Telit Easy Scan® User Guide

1vv0300972 Rev.1 – 2013-04-16

Making machines talk.

APPLICABILITY TABLE

	SW Versions
GC Family (Compact)	**10.00.xx7**
GC864-QUAD	
GC864-QUAD V2	
GC864-DUAL V2	
GE/GL Family (Embedded)	
GE864-QUAD	
GE864-QUAD V2	
GE864-QUAD Automotive V2	
GE864-QUAD ATEX	
GE864-DUAL V2	
GE864-GPS	
GE865-QUAD	
GL865-DUAL	
GL865-QUAD	
GL868-DUAL	
GE910-QUAD	**13.00.xx3**
GL865-DUAL V3	**16.00.xx2**
GL868-DUAL V3	
GT Family (Terminal)	**10.00.xx7**
GT863-PY	
GT864-QUAD	
GT864-PY	

Note: the present document covers the SW versions shown in the Applicability Table and may mention features which are not present or behave differently in previous SW versions.

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1. Introduction

The purpose of this guide is to provide a description of the AT commands used to perform the Network Survey activities. In addition, these pages will describe also the use of the AT commands used to configure the responses formats of the above mentioned commands. Several examples are showed to describe the measurements and the set of the formats supported by the commands.

1.1. Scope

Scope of the present guide is to cover the AT commands belonging to the Easy Scan® AT Commands Set provided by the modules showed on the Applicability table.

1.2. Audience

This document is intended for users who want to exploit at best the Easy Scan® feature provided by the Telit modules.

1.3. Contact Information, Support

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

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

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

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To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Related Documents

[1] Telit AT Commands Reference Guide, code: 80000ST10025a
[2] Telit Modules Software User Guide, code: 1vv0300784
[3] Telit EVK2 User Guide, code: 1vv0300704
[4] Telit GE865-QUAD Hardware User Guide, code: 1vv0300799
[5] ETSI, 45.002
[6] ETSI, 45.008
[7] ETSI, 23.122
[8] ETSI, 44.018
[9] ETSI, 44.060
[10] ETSI, 23.060
[11] ETSI, 24.008
[12] ETSI, 45.005

1.5. Document History

Revision	Date	Changes
0	2011-12-19	First issue
1	2013-04-16	Updated Applicability Table

1.6. Abbreviation and acronyms

DTE Data Terminal Equipment
NVM Non Volatile Memory

2. Easy Scan®

Easy Scan® is a Telit registered trademark that identifies a feature provided by Telit modules. Easy Scan® feature is performed by a low-level software (running on Telit modules) controlling the Network Survey activities required by the user. Easy Scan® feature provides the user with a large number of network measurements results.

Telit modules are used in applications like: alarm system, remote meter reading, remote meteorological station, etc. These types of installations require the best choice of the radio frequencies resources present on the air in the area. Both signals strength and services furnished by the local Service Providers shall be evaluated.

The Easy Scan® objective is to provide a function to analyze the required resources available in the area.

NOTICE: *it is worth noting that the Network Survey is a very invasive activity. It requires very low level module operations that monopolise the hardware resources of the module slowing down its regular activities. For these reasons the Easy Scan® feature should be used with no SIM inserted into the module. In this mode the module can operate only emergency call and the main activities like paging, registration, etc are not running. Of course, the module stays in this mode only the time necessary to perform the required measurements.*

To describe the entire set of functionalities it is useful to introduce a “Easy Scan® evaluation bench” in order to run the required AT commands to interface the Easy Scan® feature and evaluate the relating responses. The figure below shows an example of “evaluation bench” accomplished by means of a GE865-QUAD module [4].

Referring to fig. 1: let’s assume the selected module is installed (soldered, in the case of GE865-QUAD) on its interface board [3] and the last one plugged into Telit evaluation board [3]. The Modem Serial Port is connected to a DTE running, for example, a hyper terminal session.

After getting ready the “bench”, we can start the operations.

NOTICE: *don’t insert the SIM and power the module on*.

