **GT Family ( Terminal )** | |
| GT863-PY | 10.00.xx7 |
| GT864-QUAD | 10.00.xx7 |
| GT864-PY | 10.00.xx7 |
| GT864-3G | 08.01.xx8 |
| GT863-3GG | 08.01.xx8 |
| **HE910 Family** | |
| HE910 [1] | 12.00.xx4 |
| HE910-GA | 12.00.xx4 |
| HE910-D | 12.00.xx4 |
| HE910-EUR / HE910-EUD | 12.00.xx4 |
| HE910-EUG / HE910-NAG | 12.00.xx4 |
| HE910-NAR / HE910-NAD | 12.00.xx4 |
| **UE/UL Family (Embedded)** | |
| UE910-EUR / UE910-EUD | 12.00.xx4 |
| UE910-NAR / UE910-NAD | 12.00.xx4 |
| UL865-EUR / UL865-EUD | 12.00.xx4 |
| UL865-NAR / UL865-NAD | 12.00.xx4 |
| UL865-N3G | 12.00.xx4 |
| **UC864 Family (Compact)** | |
| UC864-G | 08.01.xx8 |
| UC864-E | 08.01.xx8 |
| UC864-E-DUAL | 08.01.xx8 |
| UC864-E-AUTO | 08.01.xx8 |
| **UE910 V2 Family** | |
| UE910-EU V2 | 19.10.xx2 |
| UE910-NA V2 | 19.10.xx2 |
| UE910-EU V2 AUTO | 19.10.xx2 |
| **HE910 V2 Family** | |
| HE910-EU V2 | 14.22.xx1 |
| HE910-EUG V2 | 14.22.xx1 |
| HE910-NA V2 | 14.22.xx1 |
| HE910-NAG V2 | 14.22.xx1 |

[1] HE910 is the "type name" of the products marketed as HE910-G & HE910-DG.

 

| HE920 Family | |
|---|---|
| HE920-EU AUTO | 14.12.xx1 |
| HE920-NA AUTO | 14.12.xx1 |

**Note:** the features described in the present document are provided by the products equipped with the software versions equal or higher than the versions shown in the table. See also the Document History chapter.

 

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# Contents



 

 

# 1. Introduction

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To get more details on which commands and relative parameters are available on different SW versions, please consult the AT Commands Reference Guides [1], [2], [3], [5], [6], and [7].

## 1.1. Scope

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

## 1.2. Audience

The reader is expected to have gained sound experience in GPRS/UMTS/HSPA 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:
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## 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: "IP Easy Operation" is about context setting, activation and data states.

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

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

"Chapter 6: "Notes concerning IPV6 Implementation": notes about the IPV6 implementation provided by the GE910 Modules Family

"Chapter 7: "List of Acronyms"

"Chapter 8: "Document History"

## 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

[1] AT Command Reference Guide, 80000ST10025a

[2] UC864 AT Command Reference Guide, 80304ST10041a

[3] HE910 AT Command Reference Guide, 80378ST10091A

[4] Telit GSM/GPRS SW User Guide, 1vv0300784

[5] UE910V2 AT Commands Reference Guide, 80419ST10124A

[6] HE910V2 AT Commands Reference Guide, 80418ST10126A

[7] HE920 AT Commands Reference Guide, 80404ST10113A

# 2. IP Easy Operations

## 2.1. Preliminary context parameters setting

### 2.1.1. Context parameter setting

The context parameters consist in a set of information identifying the internet entry point interface provided by the ISP. Using these parameters, the 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 IPV4 |
| "IPV6" | Internet Protocol IPV6, refer to chapter 6. |
| "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
2 – V.42bis (It is only applicable to UE910 V2, HE910 V2 and HE920 products family)

**<h_comp>** - numeric parameter that controls PDP header compression
**Values:**

0 - off (default if value is omitted)
1 - on
2 - RFC1144 (applicable for SNDP only and to only UE910 V2, HE910 V2 and HE920 product family)
3 - RFC2057 (It is only applicable to UE910 V2, HE910 V2 and HE920 products family)
4 - RFC3095 (applicable for PDCP only and to only UE910 V2, HE910 V2 and HE920 products family)

**<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.
On the other hand, UE910 V2, HE910 V2 and HE920 products family return ERROR message

**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 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

## 2.1.2. 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:**
Set command can modify the 3G QoS according to 3GPP 23.107.

**NOTE:**
If your minimum requirements are too high, then it can happen that it is impossible to establish a 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.

Example:

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

### 2.1.3. Requested Quality of the Service

The requested quality of service parameters represents the connection quality that is requested to the network on 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 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+CGQREQ=1,0,0,3,0,0

**NOTE:**
Set command can modify the 3G QoS according to 3GPP 23.107.

### 2.1.4. 3G Minimum Quality of the Service Requested[2]

The 3G minimum quality of service requested parameters represent the boundary under which the 3G connection quality is not anymore acceptable and will be terminated.

- send command

**AT+CGEQMIN=[<cid>[,<traffic class>[,<maximum bitrate UL>[,<maximum bitrate DL>[,<guaranteed bitrate UL>[,<guaranteed bitrate DL>[,<delivery order>[,<maximum SDU size>[,<SDU error ratio>[,<residual bit error ratio>[,<delivery of erroneous SDUs>[,<transfer delay>[,<traffic handling priority>[,<source statistics descriptor>[,<signalling indication>]]]]]]]]]]]]]]<cr>**

where:

**<cid>** - the index number of the desired context to be written (up to 16 different context).

**<traffic class>** - a numeric parameter that indicates the type of application for which the UMTS bearer service is optimised.

**<maximum bitrate UL>** - a numeric parameter that indicates the maximum number of kbits/s delivered to UMTS (up-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32'(e.g. AT+CGEQMIN=…,32,…)(refer TS24.008 [8] subclause 10.5.6.5).

**<maximum bitrate DL>** - a numeric parameter that indicates the maximum number of kbits/s delivered by UMTS (down-link traffic) at a SAP. As an example a bitrate of 32kbit/s would be specified as '32'(e.g. AT+CGEQMIN=…,32,…)(refer TS 24.008 [8] subclause 10.5.6.5).

**<guaranteed bitrate UL>** - a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (up-link traffic) at a SAP(provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32'(e.g. AT+CGEQMIN=…,32,…)(refer TS 24.008 [8] subclause 10.5.6.5).

**<guaranteed bitrate DL>** - a numeric parameter that indicates the guaranteed number of kbits/s delivered by UMTS (down-link traffic) at a SAP (provided that there is data to deliver). As an example a bitrate of 32kbit/s would be specified as '32'(e.g. AT+CGEQMIN=…,32,…) (refer TS 24.008 [8] subclause 10.5.6.5).

**<delivery order>** - a numeric parameter that indicates whether the UMTS bearer shall provide in-sequence SDU deliver or not.

