APPLICATION NOTE
USING A SERIAL RS232 MODBUS (ASCII) CONNECTION ON XLITE DATA LOGGERS

WAVECOM FASTRACK M1213A-ON MULTITECH MTCBA-G-FX GSM MODEM

APPLICATION NOTE

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1. OVERVIEW

The *Fastrack* and *Multitech GSM* modems are dual band cellular modems capable of supporting Voice, FAX and Data operation. Voice operation is supported in all modes, so this makes these brands the best suited for applications requiring voice reports.

The MultiModem® GPRS wireless modem offers standards-based multi-band GSM/GPRS Class 10 performance. This standalone modem provides wireless data communication and integrates seamlessly with virtually any application. The manufacturer provides the same GSM modem with a broad range of interface options including RS-232, USB, Bluetooth® and Ethernet which is very helpful to cover several application needs. The MultiModem GPRS wireless modem is based on industry-standard open interfaces and can be desktop or panel mounted.

This modem has been tested for telemetry applications (remote monitoring and configuration) between a 9210 XLite/XPert Sutron dataloggers and a location provided with a telephonic line.

The following sections present:

▶ The required equipment and options

▶ Equipment cable connections and equipment specifications

▶ Basic instructions to set up the modem using AT commands

The instructions for programming the 9210 XLITE/XPERT to use the GSM modem are almost transparent to the user, as if it would be used a typical modem (by selecting the port in which it will be installed the modem and speed settings). Any other question regarding modem configurations can be found in the 9210 Operation and Maintenance Manual. A copy of this manual is available at: www.sutron.com/DownloadsUpdates/Xpert%20User%20Manual.pdf.

Important Note: Most of the manufacturers use the AT commands to set up their devices, for this reason the commands and steps of configuration for the present GSM modem is valid for the wide variety of typical GSM modems. However, this application note is completely accurate for the *Wavecom FASTRACK M12113A-ON* and the *MultiTech MultiModem GPRS/GSM MTCBA-G-XX*.

2. EQUIPMENT

For a telemetric application (for monitoring and remotely configure the datalogger) it is required the following equipment:

	Part Number	Description
1	9210-0000-2A	9210 XLITE Data Logger
2	MTCBA-G-F2 or M12113A-ON	850/1900MHZ GSM modem with power and communication cables
3	28507 TESSCO	External 850MHz Omni Antenna with SMA adapter and cable

The modems have a SMA female connector and usually come with an interior mounting antenna. However, for external use, it is necessary to mount an OMNI antenna for the available GSM band. The antenna input connection usually is a type N female connector hence a Type N to SMA converter needs to be placed to match the antenna connection. In this case it was used the PASTERNAK *SMA*(M)-*N*(M) converter part number PE3568-36.