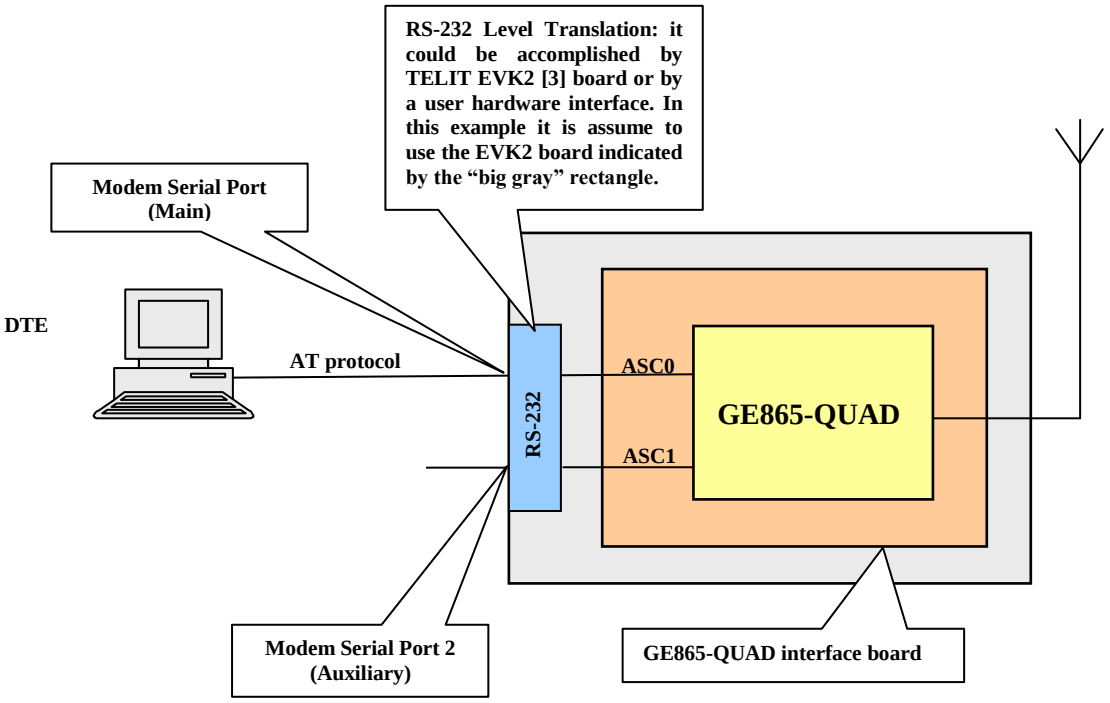

fig. 1: Easy Scan® evaluation Bench

To check the "measurement bench" working enter, for example, the following AT commands:

AT+CGMM	get module identification
GE865	it is GE865-QUAD
OK	
AT+CGMR	get software version
10.00.005	
OK	
AT#SELINT?	get the current AT command Interface Style, refer to [1].
#SELINT: 2	
OK	

Now, we can say that the connection between the module and the DTE is working; Easy Scan® AT Commands Family can be inspected.

NOTICE: *for all AT commands mentioned on the present document refer to [1], [2]. The used AT Interface Style is #SELINT=2.*

3. Easy Scan® AT Commands Family

The Easy Scan® feature running on Telit modules can be accessed easily by the users (or user applications) through a set of AT commands that will be described on the present guide. The AT commands allowing the use of the Easy Scan® feature are said commands belonging to the Easy Scan® AT Commands Family.

The Easy Scan® AT Commands Family is summarized on the tables showed below. For each command is reported a brief description in order to give to the reader an overview on the entire commands family.

Commands to perform a Network Survey of the current band			
#CSURV[=[<s>,<e>]]	**#CSURVU=[<ch1>[,<ch2>]..]**	**#CSURVB=[<n>]**	**#CSURVP<plmn>**
performs a Network Survey activity starting from <s> channel and ending with <e> channel.	performs a Network Survey of ch1, ch2, .. channels.	performs a Network Survey of the available channels. The Survey stops as soon as <n> BCCH carriers are found.	performs a Network Survey. It stops as soon as a BCCH carrier belonging to the selected PLMN is found.
#CSURVC[=[<s>,<e>]]	**#CSURVUC=[<ch1>[,<ch2>]..]**	**#CSURVBC=[<n>]**	**#CSURVPC<plmn>**
the command result holds only the values of the collected parameters. No parameter names are present in the response. They can be recognized through their positions inside the response text (Numeric Format).	the command result holds only the values of the collected parameters. No parameter names are present in the response. They can be recognized through their positions inside the response text (Numeric Format).	the command result holds only the values of the collected parameters. No parameter names are present in the response. They can be recognized through their positions inside the response text (Numeric Format).	the command result holds only the values of the collected parameters. No parameter names are present in the response. They can be recognized through their positions inside the response text (Numeric Format).

Tab. 1: Commands to perform a Network Survey

Commands to control the commands results formats		
#CSURVF	**#CSURVNLF**	**#CSURVEXT**
controls the numerical format of the following parameters: bsic, lac and cellId returned by the results texts of the Easy Scan® Commands Family.	enables/disables the presence of the <CR> <LF> characters on the results texts of the Easy Scan® Commands Family.	enables/disables the extended Network Survey format concerning the results texts of the Easy Scan® Commands Family.

Tab. 2: Commands to control the output formats

The next chapters will describe the just introduced commands.

3.1. AT#CSURV

Power the module on. The module runs the configuration setting present on NVM memory. After a power on, the portion of the configuration setting concerning the Easy Scan® AT Commands corresponds to the factory setting configuration.

Issue the command below to check which bands are supported by the used module[1]:

AT#BND=?
#BND: (0-3)
OK

Where:
0 - GSM 900MHz + DCS 1800MHz;
1 - GSM 900MHz + PCS 1900MHz;
2 - GSM 850MHz + DCS 1800MHz;
3 - GSM 850MHz + PCS 1900MHz;

Check if the module is in auto-band mode.

AT#AUTOBND?
#AUTOBND: 2 the module is in auto-band mode, factory setting.
OK

NOTICE: *in auto-band mode, the module selects the band in accordance with the frequencies available on the air. E.g.: in Europe the module will select band 0, in USA band 3.*

Issue the command below to cause the mobile to exit auto-band mode. This setting is automatically stored on NVM memory, and used on the next power on.

AT#AUTOBND=0
OK

Issue the command below to cause the mobile to camp on a frequency belonging to band 0. This setting is automatically stored on NVM memory, and used on the next power on.

AT#BND=0
OK

NOTICE: *if the module is powered down the two last settings aren't lost*.

[1] GE865-QUAD, refer to fig. 1.

The SIM isn't inserted; issue the command below to see on which arfcn the module is camped. The module is camped on the arfcn having the higher power level, regardless the plmn, see the command below (it doesn't belong to the Easy Scan® family).

AT#MONI
#MONI: I WIND BSIC:71 RxQual:0 LAC:55FA Id:1D0D ARFCN:761 PWR:-78dbm TA:0
OK

To make sure that the results formats concerning the Easy Scan® AT Commands are that set by the factory setting, enter the following commands.