**<maximum SDU size>** - a numeric parameter(1,2,3,…) that indicates the maximum allowed SDU size in octets(refer TS 24.008 [8] subclause 10.5.6.5).

[2] Available from version 08.00.xxx and from version 12.00.xx1

**<SDU error ratio>** - a string parameter that indicates the target value for the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. The value is specified as 'mEe'. As an example a target SDU error ration of $5*10^{-3}$ would be specified as '5E3' (e.g. AT+CGEQMIN=…"5E3",…)(refer TS 24.008 [8] subclause 10.5.6.5).

**<residual bit error ratio>** - a string parameter that indicates the target value for the undetected bit error ratio in the delivered SDUs. If no error detection is requested, Residual bit error ratio indicates the bit error ratio in the delivered SDUs. The value is specified as 'mEe'. As an example a tartet residual bit error ration of $5*10^{-3}$ would be specified as '5E3'( e.g. AT+CGEQMIN=…,"5E3",…)(refer TS 24.008 [8] subclause 10.5.6.5).

**<delivery of erroneous SDUs>** - a numeric parameter that indicates whether SDUs detected as erroneous shall be delivered or not.

**<transfer delay>** - a numeric parameter (0,1,2,…) that indicates the targeted time between request to transfer an SDU at on SAP to its delivery at the other SAP, in milliseconds (refer TS 24.008 [8] subclause 10.5.6.5).

**<traffic handling priority>** - a numeric parameter(1,2,3,…) that specifies the relative importance for handling of all SDUs belonging to the UMTS bearer compared to the SUDs of other bearers ( refer TS 24.008 [8] subclause 10.5.6.5).

**<source statistics description>**[3] - Characteristics of the source of the submitted SDUs for a PDP context. This parameter should be provided if the <Traffic class> is specified as conversational or streaming.

**<signalling indication>**[3] - Signalling content of submitted SDUs for a PDP context. This parameter should be provided if the <Traffic class> is specified as interactive.

Parameters assume the range of values defined in [3], [5], [6], and [7].

- wait for response:

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

[3] Available from version 12.00.xx1

**NOTE:**
Set command can modify the 2G QoS according to 3GPP 23.107.

**NOTE:**
If your minimum requirements are too high, then it can happen that it is impossible to establish a PDP activation, 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.

### 2.1.5. 3G Requested Quality of the Service[4]

The 3G requested quality of service parameters represents the connection quality that is requested to the UMTS network on PDP context activation.

- send command

**AT+CGEQREQ=[<cid>[,<traffic class>[,<maximum bitrate UL>[,<maximum bitrate DL>[,<guaranteed bitrate UL>[,<guaranteed bitrate DL>[,<delivery order>[,<maximum SDU size>[,<SDU error ratio>[,<residual bit error ratio>[,<delivery of erroneous SDUs>[,<transfer delay>[,<traffic handling priority>[,<source statistics descriptor>[,<signalling indication>]]]]]]]]]]]]]]<cr>**

where:

**<cid>** - is the index number of the desired context to be written (up to 16 different context).

**<traffic class>**

**<maximum bitrate UL>**

**<maximum bitrate DL>**

**<guaranteed bitrate UL>**

**<guaranteed bitrate DL>**

**<delivery order>**

**<maximum SDU size>**

**<SDU error ratio>**

[4] Available from version 08.00.xxx and from version 12.00.xx1

**<residual bit error ratio>**

**<delivery of erroneous SDUs>**

**<transfer delay>**

**<traffic handling priority>**

**<source statistics descriptor>**[5]

**<signalling indication>**[5]

Parameters assume the range of values defined in [3], [5], [6], and [7].

- wait for response:

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

**NOTE:**
Set command can modify the 2G QoS according to 3GPP 23.107.

**NOTE:**
Telit suggests to setup AT+CGEQREQ=1,4,0,0,0,0,2,0,”0E0”,”0E0”,3,0,0(default setting value)

[5] Available from version 12.00.xx1

## 2.2. 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 | 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 data state with context number 1(cid) written before with your 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 connection establishment.

## 2.3. 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:

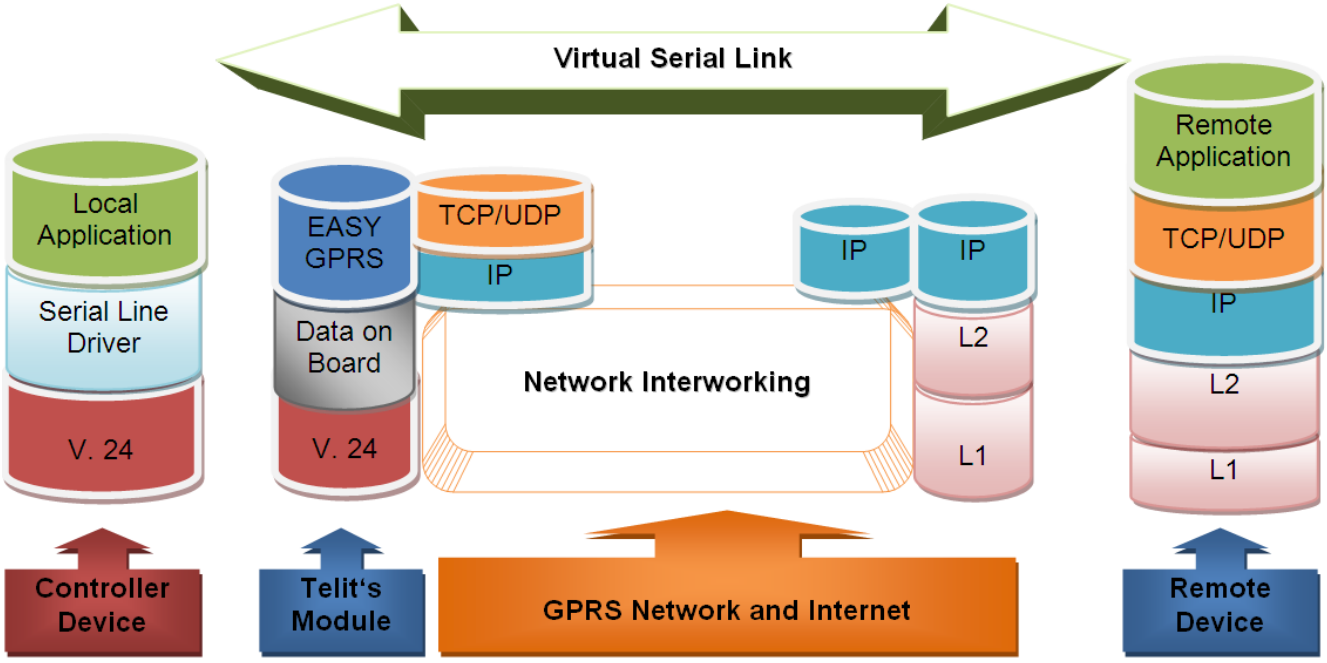
| Response | Reason | Action |
|---|---|---|
| OK | connection has been closed | |
| ERROR | some error occurred | check command syntax and retry |

# 3. IP Easy Extension

## 3.1. Overview

The IP Easy feature allows the **Telit module** users to contact a device on internet and establish with it a raw data flow over the GPRS/UMTS/HSPA 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/UMTS/HSPA and Internet packets without the need of an internal TCP/IP stack since this function is already embedded inside the module.