3. DEVICE CONNECTIONS AND SPECIFICATIONS

The configuration requires attaching the GSM modem to the Sutron datalogger. A serial cable (DB15 to DB9) is provided from the manufacturer of the modem. The modem is attached to the *SMA/N* converter and OMNI antenna. When the connections are done, the power needs to be up (the power for the GSM modem can be provided from the 12VDC battery or 9210 since the modem uses 5V to 32V).
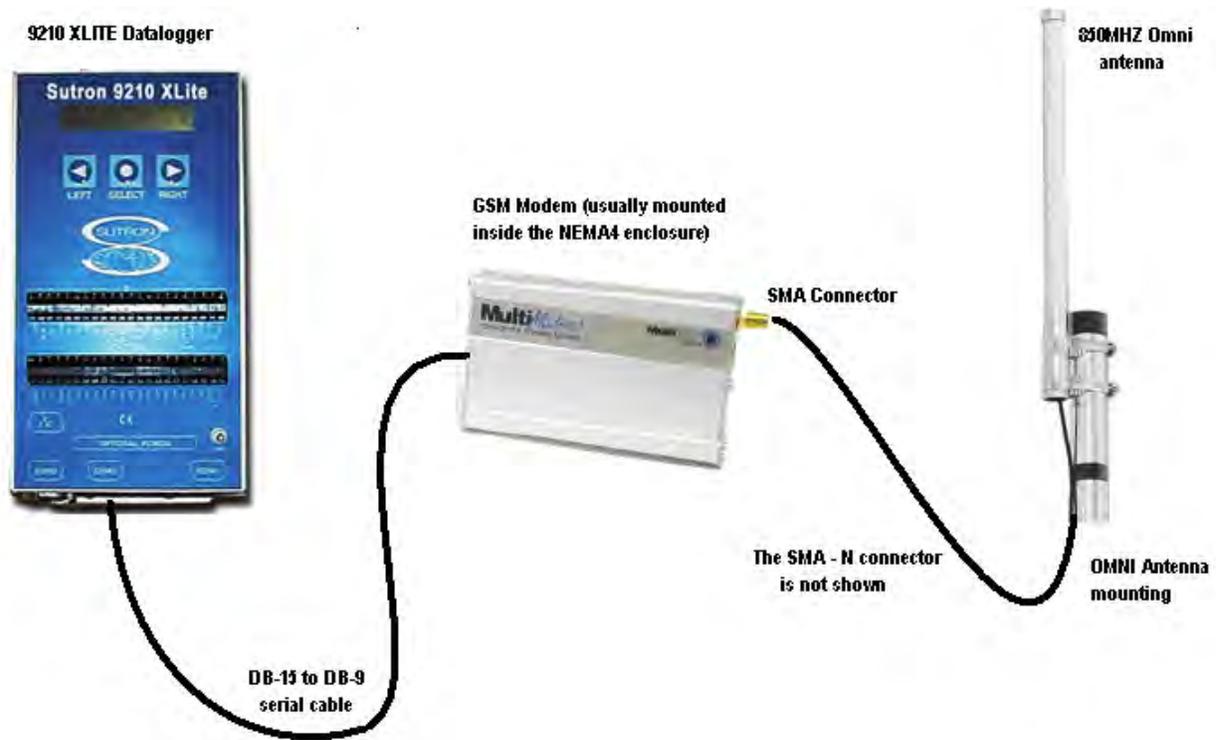

Figure 1 *9210 connected through the GSM Modem. Note the 850MHZ OMNI antenna. Remember to place a SMA-N male to male converter between the modem and antenna.*

3.1 EQUIPMENT SPECIFICATIONS

3.1.1   CELLULAR MODEM FEATURES

▸ GPRS Class 10

▸ Dual-band 850/1900 or 900/1800 MHz GSM/GPRS

▸ Packet data up to 85.6K bps

▸ Embedded TCP/IP stack

▸ Circuit-switched data up to 14.4K bps transparent and non-transparent

▸ GSM Class 1 and Class 2 Group 3 Fax

▸ Short Message Services (SMS)

▸ RS-232, USB, Bluetooth and Ethernet interfaces

▸ SMA antenna connector and SIM socket

▸ Serial interface supports DTE speeds to 115.2K bps

▸ 12-channel GPS functionality

▸ AT command compatible

▸ MNP2 error correction, V.42bis compression

▸ Numerous LED's provide operational status

▸ Desktop or panel mounting

▸ PTCRB certified

▸ Carrier approved

3.1.1.1   SPECIFICATIONS

Packet Data Features

▸ GPRS Class 10, PBCCH support

▸ Coding Schemes: CS1 to CS4

▸ Embedded TCP/IP stack

Circuit Switched Data/Fax Features

▸ Asynchronous, transparent & non-transparent up to 14.4K bps, MNP2 & V.42bis

▸ Group 3 fax, Class 1 & Class 2

SMS Features

Text & PDU, Point-to-Point, cell broadcast

Internet Protocols Supported

ARP, Dial-in PPP, DNS Resolve, FTP client, ICMP, IP, IPCP, LCP, POP 3 (receive mail), PPP, SMTP (send mail), TCP socket, Telnet client, Telnet server, UDP socket, CHAP, PAP

Antenna Connectors

RF Antenna: 50 ohm SMA (Female connector) Bluetooth & GPS Antenna: 50 ohm SMA (Male connector)

SIM Connector

Standard 3V SIM receptacle

Interface Connectors

▸ RS-232 Model: DE-15

▸ USB Model: USB Type B

▸ Bluetooth Model: DB-9

▸ Ethernet Model: RJ-45, 10BaseT/100BaseTX, 802.3

▸ GPS Model: (2) DB-9

Power Connectors

▸ RS-232, Bluetooth, Ethernet, & GPS Models: 2.5mm miniature screw

▸ USB Model: Bus Powered

Voice Connectors

RS-232 Model: Optional Y-cable, USB, Bluetooth, Ethernet, & GPS Models: RJ9 4-pos modjack