Check in which format bsic, lac and cellId numerical values will be displayed by the Easy Scan® commands results.
AT#CSURVF?
0 decimal format, factory setting. Refer to chapter 3.5.1
OK

Check if <CR><LF> characters are used on the text of the Easy Scan® commands results.
AT#CSURVNLF?
0 <CR><LF> are used, factory setting. Refer to chapter 3.5.2
OK

Check if the extended Network Survey format is enabled.
AT#CSURVEXT?
0 disabled, factory setting. Refer to chapter 3.5.3
OK

The parameters couple of the AT#CSURV[=[<s>,<e>]] execution command represents the starting/ending channels of the Network Survey activity.

Enter AT#CSURV without parameters to get information concerning all the channels present on the air and belonging to the actual band on which the module is camped.

After a while, a list of information, one for each received carrier, is reported. The meanings of the parameters returned by the command are showed after the command result showed below.

AT#CSURV

```
Network survey started

arfcn: 1019 rxLev: -76

arfcn: 107 bsic: 58 rxLev: -80 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 4759
        cellStatus: CELL_FORBIDDEN numArfcn: 2 arfcn: 113 117

arfcn: 67 rxLev: -80

arfcn: 69 bsic: 51 rxLev: -81 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 2953
        cellStatus: CELL_FORBIDDEN numArfcn: 3 arfcn: 52 67 69

arfcn: 110 bsic: 62 rxLev: -81 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 4745
        cellStatus: CELL_FORBIDDEN numArfcn: 1 arfcn: 110

arfcn: 27 rxLev: -82

arfcn: 9 bsic: 17 rxLev: -82 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093
        cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array: 24 5 6 7 10 11 12 13 18 19 28

arfcn: 13 rxLev: -83

arfcn: 52 rxLev: -83

arfcn: 47 bsic: 50 rxLev: -84 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 17572
        cellStatus: CELL_FORBIDDEN numArfcn: 3 arfcn: 47 53 56

arfcn: 41 bsic: 26 rxLev: -85 ber: 0.00 mcc: 293 mnc: 40 lac: 621 cellId: 40171
        cellStatus: CELL_OTHER numArfcn: 24 arfcn: 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 41 58 59 60 61 62
....
....
....

Network survey ended
```

OK

NOTICE: *the frequencies are arranged in decreasing power level*.

NOTICE: *the command is executed within max 2 minute*.

Measurements legend concerning the BCCH Carriers

For reader convenience, the measurements list has been dived in two parts: the first one is relating the GSM parameters, the second one, showed in the yellow area, is concerning the GPRS parameters showed by the command only if the module under test is attached to the GPRS. In addition, all the couples formed by “parameter and value” showed below are alternatively inserted into “green areas” just to make easer the reading.

arfcn: <arfcn> bsic: <bsic> rxLev: <rxLev> ber: <ber> mcc: <mcc> mnc: <mnc> lac: <lac>

cellId: <cellId> cellStatus: <cellStatus>

numArfcn: <numArfcn> arfcn: [<arfcn1> ..[<arfcn64>]]

[numChannels: <numChannels> array: [<ba1> ..[<ba32>]]

[pbcch: <pbcch>

[nom: <nom> rac: <rac> spgc: <spgc> pat: <pat> nco: <nco> t3168: <t3168>

t3192: <t3192> drxmax: <drxmax> ctrlAck: <ctrlAck> bsCVmax: <bsCVmax>

alpha: <alpha> pcMeasCh: <pcMeasCh>]]

<CR><LF><CR><LF><CR><LF>

Where:

<arfcn>	radio frequency channel C0 (BCCH - Broadcast Control Channel) [5], [12].
<bsic>	base station identification code [6], [8]; for output format refer to AT#CSURVF command, chapter 3.5.1.
<rxLev>	reception level (in dBm), expressed in decimal number, [6].
<ber>	bit error rate (in %), expressed in decimal number, [6].
<mcc>	mobile country code, expressed in hexadecimal 3-digits number, [8], [11].
<mnc>	mobile network code, expressed in hexadecimal 2-digits number, [8], [11].
<lac>	location area code, [8], [11]; for output format refer to AT#CSURVF command chapter 3.5.1.
<cellId>	cell identifier [8], [11]; for output format refer to AT#CSURVF command chapter 3.5.1.

<cellStatus>	cell status [6], [7], string type:	
	CELL_SUITABLE:	is a cell on which an MS may camp.
	CELL_LOW_PRIORITY:	the cell has low priority.
	CELL_FORBIDDEN:	the cell is forbidden.
	CELL_BARRED	the cell is barred.
	CELL_LOW_LEVEL	<rxLev> is low.
	CELL_OTHER	none of the above case.

<numArfcn>	total number of the valid channels in the Cell Channel Description, expressed in decimal number, [8].
<arfcn(n)>	arfcn(n) belongs to the valid channel set reported in the Cell Channel Description, expressed in decimal number. (n) is in the range: 1 ÷ <numArfcn>.
<numChannels>	number of the valid channels in the BCCH Allocation list [8], expressed in decimal number. For output format refer to AT#CSURVEXT command, chapter 3.5.3.
<ba(n)>	is the arfcn of a valid channel in the BCCH Allocation list, expressed in decimal number. (n) is in the range: 1 ÷ <numChannels>. For output format refer to AT#CSURVEXT command, chapter 3.5.3.

The following parameters are relating to the GPRS service. The measurements are displayed if #CSURVEXT=2 and GPRS service is present, refer to chapter 3.5.3.