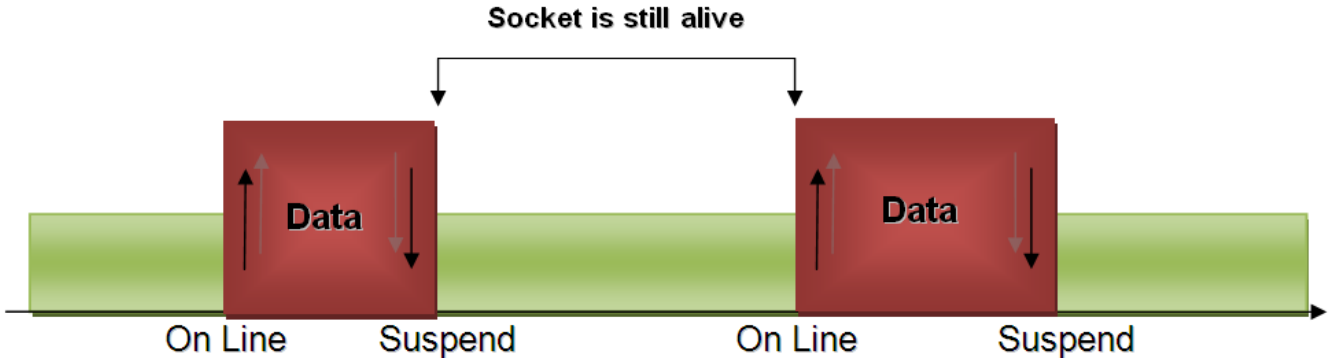
As a new functionality of Telit modules, multisocket is an extension of the Telit IP Easy feature, which allows the user to have two activated contexts (this means two different IP address), more than one socket connection -- with a maximum of 6 connections -- and simultaneous FTP client and EMAIL client 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 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 Guides [1], [2], [3], [5], [6], and [7].

### 3.2.1. IP Easy Outgoing Connection

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

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

The access configuration is done by setting:

- the 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 behavior 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 IP Easy 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 IP Easy 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 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. On the other hand, this command is not applicable to UE910 V2, HE910 V2 and HE920 products family.

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 IP Easy.

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 Guides [1], [2], [3], [5], [6], and [7].

**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[6]:

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:

[6] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO, UE910 V2 product family, HE910 V2 product family and HE920 product family

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)

#### 3.2.1.4. 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. On the other hand, UE910 V2, HE910 V2 and HE920 products family return ERROR message.

#### 3.2.1.5. 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

It is possible to get socket disconnection cause with AT command **AT#SLASTCLOSURE.**
The AT command syntax to use is:

**AT#SLASTCLOSURE=[<connId>]**

The response format is:

**#SLASTCLOSURE: <connId>,<cause>**

For details, please consult the AT Commands Reference Guides [1], [2], [3], [5], [6], and [7]. 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.

### 3.2.1.6. 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.

On the other hand, these commands are not applicable to UE910 V2, HE910 V2 and HE920 products family.

### 3.2.1.7. Sending and receiving base64 encoded data[7]

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 Guides [1],[2],[3],[5],[6], and [7])