Power Requirements

5V to 32VDC

GPS Features

▸ General: 12-channel, continuous tracking receiver

▸ Protocols: NEMA 0183, TSIP, TAIP, DGPS, Aided GPS through TSIP

Operating Environment

-30° to +70° C

Certifications:

‣ CE Mark, R&TTE,

‣ EMC: FCC Part 2, 15, 22, 24, EN 55022, & EN 55024

‣ Safety: cUL, UL 60950, EN 60950

‣ Network: PTCRB

4. CELLULAR MODEM ACTIVATION

Selection of a cellular service provider involves several considerations including: signal strength at the remote site, system type GPRS or GSM, and service plan cost. Some of the manufacturers have already an agreement with cellular providers. Depending of the geographical area in USA a *T-Mobile* or *Cingular* account may be necessary. If the cell modem will be used outside USA make sure the model of cell phone is in accordance with the local regulations and band. For more information please visit:

http://www.gsmworld.com/roaming/gsminfo/index.shtml

First of all, before we start configuring the cell phone, a DATA SERVICE PLAN needs to be added to the GSM modem. The providers usually offer voice services to the GSM subscribers but data or fax availability are considered upon request as an extra feature. For these reason, it is necessary to set up the device as a DATA modem (although it is able to have voice communication too).

A SIM card will be provided with each device, which it holds the information of the GSM modem and its phone number. The SIM card is the guarantee of a service which is going to allow the device to enter into the GSM network. The phone number, band, and coverage must be given by the GSM provider.

IMPORTANT! The modem should have Circuit Switched Data (CSD) enabled from the wireless carrier.

Before start using the modem, although it has been activated by a local provider, it needs to be configured and tested. For this reason, the modem should be powered up and hooked up to the antenna. After few seconds, one of the LED indicators (Status LED's of the modem) should be blinking as a result of being recognized by the GSM network.

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5. GSM MODEM SETUP

In spite of some providers and manufacturers sell already activated GSM modems with basic configurations, always it is necessary to be sure that such configurations are the required by the data terminal equipment DTE.

The following considerations need to be remarked to set up the device:

▶ The DTE is the datalogger 9210 XLITE or XPERT using a serial port (usually COM3 for *data* communication)

▶ The parameters of communication with the DTE are 9600 bauds, 8 bit of data, and 1 stop bit. Parity is none HARDWARE flow control.

▶ Since the stand alone datalogger will be accessed remotely, the auto-answer mode needs to be put in on.

▶ Make sure to activate the DATA mode in the modem since sometimes the providers leave the original configuration as VOICE/FAX mode. According the application or needs of the final user, extra details can be added to the configuration. Some of them will be used in the setup.

▶ To setup the GSM modem it is not necessary to plug it through the datalogger. Actually, it is only necessary to connect it through a RS-232 port in the PC and run a serial communication console (*i.e*: HyperTerminal for Windows). AT commands will be issued by this mean to configure the GSM modem.

5.1 AT COMMANDS

The GSM modem accept a wide variety of AT commands to change its operation, however, only a few of them are necessary to put it to work with the 9210 Sutron datalogger. Among others, the essential AT commands are:

COMMAND	VALUE	DESCRIPTION
AT+CR	1	Enable extended reports, very useful for testing
AT+CRC	1	Enable detailed info about incoming calls
AT+CMEE	0	Disable extended mobile equipment (ME) errors
AT+CBST	7,0,1	Bearer type modem selection: 9600, no compression, no transparent
AT+IPR	9600	Data rate of the modem for accepting commands: 9600bauds
AT+ICF	3,4	Port configuration: 3 = 8bits data, 1 Stop; 4 = Parity NONE
AT+IFC	2,2	Flow Control. RTS (default)
AT+FCLASS	0	Device operation mode: 0 = DATA mode
AT+CSNS	4	Regardless the incoming call, force the bearer to DATA mode
ATS0	3	Enable auto-answer after three rings.

After issuing each AT command, save it using the command AT&W. Additionally, to check out the configuration or for maintenance purposes, use the command AT&V to display the basic settings.

To issue the AT commands or to start talking with the modem, a serial link needs to be estsablished between the PC and the GSM modem. To do that, first connect the serial cable DB15 to DB9 provided with the equipment through the available serial port of the PC.