<pbcch>	packet broadcast control channel, [5]: - 0: pbcch not activated on the cell - 1: pbcch activated on the cell
<nom>	network operation mode, value range: 1÷3; [8], [9], [10].
<rac>	routing area code, value range: 0÷255; [8], [9], [11].
<spgc>	SPLIT_PG_CYCLE [6], [8], [9]: 0 - SPLIT_PG_CYCLE is not supported on CCCH on this cell 1 - SPLIT_PG_CYCLE is supported on CCCH on this cell
<pat>	priority access threshold: 0,3..6; [8], [9].
<nco>	network control order 0..2; [8], [9].
<t3168>	timer 3168; [8], [9].
<t3192>	timer 3192; [8], [9].
<drxmax>	discontinuous reception max time (in seconds); [8], [9].
<ctrlAck>	packed control ack ; [8], [9]:
<bsCVmax>	blocked sequence countdown max value; [8], [9].
<alpha>	alpha parameter for power control, [6], [8], [9].

<pcMeasCh>	type of channel which shall be used for downlink measurements for power control: 0 – BCCH, 1 – PDCH, [6], [8], [9].

Measurements legend concerning no BCCH Carriers:

arfcn: <arfcn> rxLev: <rxLev>

where:

<arfcn>	RF channel, [5], [12].
<rxLev>	reception level (in dBm), [6].

3.1.1. AT#CSURVC (Numeric Format)

The AT#CSURVC[=[<s>,<e>]] command can be easily explained and understood with a comparison with the AT#CSURV command response. Let's suppose the initial configuration is that showed on chapter 3.1.

Enter the AT#CSURV command to get information concerning only the arfcn=9.

AT#CSURV=9,9

```
Network survey started ...

arfcn: 9 bsic: 17 rxLev: -83 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array: 2

 4 5 6 7 10 11 12 13 18 19 28


Network survey ended
```

OK

The two parameters of the AT#CSURVC[=[<s>,<e>]] execution command represent the starting/ending channels of the Network Survey activity. Enter the AT#CSURVC command to get information concerning only the arfcn=9.

AT#CSURVC=9,9

```
Network survey started ...

9,17,-90,0.00,222,01,54717,21093,0,3,9 31 1019,12,2 4 5 6 7 10 11 12 13 18 19 28

Network survey ended
```

OK

The reader, from the comparison of the responses of the two commands, may infer that the result of the second command doesn't reports the parameters names and the strings values are changed in numerical values, e.g.: CELL_SUITABLE is changed in 0.

NOTICE: *the meanings of the numerical values returned by the command are recognized by a user application through their positions inside the response text*.

3.2. AT#CSURVU

The AT#CSURVU=[<ch1>[,<ch2>[,…]]] execution command provides the user with the possibility to inspect the desired channels and not a range of channels delimited by a couple of starting/ending channels.

In order to interpret correctly the format of the command result, let's suppose the initial configuration is that showed on chapter 3.1.

AT#CSURVU=9,107,69

```
Network survey started ...

arfcn: 69 bsic: 51 rxLev: -80 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 2953

cellStatus: CELL_FORBIDDEN numArfcn: 3 arfcn: 52 67 69

arfcn: 107 bsic: 58 rxLev: -81 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 475

9 cellStatus: CELL_FORBIDDEN numArfcn: 2 arfcn: 113 117

arfcn: 9 bsic: 17 rxLev: -83 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array: 2

 4 5 6 7 10 11 12 13 18 19 28

Network survey ended
```

OK

NOTICE: *the frequencies are arranged in decreasing power level*.

NOTICE: *the command is executed within max 2 minute*.

3.2.1. AT#CSURVUC (Numeric Format)

The AT#CSURVUC=[<ch1>[,<ch2>[,…]]] execution command can be easily explained and understood with a comparison with the AT#CSURVU command response.

Enter the AT#CSURVUC command to get information concerning the arfcn: 9,107,69

AT#CSURVUC=9,107,69

```
Network survey started ...

69,51,-80,0.00,222,10,20060,2953,2,3,52 67 69

107,58,-83,0.00,222,88,22010,4759,2,2,113 117

9,17,-84,0.00,222,01,54717,21093,0,3,9 31 1019,12,2 4 5 6 7 10 11 12 13 18 19 28

Network survey ended
```

OK

The reader**,** from the comparison of the responses of the two commands AT#CSURVU and AT#CSURVUC, may infer that the result of the second command doesn't reports the parameters names and the strings are changed in numerical values, e.g.: CELL_FORBIDDEN changed in 2 and CELL_SUITABLE changed in 0.

NOTICE: *the meanings of the numerical values returned by the command are recognized by a user application through their positions inside the response text*.

NOTICE: *the frequencies are arranged in decreasing power level*.

NOTICE: *the command is executed within max 2 minute*.

3.3. AT#CSURVB

The AT#CSURVB=[<n>] execution command performs a Network Survey activity through the M possible channels belonging to the actual band on which the module is camped. The Network Survey activity stops as soon as <n> BCCH carriers are detected. Let's suppose the initial configuration is that showed on chapter 3.1.

Using the AT#CSURVB command check the maximum number (M) of channels belonging to the actual band.

AT#CSURVB=?
(1-548) M = 548
OK

Now, extract two BCCH carriers.

AT#CSURVB=2

```
Network survey started ...

arfcn: 110 bsic: 62 rxLev: -78 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 474

5 cellStatus: CELL_FORBIDDEN numArfcn: 1 arfcn: 110


arfcn: 69 bsic: 51 rxLev: -79 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 2953

 cellStatus: CELL_FORBIDDEN numArfcn: 3 arfcn: 52 67 69


Network survey ended
```

OK

NOTICE: *the BCCH carriers are arranged in decreasing power level, in accordance are displayed the first two BCCH carriers with the higher power*.