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)
```

[7] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

**NOTE:**
It is also possible to use new feature in command mode
(please refer to AT Commands Reference Guides [1], [2], [3], [5], [6], and [7]).

## 3.2.2. IP Easy Incoming Connection

The IP Easy feature provides a way to accept incoming TCP/UDP connections and keep the same IP address after a connection, leaving the 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 context are:

- configuring the GPRS/UMTS/HSPA Access
- configuring the embedded TCP/IP stack behavior (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 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 context 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 behavior 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 IP Easy 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[8]:**
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[5].

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

[8] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

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).

It is also possible to accept automatically incoming connection depending on <ListenAutoRsp> settings[5].

#### 3.2.2.4. Checking the socket status with #SS

With the old IP Easy socket connection the possible states were: online state or closed, while with multi-socket 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 IP Easy together

Another new functionality of multi-socket is the simultaneous FTP client service with socket connections. We can use socket suspension mode to give FTP commands as in the old IP Easy, 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 Multi-socket

Using CMUX we can have up to three virtual port to execute normal AT commands; if we join CMUX with multi-socket 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[9].

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

[9] Only one socket (Online Data Mode , SKTM) for UC864-G, UC864-E, UC864-E-DUAL, UC864-E-AUTO, UE910 V2 product family, HE910 V2 product family and HE920 product family

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. Using old interface command on Multi-socket

The old commands like #SKTD or #SKTL are available also on multi-socket platform and they work like in the old IP Easy 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[10].

**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 multi-socket 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 IP Easy command with new multi-socket commands.

#### 3.2.2.8. Dial Up with Multisocket

With multi-socket we recommend you to use the first context for a dialup connection and use the other available context for IP Easy socket connection.
The first context must be deactivated to make dialup connection work correctly, if we activate IP Easy and dialup at the same time the performance get worse. It is possible to make web browsing and IP Easy socket connection at the same time.

[10] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO, UE910 V2 product family, HE910 V2 product family and HE920 product family

### 3.2.3. Known limitations

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

- #SKTOP is available only on the first virtual port of CMUX[11]
- PPP and IP Easy functionalities not on the same IP Address (PPP uses always the first Cntx Id)
- Multi listen only on different IP ports
- It's not allows to use two Data Traffic mode on CMUX or Multiple channels at the same time[12].

[11] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO, UE910 V2 product family, HE910 V2 product family and HE920 product family

[12] Only available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO, UE910 V2 product family, HE910 V2 product family and HE920 product family

## 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 behavior of Set command is the same as Read command.
On the other hand, UE910 V2, HE910 V2 and HE920 products family return OK message.

**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 behavior of Set command is the same of Read command.
On the other hand, UE910 V2, HE910 V2 and HE920 products family return ERROR message.

### 3.3.3. FTP File transfer to the server

With the command **AT#FTPPUT=<filename> ,** 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: e.g. 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

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 context if required:
AT#SGACT=1,0<cr>
OK

It is also possible to open FTP data port to send(put) data in command mode as follows.

AT#FTPOPEN=”IP”,username,password
OK

AT#FTPPUT=<filename>,1 -> the new param 1 means that we open the data port in cmd mode
OK

... here data port is opened and we remain in command mode ...

AT#FTPAPPEXT=Size
>Write here the binary data. As soon size byte are written, data are sent on the data port and OK is returned
#FTPAPPEXT: <SentBytes>
OK

...to send new data on the data port #FTPAPPEXT has to be used again...

AT#FTPAPPEXT=Size
>Write new data chunk. As soon size byte are written, data are sent and OK is returned
#FTPAPPEXT: <SentBytes>
OK

To close data port at the end, second parameter has to be set as follows:

AT#FTPAPPEXT=Size,1
>Write here the binary data. As soon Size byte are written, data are send and OK is returned
#FTPAPPEXT: <SentBytes>
OK

If a new file has to be sent, same sequence from beginning has to be considered.
If the file has to appended, FTPAPP(with second parameter set) instead of FTPPUT has to be used.

Note: if while sending the chunks the data port is closed from remote, user will be aware of it because #FTPAPPEXT will indicate ERROR and cause(CMEE 2) will indicate that socket
has been closed.
Also in this case obviously, data port will have to be reopened with FTPPUT and so on… (same sequence)

## 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

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 required)
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 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[13]

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).

[13] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

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[14]

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.

[14] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

### 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.
On the other hand, the upload restart function is not available to UE910 V2, HE910 V2 and HE920 products family.

To get more information for other available commands on the FTP functionality please refer to the AT Commands Reference Guides [1], [2], [3], [5], [6], and [7].

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

# 3.4. HTTP OPERATIONS

## 3.4.1. HTTP settings

With the command
A**T#HTTPCFG=<prof_id>,<server_address>,<server_port>,<auth_type>,<username>,<password>,<ssl_enable>,<timeout>,<cid>** is possible to setup the HTTP connection.
Parameters:
**<prof_id>**Numeric parameter indicating the profile identifier. Range: 0-2
**<server_address>** - String parameter indicating the IP address of the HTTP server.
This parameter can be either:

- Any valid IP address in the format: “xxx.xxx.xxx.xxx”
- Any host name to be solved with a DNS query

Default value: “” for first and second profile; "m2mlocate.telit.com" for third profile.
**<server_port>** - Numeric parameter indicating the TCP remote port of the HTTP server to connect to.
Default: 80 for first and second profile; 9978 for third profile. Range 1...65535
**<auth_type>** - Numeric parameter indicating the HTTP authentication type.

- 0 – no authentication (default)
- 1 – basic authentication

**<username>** - String parameter indicating authentication user identification string for HTTP.
**<password>** - String parameter indicating authentication password for HTTP.
**<ssl_enable>** - Numeric parameter indicating if the SSL encryption is enabled.

- 0 – SSL encryption disabled (default)
- 1 – SSL encryption enabled (not applicable to UE910 V2, HE910 V2 and HE920 products family)

**<timeout>** - Numeric parameter indicating the time interval in seconds to wait for receiving data from HTTP server. Range: (1- 65535). Default: 120.
**<cid>** - Numeric parameter indicating the PDP Context Identifier. Range: (1-5). Default: 1

**NOTE:**
A special form of the Set command, **#HTTPCFG=<prof_id>**, causes the values for profile number **<prof_id>** to reset to default values.

**NOTE:**
If the SSL encryption is enabled, the **<cid>** parameter has to be set to 1.

**NOTE:**
The SSL encryption can be enabled only if **<Enable>** parameter of #SSLEN is set to 0 and **<FTPSEn>** parameter of #FTPCFG is set to 0.

**NOTE:**
Values are automatically saved in NVM.

### 3.4.2. Sending HTTP requests (GET / HEAD / DELETE)

With the command
**AT#HTTPQRY=<prof_id>,<command>,<resources>,<extra_header_lines>** is possible to send a request to HTTP server.

Parameters:
**<prof_id>** - Numeric parameter indicating the profile identifier. Range: 0-2
**<command>** - Numeric parameter indicating the command requested to HTTP server:

- 0 – GET