Then, create a new connection using the *HYPERTERMINAL* of Windows. Usually, it is located in *START-----ALL PROGRAMS----ACCESSORIES----COMMUNICATIONS.*

Set the COM port parameters to: 9600, 8,N,1 with HARDWARE flow control. This is very important as the MODEM MUST SEE THE DTR SIGNAL ACTIVE to accept the following commands for setup. Figure 1 below illustrates what the modem LED's show when this is done properly.

To see the commands, make sure that the echo character is enabled locally. To do that, inside the *HyperTerminal session* go to *FILE/Properties/Settings*, and then select *ASCII Setup*. For *ASCII Sending,* it is necessary to check the box beside: ECHO TYPED CHARACTERS LOCALLY

Figure 1 MODEM status LED's

5.2 PROGRAMMING REQUIREMENTS

The following COMMANDS programmed into the modem are necessary to allow the 9210 to utilize the modem on a typical cellular data connection. Each command should be acknowledged with an OK.

AT+VGR=1
AT+VGT=255
AT+CBST=7,0,1
AT+IPR=9600
AT+ICF=3,4
AT+IFC=2,2
AT+FCLASS=0
AT+CSNS=4
ATS0=3
AT&W

5.3 EXAMPLES

The following are examples of the commands issued to the MultiTech MTCBA-G-F2 using HyperTerminal. Some of them are only information commands that don't affect or change the configuration. Comments are placed in red letters.

- Checking the operation device settings AFTER ALL programming is done should show:

  AT&V   *(AT commands and their actual value)*
  Q:0 V:1 S0:003 S2:043 S3:013 S4:010 S5:008
  +CR:0 +CRC:0 +CMEE:0 +CBST:7,0,1
  +SPEAKER:0 +ECHO:0,1 &C:1 &D:2 %C:0
  +IPR:9600 +ICF:3,4 +IFC:2,2
  OK

- To check independently the parameter of CBST (Bearer type modem selection):

  AT+CBST?
  +CBST: 7,0,1 *(9600 bps, no data compression, default non-transparent)*
  OK

- To check the default auto-answer mode setting:

  ATS0?
  003   *(Auto-answer after THREE rings)*
  OK

- Saving the data rate of the modem to accept commands (between PC and modem)

  AT+IPR=9600   *(Saving the value using the equal sign "=" and value)*
  OK   *(Modem positive answer)*
  AT&W   *(Command to SAVE the value in modem EEPROM memory)*
  OK   *(Modem positive answer)*

- Consulting the current value of +CR to know if the extended report is enabled or not.

  AT+CR?   *(Consulting with question mark "?" the value of an AT command)*
  +CR: 0   *(Answer; modem says CR=0)*
  OK   *(Positive response from the modem)*
  AT+CR=1   *(Changing the value of the CR command to "1" or ENABLE)*
  OK   *(Positive response from the modem)*
  AT&W   *(Saving the value to the EEPROM memory)*
  OK   *(Positive response from the modem)*
  AT+CR?   *(Consulting again the NEW data)*
  +CR: 1   *(Data has been changed)*
  OK   *(Positive response from the modem)*

6. TESTING & TROUBLESHOOTING

After the entire configuration has been done, some problems might be found in the link. Hence, it is recommended that you test the GSM modem with the *Hyperterminal* before it is connected to the datalogger or DTE.

To test if the modem is answering correctly in a DATA link, it is necessary to dial the GSM modem number and look at the answer in the screen. Since the modem has been configured as an auto-answer device, it will automatically display the mode of the incoming call. Below is an example of a correct response from the modem to a data call.

+CRING: REL ASYNC

+CRING: REL ASYNC

+CRING: REL ASYNC

+CRING: REL ASYNC

+CR: REL ASYNC   (After 4 rings the GSM modem will answer)

1. *What happens if the status LED of the modem is not blinking?*

   This means that the network provider is not recognizing the GSM modem or subscriber. Sometimes recognition takes a few minutes, depending on traffic, but it should be finished in less than 10 minutes in a standard covered area.

   Solutions:

   ✓ Make sure that the SIM card is correctly inserted in its respective slot

   ✓ Check with the provider if the service has been activated

   ✓ Check if the connections with the PC and antenna have been done correctly

2. *Instead of receiving a RING, the message NO CARRIER appears.*

   NO CARRIER is a message that appears when a communication link has finished or failed. For example, after the modem receives the RING tones, *configured using ATS0 = <number of tones>*, the Hyperterminal will show these tones in the screen until the modem picks up the call (autoanswer). In this moment, the communication has been engaged between the GSM modem and the caller. The Hyperterminal won't show anything until the connection finishes. After that, the message NO CARRIER will be displayed.