3.3.1. AT#CSURVBC (Numeric Format)

The AT#CSURVBC=[<n>] execution command performs a Network Survey activity through the M possible channels belonging to the actual band on which the module is camped. The Network Survey activity stops as soon as <n> BCCH carriers are detected. Let's suppose the initial configuration is that showed on chapter 3.1.

Using the AT#CSURVBC command check the maximum number (M) of channels belonging to the actual band.

AT#CSURVBC=?
(1-548) M = 548
OK

Now, extract two BCCH carriers.

AT#CSURVBC=2

```
Network survey started ...

110,62,-78,0.00,222,88,22010,4745,2,1,110

69,51,-79,0.00,222,10,20060,2953,2,3,52 67 69

Network survey ended
```

OK

NOTICE: *the BCCH carriers are arranged in decreasing power level, in accordance are displayed the first two BCCH carriers with the higher power*.

The reader, from the comparison of the responses of the two commands AT#CSURVB and AT#CSURVBC, may infer that the result of the second command doesn't reports the parameters names and the strings are changed in numerical values, e.g.: CELL_FORBIDDEN changed in 2.

NOTICE: *the meanings of the numerical values returned by the command are recognized by a user application through their positions inside the response text*.

3.4. AT#CSURVP

The AT#CSURVP=[<plmn>] execution command performs a Network Survey activity of the channels present on the air and belonging to the actual band on which the module is camped. The Network Survey stops as soon as is detected a BCCH carrier belonging to the selected PLMN. PLMN=MCC/MNC.

Power the module on. To make sure that the factory setting has not been changed, enter the following commands:

Check in which format bsic, lac and cellId numerical values will be displayed by the Easy Scan® commands.
AT#CSURVF?
0 decimal format, factory setting. Refer to chapter 3.5.1
OK

Check if <CR><LF> characters are used on the text of the Easy Scan® commands results.
AT#CSURVNLF?
0 <CR><LF> are used, factory setting. Refer to chapter 3.5.2
OK

Check if the extended Network Survey format is enabled.
AT#CSURVEXT?
0 disabled, factory setting. Refer to chapter 3.5.3
OK

Enter the following command.
AT#CSURVP=22201

Network survey started ...

arfcn: 110 bsic: 62 rxLev: -78 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 474

5 cellStatus: CELL_FORBIDDEN numArfcn: 1 arfcn: 110

arfcn: 69 bsic: 51 rxLev: -79 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 2953

cellStatus: CELL_FORBIDDEN numArfcn: 3 arfcn: 52 67 69

arfcn: 761 bsic: 57 rxLev: -80 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 743

7 cellStatus: CELL_FORBIDDEN numArfcn: 4 arfcn: 776 785 794 803

arfcn: 1019 rxLev: -81

```
arfcn: 27 rxLev: -82

arfcn: 31 rxLev: -82

arfcn: 102 bsic: 63 rxLev: -82 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 473
7 cellStatus: CELL_FORBIDDEN numArfcn: 2 arfcn: 115 123

arfcn: 78 bsic: 53 rxLev: -83 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 3910
2 cellStatus: CELL_FORBIDDEN numArfcn: 2 arfcn: 39 78

arfcn: 47 bsic: 50 rxLev: -83 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 1757
2 cellStatus: CELL_FORBIDDEN numArfcn: 3 arfcn: 47 53 56

arfcn: 41 bsic: 26 rxLev: -83 ber: 0.00 mcc: 293 mnc: 40 lac: 621 cellId: 40171
cellStatus: CELL_OTHER numArfcn: 24 arfcn: 22 23 24 25 26 27 28 29 30 31 32 33 3
4 35 36 37 38 39 41 58 59 60 61 62

arfcn: 13 rxLev: -83

arfcn: 107 bsic: 58 rxLev: -84 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 475
9 cellStatus: CELL_FORBIDDEN numArfcn: 2 arfcn: 113 117

arfcn: 96 bsic: 62 rxLev: -85 ber: 0.00 mcc: 222 mnc: 88 lac: 22010 cellId: 4843
 cellStatus: CELL_FORBIDDEN numArfcn: 2 arfcn: 116 119

arfcn: 67 rxLev: -85

arfcn: 75 rxLev: -86

arfcn: 7 bsic: 18 rxLev: -86 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21007
 cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 7 13 27 numChannels: 16 array: 2 3
 4 5 6 8 9 11 12 14 15 16 17 19 21 32

Network survey ended
```

OK

NOTICE: *the Network Survey activity is stopped when the first BCCH carrier, belonging to the selected plmn, is detected*.

3.4.1. AT#CSURVPC (Numeric Format)

The AT#CSURVPC=[<plmn>] execution command performs a Network Survey of the channels present on the air and belonging to the actual band on which the module is camped. The Network Survey stops as soon as is detected a BCCH carrier belonging to the selected PLMN. PLMN=MCC/MNC.

Power the module on. To make sure that the factory setting has not been changed, enter the following commands:

Check in which format bsic, lac and cellId numerical values will be displayed by the Easy Scan® commands.
AT#CSURVF?
0 decimal format, factory setting. Refer to chapter 3.5.1
OK

Check if <CR><LF> characters are used on the text of the Easy Scan® commands results.
AT#CSURVNLF?
0 <CR><LF> are used, factory setting. Refer to chapter 3.5.2
OK

Check if the extended Network Survey format is enabled.
AT#CSURVEXT?
0 disabled, factory setting. Refer to chapter 3.5.3
OK

Enter the following command.
AT#CSURVPC=22201

Network survey started ...