- 1 – HEAD
- 2 – DELETE

**<resources>** - String parameter indicating the HTTP resource (uri), object of the request
**<extra_header_lines>** - String parameter indicating optional HTTP header line.
If sending ends successfully, the response is OK; otherwise an error code is reported.
Note: the HTTP request header sent with #HTTPQRY always contains the "Connection:close" line, and it cannot be removed. When the HTTP server answer is received, the following URC is printed on the serial port:

**#HTTPRING: <prof_id>,<http_status_code>,<content_type>,<data_size>**

Where:
**<prof_id>** - is defined above
**<http_status_code>** - is the numeric status code, as received from the server (see RFC 2616)
**<content_type>** - is a string reporting the "Content-Type" header line, as received from the server (see RFC 2616)
**<data_size>** - is the byte amount of data received from the server. If the server doesn't report the "Content-Length:" header line, the parameter is 0.

---

**NOTE:**
If no data is received from server or the server doesn't answer within the time interval specified in **<timeout>** parameter of #HTTPCFG command, then the URC #HTTPRING **<http_status_code>** parameter has a value of 0.

**NOTE:**
The time required to receive the #HTTPRING unsolicited can be greater than the one specified in **<timeout>** parameter of #HTTPCFG command because it is also includes the time needed to send the HTTP request to the server.

**NOTE:**
After issuing #HTTPQRY command is not possible to change SSL configuration with #SSLSECCFG and #SSLSECDATA until a #HTTPCFG is issued, because SSL connection remains up.

---

### 3.4.3. Sending HTTP POST or PUT

With the command
**AT#HTTPSND=<prof_id>,<command>,<resource>,<data_len>,<post_param>, <extra_header_line>** is possible to send data to HTTP server with POST or PUT commands.

Parameters:
**<prof_id>** - Numeric parameter indicating the profile identifier. Range: 0-2
**<command>** - Numeric parameter indicating the command requested to HTTP server:

- 0 – POST
- 1 – PUT

**<resource>** - String parameter indicating the HTTP resource (uri), object of the request
**<data_len>** - Numeric parameter indicating the data length to input in bytes
**<post_param>** - Numeric/string parameter indicating the HTTP Contenttype identifier, used
only for POST command, optionally followed by colon character (:) and a string that extends
with sub-types the identifier:

- "0[:extension]" – "application/x-www-form-urlencoded" with optional extension
- "1[:extension]" – "text/plain" with optional extension
- "2[:extension]" – "application/octet-stream" with optional extension
- "3[:extension]" – "multipart/form-data" with optional extension other content – free string corresponding to other content type and possible sub-types

**<extra_header_line>** - String parameter indicating optional HTTP header line.

If sending ends successfully, the response is OK; otherwise an error code is reported. When the HTTP server answer is received, the following URC is printed on the serial port:

**#HTTPRING: <prof_id>,<http_status_code>,<content_type>,<data_size>**

Where:
**<prof_id>** is defined as above
**<http_status_code>** is the numeric status code, as received from the server (see RFC 2616)
**<content_type>** is a string reporting the "Content-Type" header line, as received from the
server (see RFC 2616)
**<data_size>** is the byte amount of data received from the server. If the server doesn't report the "Content-Length:" header line, the parameter is 0.

**NOTE:**
The HTTP request header sent with #HTTPSND always contains the "Connection: close" line, and it cannot be removed.

**NOTE:**
If no data is received from server or the server doesn't answer within the time interval specified in **<timeout>** parameter of #HTTPCFG command, the URC #HTTPRING **<http_status_code>** parameter has a value of 0.

**NOTE:**
The time required to receive the #HTTPRING unsolicited can be greater than the one specified in **<timeout>** parameter of #HTTPCFG command because it is also includes the time needed to send the HTTP request to the server.

**NOTE:**
After issuing #HTTPQRY command is not possible to change SSL configuration with #SSLSECCFG and #SSLSECDATA until a #HTTPCFG is issued, because SSL connection remains up.

### 3.4.4. HTTP GET Example

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

Context activation:
AT#SGACT=1,1 <CR>
#SGACT: 10.7.125.7
OK

Configure HTTP server parameters:
AT#HTTPCFG=0,"www.example.com",80,0,,,0,120,1<CR>
OK

Send HTTP query to server:
AT#HTTPQRY=0,0,"/" <CR>
OK

#HTTPRING: 0,200,"text/html",1270

AT#HTTPRCV=0<CR>

<!doctype html>
<html>
<head>
<title>Example Domain</title> …
OK

### 3.4.5. HTTP GET over SSL / TLS Example

**NOTE:**
To validate the identity of the server, the CA certificate must be previously loaded on the module with command AT#SSLSECDATA. For additional information refer to Telit SSL TLS Users Guide.
On the other hand, this functionality is not applicable to UE910 V2, HE910 V2 and HE920 products family.

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

Context activation:
AT#SGACT=1,1 <CR>
#SGACT: 10.7.125.7
OK

**SSL / TLS settings:**
AT#SSLEN=1,1<CR>
OK

AT#SSLSECCFG=1,0,1<CR> (CA certificate must be previously stored
OK on the module)

AT#SSLEN=1,0<CR>
OK

Configure HTTP over SSL server parameters:
AT#HTTPCFG=0,"www.example.com",443,0,,,1,120,1<CR>

Send HTTP query to server:
AT#HTTPQRY=0,0,"/" <CR>
OK

#HTTPRING: 0,200,"text/html",1270

AT#HTTPRCV=0<CR>

<!doctype html>
<html>
<head>
<title>Example Domain</title>
….
OK

# 3.5. SMTP OPERATIONS

## 3.5.1. SMTP Settings

Support for SMTP over SSL / TLS is currently not available in all software versions.
The applicability table shows the software versions that currently support this feature:

| SW Versions[15] | SMTP over SSL / TLS |
|---|---|
| 10.01.xx0 | ✓ |
| 13.00.xx6 | ✓ |
| 16.00.xx0 | ✓ |
| 12.00.xxx | ✗ |
| 08.01.xxx | ✗ |
| 19.10.xxx | ✗ |
| 14.22.xx1 | ✗ |
| 14.12.xx1 | ✗ |

The command **AT#SMTPCFG=<ssl_enabled>[,<port>[,<mode>]]** is used to configure the SMTP parameters. On the other hand, this command is not applicable to UE910 V2, HE910 V2 and HE920 products family.

Parameters:
**<ssl_enable> -** Numeric parameter indicating if the SSL encryption is enabled.
- 0 – SSL encryption disabled (default)
- 1 – SSL encryption enabled (check the applicability table)

**<port>** - SMTP port to contact (default 25). Range: 25 - 465, 587
**<mode>** - SMTP start session command:
- 0 – SMTP start session command HELO (default)
- 1 – SMTP start session command EHLO

The command **AT#EMAILD=<da>,<subj>** is used to send an e-mail.
The device responds with a "> " and waits for the message body text.

Parameters:
**<da>** - destination address, string type (maximum length 100 characters)
**<subj>** - subject of the message, string type (maximum length 100 characters)

To complete the operation send **Ctrl-Z** char (**0x1A**); to exit without writing the message send **ESC** char (**0x1B**).

If e-mail message is successfully sent, then the response is OK.
If message sending fails for some reason, an error code is reported.

**NOTE:**

[15] Refer to Applicability Table

Maximum length for message body is 1024 bytes, trying to send more data will cause the surplus to be discarded and lost.

---

The command **AT#SMTPCL=<da>,<subj>,<att>[,<filename>,<encod>]**is used, to send an e-mail with attachment.

Parameters:
**<da>** - destination address, string type.(maximum length 100 characters)
**<subj>** - subject of the message, string type.(maximum length 100 characters)
**<att>** - attached file flag:

- 0 – no attachment
- 1 – attach a txt file
- 2 – attach a binary file(jpg,bin,pdf,...)

**<filename>** - attached file name (maximum length 50 characters)
**<encod>** - Content-Transfer-Encoding used for attachment

- 0 – “7bit” means data all represented as short lines of US-ASCII data
- 1 – “base64” designed to represent arbitrary sequences of octets in a form that need not be humanly readable

---

**NOTE:**
If a txt file (<att>=1) is attached, only <encod>0(“7bit”) is possible.
If a binary file (<att>=2) is attached, only <encod>1(“base64”) is possible.

**NOTE:**
If <att>=0 and <filename> is present and not empty, the attachment won’t be considered

**NOTE:**
If <att> 1 or 2 and <filename> is not present, command will return an ERROR

---

### 3.5.2. E-mail with attachment Example

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

Context activation:
AT#SGACT=1,1 <CR>
#SGACT: 10.7.125.7
OK

Configure SMTP server port: (This command is not applicable to UE910 V2, HE910 V2 and HE920 products family.)
**AT#SMTPCFG**=0,587
OK

Configure SMTP server address:
**AT#ESMTP**="smtp.example.com"
OK

Configure user e-mail address:
**AT#EADDR**="john@example.com"

Configure username:
**AT#EUSER**="john@example.com"
OK

Configure user password:
**AT#EPASSW**="Password"
OK

Send an e-mail with a picture in the attachment:
**AT#SMTPCL**="john.smith@telit.com","Mail with picture",2,"picture1.jpg"

> Hello,<CR><LF>
  This is the body.<CR><LF>
  The picture is in the attachment.<CR><LF> <CTRL+Z>
CONNECT
  <binary data of the picture>
+++
NO CARRIER

### 3.5.3. E-mail over SSL / TLS Example

**NOTE:**
To validate the identity of the server, the CA certificate must be previously loaded on the module with command AT#SSLSECDATA. For additional information refer to Telit SSL TLS Users Guide.

**NOTE:**
The command AT#SMTPCFG affects all three e-mail sending commands and therefore SSL / TLS can be used with all three commands (AT#EMAILD, AT#SMTPCL and AT#SEMAIL).

**NOTE:**
SMTP over SSL / TLS is currently not supported on all software versions. Check the applicability table in section **SMTP Settings** for more information.

On the other hand, this functionality is not applicable to UE910 V2, HE910 V2 and HE920 products family.

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

Context activation:
AT#SGACT=1,1 <CR>
#SGACT: 10.7.125.7
OK

Enable SSL if it is not already enabled:
AT#SSLEN=1,1
OK

Configure Certificate validation:
AT#SSLSECCFG=1,0,1<CR>
OK

Disable SSL:
AT#SSLEN=1,0<CR>
OK

Configure SMTP server port and enable SSL:
**AT#SMTPCFG**=1,587
OK

Configure SMTP server address:
**AT#ESMTP**="smtp.example.com"

OK

Configure user e-mail address:
**AT#EADDR**="john@example.com"

Configure username:
**AT#EUSER**="john@example.com"
OK

Configure user password:
**AT#EPASSW**="Password"
OK

Send e-mail:
**AT#EMAILD=**"john.smith@telit.com","This is the subject”
> Hello, <CR><LF>
This is the body.<CR><LF>
Best Regards.<CR><LF> <CTRL+Z>
OK

## 3.6. 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 IP Easy AT commands. Below you can find compatibility table for old and new commands:

| IP Easy old AT commands | IP Easy 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 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, and to use only the new ones

Note: #SKTOP command is not available for versions starting from 12.00.xx1 and for HE910 product family, UE910 V2 product family, HE920 V2 product family and HE920 product family.

# 3.7. Examples

## 3.7.1. IP Easy- HTTP client with #SD

Let's suppose we want to connect our embedded device to an HTTP server and retrieve an HTML page using the IP EASY 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 |
| **Preliminary settings** | |
| APN | internet |
| IP of device | dynamically assigned by the network |
| DNS | assigned by the network |
| USERID | IPEASY |
| PASSWORD | IPEASY |
| **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 IP EASY 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.

With our microcontroller we issue to the Telit module the following AT commands:
AT+CGDCONT = 1,"IP","internet","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 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.

### 3.7.2. IP Easy - EMAIL sending with #SD

Let's suppose we want to send with our embedded device an EMAIL using the SMTP protocol.

**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 IP Easy feature. Hello World! |
| **Preliminary settings** | |
| APN | internet |
| IP of device | dynamically assigned by the network |
| DNS | assigned by the network |
| USERID | IPEASY |
| PASSWORD | IPEASY |
| **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 sending) | 300 |
| 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 IPEASY 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.

In the following example are described the steps to send an e-mail from the Telit module with a socket dial command (AT#SD).

AT+CGDCONT = 1,"IP","internet","0.0.0.0",0,0<cr> (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 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 on the remote host machine.

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

---

**NOTE:**
→ represents received data,
← represents sent data / sent command

---

→ 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 IP Easy 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
**+++** (exit data mode)
OK
AT#SH=1
OK

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

### 3.7.3. IP Easy -EMAIL receive with #SD

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 |
| **Context settings** | |
| APN | internet |
| IP of device | dynamically assigned by the network |
| DNS | assigned by the network |
| USERID | IPEASY |
| PASSWORD | IPEASY |
| **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 IP EASY 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","0.0.0.0",0,0<cr> (1- 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 context:
AT#SGACT=1,1,“IPEASY“,“IPEASY“
#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

### 3.7.4. 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” |
| Context Activation | AT#SGACT=1,1 |
| Firewall Setup | AT#FRWL=1,”198.158.1.1”,”0.0.0.0” |
| Socket Listen | AT#SL=1,1,1024 |

First you have to define PDP context filling in the information of APN in this example: ibox.tim.it.
Next step is activation of 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” |
| 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 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[16]:**
IP of the modules can be verified with the following AT command line: AT#CGPADDR=

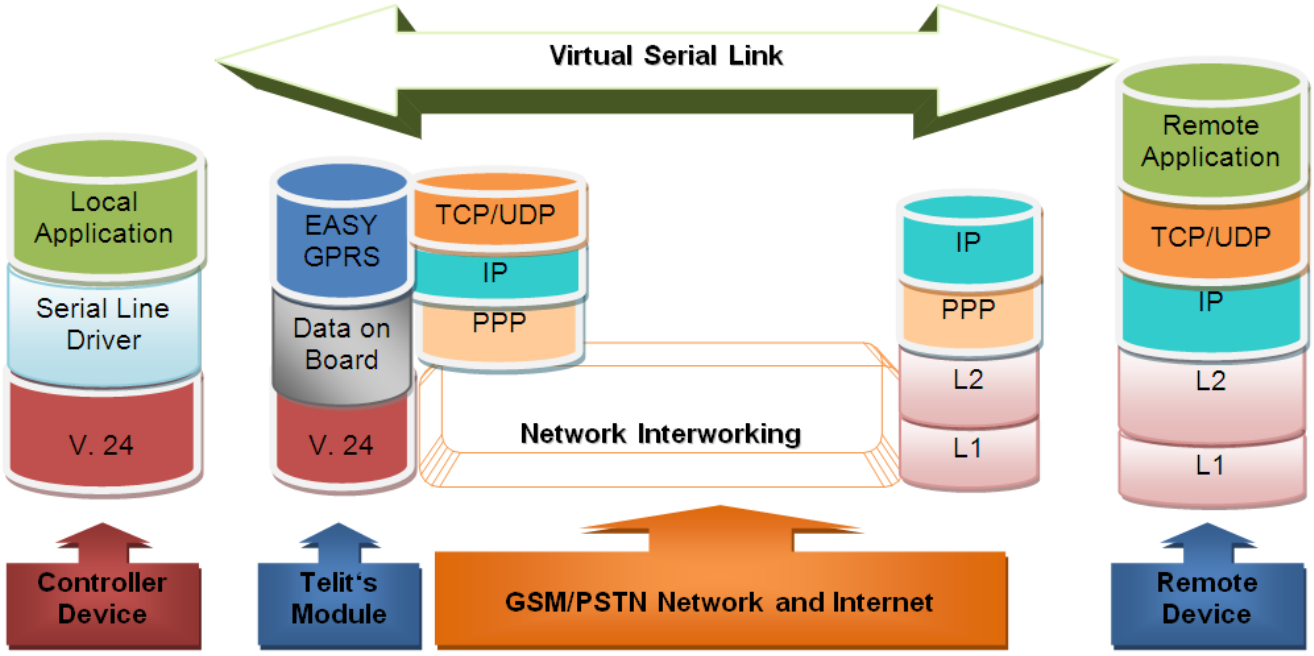
[16] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

# 4. Easy GSM[17]

## 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 IP Easy, 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/UMTS/HSPA contexts.

[17] Not available on UC864-G, UC864-E, UC864-E-DUAL, UC864-E-AUTO, UE910 V2 product family, HE910 V2 product family and HE920 product family

## 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 IP Easy in the same device.
For more information about concerning outgoing and incoming connections, you can refer to the chapter “Enhanced IP Easy Extension“: there are no differences at sockets level.

**NOTE:**
For more detailed AT commands and parameters definitions consult the AT Commands Reference Guides [1], [2], and [3].

### 4.2.1. Configuring GSM access

GSM context definition differs from GPRS/UMTS/HSPA 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, 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/HSPA/UMTS:

**#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; 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 context.
This check has been introduced because context 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/UMTS/HSPA carrier.
Suppose to use a sim TIM.

**Initial data:**

| | |
|---|---|
| Server to be contacted | www.telit.com |
| Application Layer Protocol | HTTP1.0 (RFC1945);<br>HTTP1.1 (RFC2068) |
| Page to be retrieved | homepage of server |
| **Context 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 IP EASY 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” |
| 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” |
| 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 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=

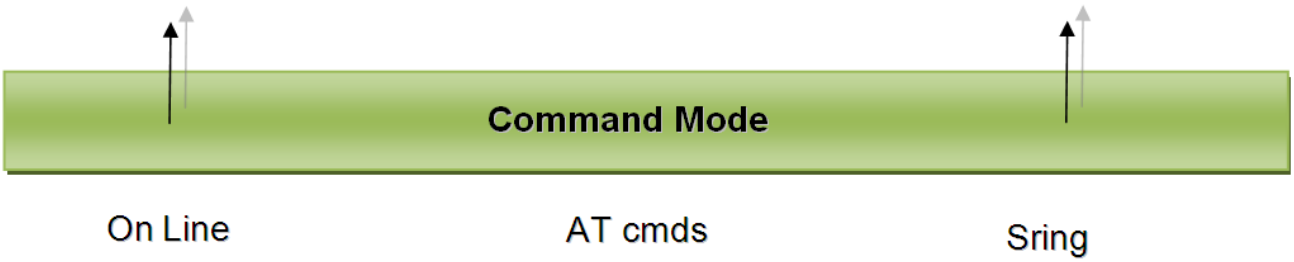
 

# 5. Command Mode Connections

## 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 IP Easy Extension": there are no differences at sockets level.

**NOTE:**
For more detailed AT commands and parameters definitions consult the AT Commands Reference Guides [1], [2], [3], [5], [6], and [7].

### 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 1500 chars for UE910 V2, HE910 V2, HE920 products family, up to 1300 chars for HE910 product family, up to 64 chars for all other products) 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).
- *View data UDP SRING*: the message is the same as the previous one for TCP connections, but for UDP connections it shows also the source IP and port and the number of bytes left in the datagram.

**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[18]
- <sendDataMode> - sets text or hex data mode for sending data in command mode(AT#SSEND)[14]

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[14]
- *AT#SCFGEXT = 1,3,1,0* - Socket 1 set with SRING view UDP data mode in hex.

**NOTE:**
For UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO the command syntax is:

**AT#SCFGEXT = <connId>,<srMode>,<recvDataMode>,<keepalive>**
***[,<unused_A> [,<unused_B>] ]***

**NOTE[14]:**
With AT command #SCFGEXT2 is possible to set other configuration parameters.

The command syntax is:

[18] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

**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 behavior 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 behavior 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 Guides [1], [2], [3], [5], [6], and [7].

### 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 1500, 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

**NOTE[14]:**

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#SSENDEXT = <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 the maximum number of chars for a SRING, this will cause two unsolicited SRING.