   However, if the message NO CARRIER appears before the number of ring tones configured, or if the message appears with no communication at all, probably, the service has been suspended or it is not working properly. An example is shown below:

   +CRING: VOICE   *(First ring)*

   +CRING: VOICE   *(Second ring)*

   OK   *(Communication established)*

   NO CARRIER   *(Communication finished by one of the parties)*

3. *Instead of receiving the RING tone as a DATA call (REL.SYNCH), display shows VOICE.*

Make sure that the AT+FCLASS command has been correctly issued. For example, for data calls +FCLASS = 0. If, in spite of this setting, the modem receives a VOICE call, probably the provider has not activated a DATA service for the modem. Please, contact the GSM provider.

APPENDIX

AT COMMANDS USED IN A TYPICAL SETTING

Service Reporting Control +CR

This command enables a more detailed type of service reporting in the case of incoming or outgoing data calls. Before sending the CONNECT response to the application, the product will specify the type of data connection that has been set up.

These report types are:

+CR: ASYNC For asynchronous transparent

+CR: REL ASYNC For asynchronous non-transparent

Values:

<mode>

> **0**: Disable extended reports

> **1**: Enable extended reports

Command syntax: AT+CR=<mode>

Command	Possible responses
AT+CR=0 *Note: Extended reports disabled*	OK *Note: Command valid*
AT+CR=1 *Note: Extended reports enabled*	OK *Note: Command valid*
AT+CR?	+CR: 1 OK
AT+CR=?	+CR: (0,1) OK

Cellular Result Codes +CRC

This command shows more detailed ring information for an incoming call (voice or data). Instead of the string "RING", an extended string is used to indicate which type of call is ringing (e.g. +CRING: VOICE).

These extended indications are:

+CRING: ASYNC for asynchronous transparent

+CRING: REL ASYNC for asynchronous non-transparent

+CRING: VOICE for normal speech.

+CRING: FAX for fax calls

Values:

<mode>

0: Disable extended reports

1: Enable extended reports

Command syntax: AT+CRC=<mode>

Command	Possible responses
AT+CRC=0 *Note: Extended reports disabled*	OK *Note: Command valid*
AT+CRC=1 *Note: Extended reports enabled*	OK *Note: Command valid*
AT+CRC?	+CRC: 1 OK
AT+CRC=?	+CRC: (0,1) OK

Report Mobile Equipment Errors +CMEE

Disables or enables the use of the "+CME ERROR: <xxx>" or "+CMS ERROR:<xxx>" result code instead of simply "ERROR". See Appendix A for +CME ERROR result codes description and +CMS ERROR result codes.

Values: <error reporting flag>

0: Disable ME error reports; use only ERROR

1: Enable +CME ERROR: <xxx> or +CMS ERROR: <xxx>

Syntax: AT+CMEE=<error reporting flag>

Command	Possible responses
AT+CMEE=0 Note: Disable ME error reports, use only ERROR	OK
AT+CMEE=1 Note: Enable +CME ERROR: <xxx> or +CMS ERROR: <xxx>	OK

Bearer Type Selection +CBST

This command applies to both outgoing and incoming data calls. For an outgoing call, the two parameters (e.g. <speed> and <ce>) apply, whereas for an incoming call, only the <ce> parameter applies.

Notes:

✓ For incoming calls, if <ce> is set to T only and the network offers NT only or vice versa, then the call is released.

✓ The values 2 and 3 for the <ce> parameter are equivalent to the former values of 100 and 101. Those values are managed for compatibility purposes, but they should no longer be used in the new code (2 as former 100 and 3 as former 101).

Values:

<speed>

> **0** (default): Autobauding (modem type: none)
>
> **1**: 300 bps (modem type: V.21)
>
> **2**: 1200 bps (modem type: V.22)
>
> **3**: 1200/75 bps (modem type: V.23)
>
> **4**: 2400 bps (modem type: V.22bis)
>
> **5**: 2400 bps (modem type: V.26ter)
>
> **6**: 4800 bps (modem type: V.32)
>
> **7**: 9600 bps (modem type: V.32)
>
> **8**: Specific
>
> **12**: 9600 bps (modem type: V.34)
>
> **14(*)**: 1400 bps (modem type: V.34)
>
> **65**: 300 bps (modem type: V.110)
>
> **66**: 1200 bps (modem type: V.110)
>
> **68**: 2400 bps (modem type: V.110)
>
> **70**: 4800 bps (modem type: V.110)
>
> **71**: 9600 bps (modem type: V.110)
>
> **75(*)**: 14400 bps (modem type: V.110)
>
> (*)This speed configures data and fax 14.4 kbps bearers.