110,62,-78,0.00,222,88,22010,4745,2,1,110,17,95 96 97 98 99 101 102 104 107 108

741 744 752 756 757 759 761

761,57,-80,0.00,FFF,FF,65535,0,5,0,0

69,51,-80,0.00,222,10,20060,2953,2,3,52 67 69,16,42 45 46 47 58 68 69 70 73 78 8

0 81 84 86 88 90

78,53,-82,0.00,222,10,20060,39102,2,2,39 78,11,69 70 73 74 78 81 83 86 88 90 854

1019,-82

```
86,50,-83,0.00,222,10,20060,17573,2,2,37 86,21,42 45 46 47 48 58 62 68 69 70 73
78 80 81 84 85 86 88 89 90 854

13,-84

96,62,-84,0.00,222,88,22010,4843,2,2,116 119,9,99 101 102 107 110 742 744 759 76
1

107,58,-84,0.00,222,88,22010,4759,2,2,113 117,12,96 97 99 101 102 109 110 742 74
4 757 759 761

102,63,-84,0.00,222,88,22010,4737,2,2,115 123,14,96 105 107 109 110 111 739 742
743 744 754 759 761 763

41,26,-85,0.00,293,40,621,40171,5,24,22 23 24 25 26 27 28 29 30 31 32 33 34 35 3
6 37 38 39 41 58 59 60 61 62,23,1 2 3 4 5 6 7 8 9 11 12 14 15 16 19 41 43 44 47
50 56 600 612

47,50,-85,0.00,222,10,20060,17572,2,3,47 53 56,16,40 41 42 43 45 47 48 68 69 70
78 80 81 84 86 874

7,18,-86,0.00,222,01,54717,21007,0,3,7 13 27,16,2 3 4 5 6 8 9 11 12 14 15 16 17
19 21 32

Network survey ended
```

OK

NOTICE: *the Network Survey activity is stopped when the first BCCH carrier, belonging to the selected plmn, is detected*.

The reader, from the comparison of the responses of the two commands, may infer that the result of the second command doesn't reports the parameters names and the strings values are changed in numerical values, e.g.: CELL_SUITABLE is changed in 0.

NOTICE: *the meanings of the values belonging to the response are recognized by a user application through their positions inside the response text*.

3.5. AT Commands to control the output formats

The following pages will describe the AT commands used to configure the responses formats of the previous mentioned AT commands. Several examples are showed to describe the set of the formats supported by the commands.

3.5.1. AT#CSURVF

The AT#CSURVF=[<format>] execution command controls the format of the numerical values of some parameters returned by the Easy Scan® Family commands.

Before analysing the AT#CSURVF, issue the following two commands to make sure about the actual setting:

check if <CR><LF> characters are used on the text of the Easy Scan® commands results.
AT#CSURVNLF?
0 <CR><LF> are used, factory setting. Refer to chapter 3.5.2
OK

check if the extended Network Survey format is enabled.
AT#CSURVEXT?
0 disabled, factory setting. Refer to chapter 3.5.3
OK

Issue the command below to check the entire set of the allowed formats:
AT#CSURVF=?
(0-2)
OK

Set the format corresponding to the parameter value 0.
AT#CSURVF=0
OK

Issue the command below just to check the command result format.
AT#CSURVU=9

```
Network survey started

arfcn: 9 bsic: 17 rxLev: -95 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019

Network survey ended
```

OK

Returned format when #CSURVF=0		
bsic	17	in decimal format
lac	54717	in decimal format
cellId	21093	in decimal format

Set the format corresponding to the parameter value 1.
AT#CSURVF=1
OK

Issue the command below just to check the command result format.
AT#CSURVU=9

```
Network survey started ...

arfcn: 9 bsic: 21 rxLev: -99 ber: 0.00 mcc: 222 mnc: 01 lac: D5BD cellId: 5265

cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019


Network survey ended
```

OK

Returned format when #CSURVF=1		
bsic	21	in octal format
lac	D5BD	in hexadecimal format
cellId	5265	in hexadecimal format

Set the format corresponding to the parameter value 2.
AT#CSURVF=2
OK

Don't use <CR><LF>
AT#CSURVNLF=1
OK

Issue the command below just to check the command result format.
AT#CSURVU=9,7,1019

```
Network survey started ...

arfcn: 1019 rxLev: -83


arfcn: 7 bsic: 22 rxLev: -87 ber: 0.00 mcc: 222 mnc: 01 lac: D5BD cellId: 520F c
ellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 7 13 27


arfcn: 9 bsic: 21 rxLev: -95 ber: 0.07 mcc: 222 mnc: 01 lac: D5BD cellId: 5265 c
ellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019


Network survey ended (Carrier: 3 BCCh: 2)
```

OK

Returned format when #CSURVF=2, refer to arfcn=9.		
bsic	21	in octal format
lac	D5BD	in hexadecimal format
cellId	5265	in hexadecimal format
Added information: - total number of carriers: 3. - number of BCCH carriers: 2.		

The reader can compare these three examples and infers the format differences concerning the responses.

3.5.2. AT#CSURVNLF

The AT#CSURVNLF=[<value>] execution command enables/disables the automatic removing of <CR><LF> characters from the text lines belonging to the information packet concerning the generic channel discovered by the Network Survey action of the Easy Scan® Family commands.