```
AT#SSEND=1
> testtesttesttesttesttesttesttesttesttesttesttesttesttesttesttest
OK

SRING: 1,64,testtesttesttesttesttesttesttesttesttesttesttesttesttesttest

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[19]:**

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 UDP connection with Data view UDP SRING

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

AT#SCFGEXT = 1,3,0,0
OK

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

AT#SCFGEXT = 2,3,1,0
OK

Open the two echo UDP connections in command mode:

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

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

[19] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

Send some data on the first, text mode:

AT#SSEND=1
> hello
OK

SRING: ”88.37.127.146”,10510,1,5,0,hello

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

AT#SSEND=2
> hello
OK

SRING: ”88.37.127.146”,10510,2,5,0,68656C6C6F

Now we send more than the maximum number of chars for a SRING, this will cause two unsolicited SRING. The first one showing also the number of bytes left in the UDP datagram.

AT#SSEND=1
> testtesttesttesttesttesttesttesttesttesttesttesttesttesttesttest
OK

SRING: ”88.37.127.146”,10510,1,64,4,testtesttesttesttesttesttesttesttesttesttesttesttesttesttesttest

SRING: ”88.37.127.146”,10510,1,4,0,test

### 5.3.5. 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.

### 5.3.6. 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.

### 5.3.7. ICMP / PING[20] 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

**NOTE[21]:**

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:

[20] PING functionality is not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO
[21] Not available on UC864-G, UC864-E, UC864-E-DUAL and UC864-E-AUTO

- <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 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. Notes concerning IPV6 Implementation

The table below shows in which Connection Configurations are supported IPV4, IPV6 or both Internet Protocols in accordance with the used module family and software version. Refer to the Application Table to see the latest Software Versions for each module family covered by the document.

| | Connection Configurations | |
|---|---|---|
| SW Versions[22] | IP Easy | Dial UP |
| 10.01.xxx | IPV4 / IPV6 | IPV4 / IPV6 |
| 13.00.xxx | IPV4 / IPV6 | IPV4 / IPV6 |
| 16.01.xxx | IPV4 / IPV6 | IPV4 / IPV6 |
| 12.00.xxx | IPV4 | IPV4 / IPV6 |
| 08.01.xxx | IPV4 | IPV4 |

The table shows that the GE910 Family (13.00.xxx) supports the IPV4/IPV6 Internet Protocols also when the IP Easy connection configuration is used. When the IPV6 parameter value is selected via the +CGDCONT command, the TCP/IP stack installed on the module (IP Easy configuration) uses the IPV6 Internet Protocol. In this case the protocol deals only with IPV6 addresses.
Currently, the GE910 Family provides the following commands supporting the IPV6 addresses:

- AT#SD
- AT#SSENDUDP
- AT#SSENDUDPEXT
- AT#FTPOPEN
- AT#PING
- AT#EMAILD
- AT#DNS
- AT#FRWLIPV6 (new AT command)

The IPV6 address used as input parameter in an AT command can have the following two formats:

- xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx.xxx
  Where xxx is a number having the range: 000 ÷ 255

A more common IPV6 format is:

- yyyy:yyyy:yyyy:yyyy:yyyy:yyyy:yyyy:yyyy
  Where yyy is expressed in hexadecimal format

[22] Refer to Applicability Table

The results of AT commands show the IPV6 addresses always in the first format as shown by the following examples:

Example:

AT+CGDCONT=1,”Ipv6”,”APN”
OK

AT#SGACT=1,1
+IP: 42.1.1.152.2.76.193.109.0.0.0.5.17.176.201.1
OK

Example:

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

AT#SD=1,0,80,”32.1.7.0.0.0.1.46.0.0.0.0.0.0.15.112”,0
CONNECT

or

AT#SD=1,0,80,” 2001:700:0:12e::f70”,0
CONNECT

Example:

AT#FTPOPEN=”2001:700:0:12e::f70”,””,””,1
OK

or

AT#FTPOPEN=”=”32.1.7.0.0.0.1.46.0.0.0.0.0.0.15.112”,””,””,1
OK

Example:

AT#PING=”32.1.7.0.0.0.1.46.0.0.0.0.0.0.15.112”
#PING: 01,” 32.1.7.0.0.0.1.46.0.0.0.0.0.0.15.112”,47,237
…
OK

or

AT#PING=”2001:700:0:12e::f70”
#PING: 01,” 32.1.7.0.0.0.1.46.0.0.0.0.0.0.15.112”,47,237
…
OK

Example:

AT#DNS=1,”2001:4860:4860::8888”,”2001:4860:4860::8844”
OK

AT#DNS?
#DNS: 1,”32.1.72.96.72.96.0.0.0.0.0.0.0.0.136.136”,”32.1.72.96.72.96.0.0.0.0.0.0
.0.0.136.68”

In addition, the GE910 Family provides a new AT command to set the firewall functionalities working with the IPV6 format addresses, see next examples:

AT#FRWLIPV6=1,”2001:700:0:12e::f70”,”ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff”
OK

AT#FRWLIPV6?
#FRWLIPV6: “32.1.7.0.0.0.1.46.0.0.0.0.0.0.15.112”,”255.255.255.255.255.255.255.2
55.255.255.255.255.255.255.255.255”

# 7. 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 |

# 8. Document History

| Revision | Date | Products/SW Versions | 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<br>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<br>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:<br>• automatic context activation,<br>• direct control on TCP/IP settings,<br>• Listen auto-response, UDP Listen,<br>• command mode data sending in Hex format,<br>• ICMP/PING handling. |
| ISSUE#8 | 2010-07-26 | / | Added new features related to sw release 7.03.02 or 7.02.07 such as:<br>• added new socket configuration parameters (see new #SCFGEXT2 command)<br>• 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:<br>• AT#PADFWD and AT#PADCMD commands<br>Removed parameter no more present in #EMAILD command from the example(pag. 61)<br>Added new features related to SW release 10.0.03 such as:<br>• AT#BASE64 command<br>• AT#SGACTCFGEXT command<br><br>Added note in Easy GSM chapter, about COPS and CSURV commands |
| ISSUE#9 | 2010-10-04 | / | Added GL865-DUAL to applicability table |
| ISSUE#10 | 2011-03-09 | / | Added new features related to sw release 10.0.04 such as:<br><br>• AT#SMTPCL command, it allows to send and email with different types of attachments. #SMTPCL handles attachment, managing MIME headers and encoding if required.<br><br>Updated all references from “GPRS” to “GPRS/UMTS/HSPA”(or removed when not required)<br><br>Correction on #SSENDEXT referenced wrongly as “#SSEND” at page 78; par. 5.2.3<br><br>Correction on par. 5.2.1(pag.74), reference to #SD / cmd mode (was wrongly indicated as “Atem”)<br><br>Added general note regarding availability of commands on different SW version<br><br>Changed title from EASY GPRS User Guide to IP Easy User Guide |

| Revision | Date | Products/SW Versions | Changes |
|---|---|---|---|
| ISSUE#11 | 2011-10-17 | / | Updated software versions<br>Corrected mistake in note at par 2.1.3 |
| ISSUE#12 | 2011-10-20 | / | Update related to differences relating to SW versions starting from 12.00.xx1 |
| ISSUE#13 | 2012-10-09 | / | Updated Applicability and SW Versions tables.<br>Modified values range of the <srMode> parameter of the AT#SCFGEXT command.<br>Added new commands #FTPAPPEXT, #SLASTCLOSURE |
| ISSUE#14 | 2013-02-07 | / | Removed a note in chapter 2.1.4. Updated Applicability Table. |
| ISSUE#15 | 2013-02-19 | / | Updated Applicability Table and chapter 1.4.<br>Added IPV6 parameter value relating +CGDCONT command in chapter 2.1.1.<br>Modified max number of bytes from 1024 to 1500 in chapter 5.2.3.<br>Added chapter 6. |
| ISSUE#16 | 2014-03-06 | / | Chapter 3.7.2:<br>Changed sentence from "…three different procedures…" to "…two different procedure…".<br>Changed sentence from "(in blue you can find … , in violet the one received from host)" to "(in bold you can find the data sent by us, in regular the one received from host)". |
| | | Products added:<br>GE910-QUAD AUTO / 13.00.xx5<br>GE910-GNSS / 13.00.xx4<br>GL865-QUAD V3 / 16.00.xx3<br>GE910-QUAD V3 / 16.00.xx3<br>GE866-QUAD / 16.00.xx3<br>UE910-EUR / EUD / 12.00.xx4<br>UE910-NAR / NAD / 12.00.xx4<br>UL865-EUR/EUD / 12.00.xx4<br>UL865-NAR/NAD / 12.00.xx4<br>UL865-N3G / 12.00.xx4 | / |
| ISSUE#17 | 2014-04-18 | | Added chapters 3.4 and 3.5<br>Chapter 3.7.1.- "IP Easy- HTTP client application" was renamed to "IP Easy HTTP client with #SD"<br>Chapter 3.7.2. – "IP Easy - EMAIL sending application" was renamed to "IP Easy - EMAIL sending with #SD" and part with AT#SMTPCL / AT#EMAILD was removed<br>Chapter 3.7.3 - "IP Easy -EMAIL receiving application" was renamed to "IP Easy -EMAIL receive with #SD"<br>IPv6 table updated in chapter 6.- "Notes concerning IPV6 Implementation" |
| ISSUE#18 | 2014-07-14 | / | Chapter 3.7.4: correct the syntax of the AT#SL command listed in the first table of the chapter. |
| ISSUE#19 | 2014-09-03 | Products added:<br>UE910-EU V2 / 19.10.xx2<br>UE910-NA V2 / 19.10.xx2<br>UE910-EU V2 AUTO / 19.10.xx2<br>HE910-EU V2 / 14.22.xx1<br>HE910-EUG V2 / 14.22.xx1<br>HE910-NA V2 / 14.22.xx1<br>HE910-NAG V2 / 14.22.xx1<br>HE920-EU AUTO / 14.12.xx1<br>HE920-NA AUTO / 14.12.xx1 | / |