<name>

No data compression is provided. Only asynchronous modem is supported (<name> = 0).

<ce>: Connection element

> **0**: Transparent only
>
> **1**(default): Non transparent only
>
> **2**: Transparent preferred
>
> **3**: Non transparent preferred

Command syntax: AT+CBST= <speed>, <name>, <ce>

Command	Possible responses
AT+CBST=? *Note: Test command*	+CBST: (0-8,65,66,68,70,71),(0),(0-3) OK *Note: Data 14,4 kbps not supported*
AT+CBST=? *Note: Test command*	+CBST: (0-8,12,14,65,66,68,70,71,75),(0),(0-3) OK *Note: Data 14,4 kbps not supported*
AT+CBST=7,0,1 *Note: Ask for a bearer*	OK *Note: Bearer supported*
AT+CBST? *Note: Current values*	+CBST:7,0,1 OK *Note: Command valid*
AT+CBST=81,0,0 *Note: Ask for a bearer*	+CME ERROR: 4 *Note: Bearer not supported*

Fixed DTE Rate +IPR

This command specifies the data rate at which the DCE will accept commands.

Notes:

- ✓ Auto-bauding is supported (operating from 2400 to 115200 baud).

- ✓ Any AT command issued by the DTE must start with both capital 'A' and 'T' (or '/') or both lower case 'a' and 't' (or '/'); otherwise, the DCE may return some garbage characters and become desynchronized.

- ✓ Should this happen, the DTE simply issues 'AT\r' (at 2400 or 4800 bauds) once or twice or just 'AT' (at 9600 bauds) to resynchronize the modem.

- ✓ The DTE waits for 1ms after receiving the last character of the AT response (which is always '\n' or 0x0A) to send a new AT command at either the same rate or a new rate. Should this delay be ignored, the DCE can become de-synchronized. Once again, sending 'AT\r' once or twice or just 'AT' causes the DCE to recover.

Caution: **When starting up, if auto-bauding is enabled and no AT command has yet been received, the product sends all unsolicited responses (like RING) at 9600 bauds.**
Values:
<value> Baud rates that can be used by the DCE

   0 Enables auto-bauding
   300
   600
   1200
   2400
   4800
   9600

19200

38400

57600

115200

Command syntax: AT+IPR=<value>

Command	Possible responses
AT+IPR?	+IPR: 9600 OK *Note: Current rate is 9600 bps*
AT+IPR=?	+IPR: (0,2400,4800,9600,19200,38400,57600,115200), (300,600,1200) OK *Note: Possible values, according to V25ter Recommendation:* *The first set of values indicates the range of auto-detectable baud rates (including 0). The second set of values indicates the baud rates supported by the DCE but not auto-detectable.*
AT+IPR=38400	OK *Note: Disable autobauding and set rate to 38400 bps*
AT+IPR=0	OK *Note: Enable autobauding*

DTE-DCE Character Framing +ICF

This command determines the local serial port start-stop (asynchronous) character framing that the DCE uses.

Values:

<format>

0: Autodetect (not supported)

1: 8 Data 2 Stop (supported) <parity> parameter is ignored

2: 8 Data 1 Parity 1 Stop (supported)

If no <parity> provided, 3 is used by default as <parity> value

3: 8 Data 1 Stop (supported)

<parity> parameter is ignored

4: 7 Data 2 Stop (supported)

<parity> parameter is ignored

5: 7 Data 1 Parity 1 Stop (supported)

If no <parity> provided, 3 is used by default as <parity> value

6: 7 Data 1 Stop (supported) <parity> parameter is ignored

<parity>

0: Odd (supported)

1: Even (supported)

2: Mark (supported)

3: Space (supported)

4: None (supported)

Notes:

✓ Setting a character framing different from 8N1 will disable auto-bauding if it was activated. Setting it back to 8N1 **will not** re-enable auto-baud.

✓ Setting the framing to 8N1 will let auto-bauding be enabled, if it was already enabled (implying framing was already 8N1).