Before analysing the AT#CSURVNLF, issue the following two commands to make sure about the actual setting:

check in which format bsic, lac and cellId numerical values will be reported on the results returned by the Easy Scan® commands.
AT#CSURVF?
0 decimal format, factory setting. Refer to chapter 3.5.1
OK

check if the extended Network Survey format is enabled.
AT#CSURVEXT?
0 disabled, factory setting. Refer to chapter 3.5.3
OK

Issue the command below to check the entire set of the allowed values:
AT#CSURVNLF=?
(0,1)
OK

Disable the automatic removing of <CR><LF> characters from the text lines returned by the Easy Scan® commands.
AT#CSURVNLF=0
OK

Issue the command below just to have an example of command result format.
AT#CSURVU=9

```
Network survey started ...

arfcn: 9 bsic: 17 rxLev: -96 ber: 1.01 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

 cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array: 2

 4 5 6 7 10 11 12 13 18 19 28


Network survey ended
```

OK

Enable the automatic removing of <CR><LF> characters from the text lines returned by the Easy Scan® commands. The new setting isn't stored on NVM memory.
AT#CSURVNLF=1
OK

Issue the command below just to check the command result format.
AT#CSURVU=9

```
Network survey started ...

arfcn: 9 bsic: 17 rxLev: -91 ber: 50.00 mcc: 222 mnc: 01 lac: 54717 cellId: 2109
3 cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array:
2 4 5 6 7 10 11 12 13 18 19 28

Network survey ended
```

OK

NOTICE: *If only <arfcn> and <rxLev> values are returned by the command and the rxLev is low (expressed in dBm) it could be a good practice to try again the command to verify if really that <arfcn> isn't a BCCH carrier*.

The reader can compare these two examples and infers the format differences concerning the responses.

3.5.3. AT#CSURVEXT

The AT#CSURVEXT[=<value>] execution command enables/disables the extended Network Survey format supported by the Easy Scan® Family commands. To make sure that the factory setting format of the command family has not been changed, enter the following commands:

check in which format bsic, lac and cellId numerical values will be reported on the results returned by the Easy Scan® commands.
AT#CSURVF?
0 decimal format, factory setting
OK

check if <CR><LF> characters are used on the text of the Easy Scan® commands results.
AT#CSURVNLF?
0 <CR><LF> are used, factory setting
OK

Now, check the entire set of the allowed values concerning extended Network Survey format:
AT#CSURVEXT=?
(0-2)
OK

#CSURVEXT=0 disables the extended Network Survey format, it is the factory setting.
AT#CSURVEXT=0
OK

Issue the command below just to have an example of command result format.
AT#CSURVU=9

Network survey started ...

arfcn: 9 bsic: 17 rxLev: -94 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019

Network survey ended

OK

#CSURVEXT=1 enables the first form of the extended Network Survey format, the new setting isn't stored on NVM memory.
AT#CSURVEXT=1
OK

NOTICE: *if the module is powered down the setting is lost*.

Issue the command below just to have an example of command result format.
AT#CSURVU=9

```
Network survey started ...

arfcn: 9 bsic: 17 rxLev: -92 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

 cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array: 2

 4 5 6 7 10 11 12 13 18 19 28


Network survey ended
```

OK

The reader, from the comparison of the two command results, may infer that the #CSURVEXT=1 causes the AT#CSURVU command to display the valid channels of the BCCH allocation list, this is valid for every scanned BCCH carrier.

#CSURVEXT=2 enables the extended Network Survey format also for GPRS parameters, the new setting isn't stored on NVM memory.
AT#CSURVEXT=2
OK

AT#CSURVU=9,90,19

```
Network survey started ...

arfcn: 9 bsic: 17 rxLev: -75 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

 cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array: 2

 4 5 6 7 10 11 12 13 18 19 28 pbcch: 0 nom: 2 rac: 0 spgc: 0 pat: 6 nco: 0 t3168

: 500 t3192: 500 drxmax: 64 ctrlAck: 0 bsCVmax: 15 alpha: 0 pcMeasCh: 0
```

```
arfcn: 90 bsic: 48 rxLev: -88 ber: 0.00 mcc: 222 mnc: 10 lac: 20060 cellId: 2716

2 cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 75 79 90 numChannels: 15 array: 4

6 62 69 70 73 74 78 81 83 84 86 88 90 854 873 pbcch: 0 nom: 2 rac: 30 spgc: 0 pa

t: 6 nco: 0 t3168: 1000 t3192: 500 drxmax: 0 ctrlAck: 1 bsCVmax: 6 alpha: 7 pcMe

asCh: 0

arfcn: 19 rxLev: -101

Network survey ended
```

OK

The reader, from the example above, may infer that #CSURVEXT=2 causes the AT#CSURVU command to display the valid channels of the BCCH allocation list, for every scanned BCCH carrier, and several parameters concerning GPRS if present. For pbcch=1 refer to Appendix 4.

Issue the command below just to have an example of command result format.
AT#CSURVP=22201

```
Network survey started ...

arfcn: 1019 rxLev: -71

arfcn: 9 bsic: 17 rxLev: -75 ber: 0.00 mcc: 222 mnc: 01 lac: 54717 cellId: 21093

 cellStatus: CELL_SUITABLE numArfcn: 3 arfcn: 9 31 1019 numChannels: 12 array: 2

 4 5 6 7 10 11 12 13 18 19 28 pbcch: 0 nom: 2 rac: 0 spgc: 0 pat: 6 nco: 0 t3168

: 500 t3192: 500 drxmax: 64 ctrlAck: 0 bsCVmax: 15 alpha: 0 pcMeasCh: 0

Network survey ended
```

OK

Issue the command below just to have an example of command result format.
AT#CSURVPC=22201

```
Network survey started ...

1019,-71


9,17,-75,0.00,222,01,54717,21093,0,3,9 31 1019,12,2 4 5 6 7 10 11 12 13 18 19 28

,0,2,0,0,6,0,500,500,64,0,15,0,0


Network survey ended
```

OK

4. Appendix A:"GPRS"

To simulate the presence on the air of the pbcch [5] channel the following "Easy Scan® evaluation bench" has been arranged. In this case the module will not camp on a cell present on the air, but on a cell simulated by the Communication Test Set.

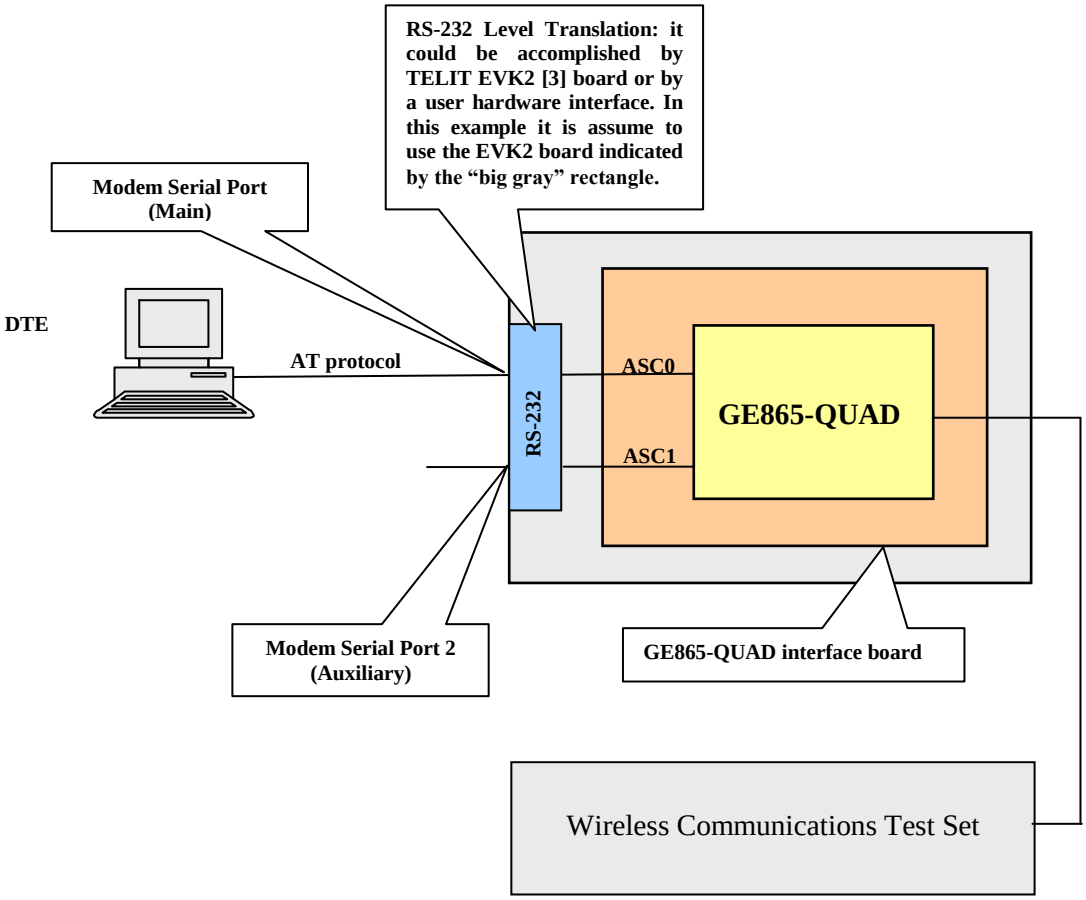

fig. 2: Easy Scan® evaluation Bench & PBCCH

After having configured the Communication Test Set to support the pbcch channel and a mcc mnc = 222 01, issue the following commands:

#CSURVEXT=2 enables the extended Network Survey format also for GPRS parameters.

AT#CSURVEXT=2
OK

Let's suppose that #CSURVF=0 and #CSURVNLF=0.

Issue the command below just to have an example of command result format.

AT#CSURV

```
Network survey started ...

arfcn: 20 bsic: 46 rxLev: -87 ber: 0.00 mcc: 222 mnc: 01 lac: 3 cellId: 0 cellSt

atus: CELL_OTHER numArfcn: 16 arfcn: 1 124 128 251 259 293 306 340 438 511 520 6

61 810 885 955 975 numChannels: 3 array: 20 30 32 pbcch: 1

arfcn: 21 rxLev: -105

Network survey ended
```

OK

Issue the command below just to have another example of command result format.

AT#CSURVP=22201

```
Network survey started ...

arfcn: 20 bsic: 46 rxLev: -87 ber: 0.00 mcc: 222 mnc: 01 lac: 3 cellId: 0 cellSt

atus: CELL_OTHER numArfcn: 16 arfcn: 1 124 128 251 259 293 306 340 438 511 520 6

61 810 885 955 975 numChannels: 3 array: 20 30 32 pbcch: 1

Network survey ended
```

OK

The reader, from the comparison of the two commands responses, may infer that the results are equal, and the pbcch=1. It means that the pbcch channel is present on the cell simulated by the instrument. No other GPRS parameters are showed by the commands responses refer to the response command legend showed on chapter 3.1.