Command syntax: AT+ICF= <format>, <pa>

Command	Possible responses
AT+ICF?	+ICF: 3,4 OK *Note: Current values*
AT+ICF=?	+ICF: (1-6),(0-4) OK *Note: Possible values*
AT+ICF=2,0	OK *Note: New values*

DTE-DCE Local Flow Control +IFC

This command is controls the operation of local flow control between the DTE and DCE.

Values:

< DCE_by_DTE >

0: none (supported)

1: Xon/Xoff local circuit 103 (not supported)

2: RTS (supported)

3: Xon/Xoff global on circuit 103 (not supported)

Note: When this parameter is set to 2 (DTE invokes flow control through RTS), DCE behavior is as follows:

If the DCE has never detected RTS in the high (or ON) condition since startup, then it ignores RTS as it assumes that this signal is not connected. As soon as the DCE detects RTS high, the signal acts on it. Therefore, subsequent RTS transition to OFF will prevent the DCE from sending any further data in both online and offline modes. This allows use of the default settings (hardware flow control) and leaves RTS disconnected. If RTS is connected and is high, at least once, it acts on the DCE.

< DTE_by_DCE >

0: none (supported)

1: Xon/Xoff circuit 104 (not supported)

2: CTS (supported)

Note: When this parameter is set to 0 (none) then CTS is kept high all the time.

Command syntax: AT+IFC=<DCE_by_DTE>,<DTE_by_DCE>

Command	Possible responses
AT+IFC?	+IFC: 2,2 OK *Note: Current values*
AT+IFC=?	+IFC: (0,2),(0,2) OK *Note: Possible values*
AT+IFC=0,0	OK *Note: New values*

Select Mode +FCLASS

This command puts the product into a particular operating mode (data or fax).

Values:

<n>

> **0**: Data
>
> **1**: Fax class 1
>
> **2**: Fax class 2

Command syntax: AT+FCLASS= <n>

Command	Possible responses
AT+FCLASS=? *Note: Test command*	+FCLASS: (0,1) OK *Note: Fax class 2 not supported*
AT+FCLASS=? *Note: Test command*	+FCLASS: (0,1,2) OK *Note: Fax class 2 supported*
AT+FCLASS=0 *Note: Data mode requested*	OK *Note: Command valid*
AT+FCLASS=1 *Note: Fax class 1 mode requested*	OK *Note: Command valid*
AT+FCLASS? *Note: Current value*	+FCLASS: 1 OK *Note: Command valid*

Single Numbering Scheme +CSNS

This command selects the bearer to be used when an MT single numbering scheme call is set up (see +CICB).

Note: Setting the +CSNS command affects the current value of +CICB.

Values:

<mode>

        0: Voice

        2: Fax

        4: Data

Syntax: AT+CSNS

Command	Possible responses
AT+CSNS=2 Note: force a fax call	OK Note: Command accepted
AT+CSNS=0 Note: force a voice call	OK Note: Command accepted
AT+CSNS? Note: Interrogate value	+CSNS: 0 Note: Default incoming bearer: voice call
AT+CSNS=? Note: Test command	+CSNS: (0,2,4) Note: Voice, data or fax default incoming bearer

Automatic Answer S0

This S0 parameter determines and controls the product automatic answering mode.

Values:

<value> is the number of rings before automatic answer (3 characters padded with zeros) Range of values is 0 to 255.

Syntax: ATS0=<value>

Command	Possible responses
ATS0=2 Note: Automatic answer after 2 rings	OK
ATS0? Note: Current value	002 OK Note: always 3 characters padded with zeros
ATS0=0 Note: No automatic answer	OK Note: Command valid

APPLICATION NOTE

Dial Command D

The ATD command sets a voice, data or fax call. As per GSM 02.30, the dial command also controls supplementary services.

For a **data** or a **fax call**, the application sends the following ASCII string to the product (the bearer must be previously selected with the +CBST command):

ATD<nb> where <nb> is the destination phone number.

For a **voice call**, the application sends the following ASCII string to the product: (the bearer may be selected previously, if not a default bearer is used):

ATD<nb>; where <nb> is the destination phone number.

Please note that for an **international number**, the local international prefix does not need to be set (usually 00) but does need to be replaced by the '**+**' character. Example: to set up a voice call to Multi-Tech offices from another country, the AT command is:

"ATD+17637853600"

Note that some countries/regions may have specific numbering rules for GSM handset numbering.

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