

Application Note: Remote Diagnostics

Overview

The AT100 supports remote diagnostics via SMS, which are often useful to diagnose GPRS or GPS problems. The STAT? and PARA? commands can be sent from a host application or from a GSM handset and should be the first course of action to take in the event of a suspected fault.

Device Status Check *STAT?#

The STAT? command is used to request basic status information from an AT100. Like any OTA command, it can be sent in SMS or TCP mode, but is most often used in SMS mode to diagnose GPRS problems. The AT100 response contains various information fields, separated by semi-colons, as below:

STATUS:	Fixed packet header
AT100 serial number	15 digit IMEI number (serial number of device)
Software version number	Floating point number
Date of the last GPS fix	dd/mm/yy
Time of the last GPS fix	hh:mm:ss
Latitude of the last GPS fix	Floating point – decimal degrees
Longitude of the last GPS fix	Floating point - decimal degrees
Speed of the last GPS fix	integer - kmh
Heading of the last GPS fix	Integer - degrees
External Input voltage	Floating point - volts
Battery Level Percentage	integer
Number of reports stored in flash	integer
SMS used this month/monthly limit	Integer/integer
Network Roaming	“H” for home network and “R” when roaming
GPS timeout error	Boolean (1 if TRUE and 0 if FALSE)
Modem GPRS attach error	Boolean
Modem GPRS connect error	Boolean
Modem TCP socket error	Boolean
Modem TCP acknowledgment error	Boolean

Notes on error codes:

1. GPS timeout

No GPS fix has been returned for the specified timeout period (GPST). Could be an indication of an antenna fault (or poor installation) or simply that the vehicle is parked in covered area (e.g. underground car park). Excessive numbers of GPS timeouts could also be caused by the GPS quality filtering parameters – GPST, GPSTD and GPSTA (or GPSTL and GPSTSS in later firmware). Please refer to the GPS Quality Application Note for further details. Also refer to the appropriate antenna installation guidelines to ensure that the antenna is installed correctly. The orientation and position of the antenna is critical to achieving reliable GPS data.

In some cases, long term GPS timeouts can be resolved by using the following OTA commands:

*RNAV# restarts GPS navigation
*RBUT# reboot the GPS receiver

2. Modem GPRS attach fail

Can be simply due to GSM network coverage or poor antenna installation. Persistent attach failure is an indication that the GSM SIM card is not enabled for GPRS (in most cases this applies to new installations or new SIM cards).

3. Modem GPRS connect fail

If the modem is attached, but not connected, this is usually caused by incorrect GPRS access point settings (APAD, APUN and APPW). See appendix E of the AT100 Integration Guide for a list of access point details for most networks.

4. Modem TCP socket error

The modem has failed to open a socket on the specified IP address and port number. Can be caused by incorrect TCP address settings (IPAD, PORT), a fault at the host server or even wider internet problems.

5. Modem TCP acknowledgment fail

This error code indicates that the AT100 can proceed all the way to open a socket and deliver the report packet, but does not get the normal acknowledgment response from the host TCP application. This is normally caused by a fault at the host end. In some cases, this error can be cleared by extending the TCP acknowledgement timeout using the TCPT command (default is 30 seconds). Another possible cause is corrupt data in the report queue, a problem that can be cleared using the ELIV and ELOG commands (see later in this document for details).

STAT? Response Example:

STATUS:012346789123456;1.40;12/9/2005;10:20:49;51.689366;-0.224821;0;260;26.8;95;328;8/10;H;0;1;1;0;0

The above response tells us the following:

The device IMEI (serial number) is 012346789123456

The AT100 firmware version is 1.40

Latest GPS fix was:

12th Sept 2005, at 10:20 GMT

Lat: 51.689366

Lon: -0.224821

Speed: 0 kmh

Heading: 260 degrees

Input voltage is 26.8 volts

Internal battery is 95% charged

There are 328 reports stored in memory

SMS usage is currently 8 out of a limit of 10 per month

The AT100 is currently registered on its home GSM network (as per the SIM card)

Errors are present – GPRS attach fail and GPRS connect fail

The above is a typical case. The AT100 is working as expected, but there is no GPRS service available, which in most cases is a SIM card issue. In some cases, this error could also indicate that there is no GPRS coverage in that area, but that is rare these days.

The connect fail error is a direct result of the attach fail.

Device Parameter Check *PARA?#

The PARA? command is used to query user configuration parameters from a AT100. Like any OTA command, it can be sent in SMS or TCP mode, but is most often used in TCP mode by the host application to confirm or synchronise device configuration with system settings. The AT100 response contains various information fields, separated by semi-colons, as below:

The PARA? response packet has been extended in later firmware releases to include additional (i.e. new) parameters. Please check your device firmware or reporting protocol and refer to the appropriate table below. As a general guide, all hard revision D/E devices (IMEI starting 01100900) use protocol A and the earlier PARA? format. Rev H devices (IMEI starting 35944900) shipped during 2008 also use protocol A, with Protocol C being a client option from January 2009.

Protocol “C” PARA? Response Format (firmware 4.xx and later):

PARA:	Fixed packet header
Software version number	Floating point number
SERV SMS host number	International format telephone number
IPAD primary TCP IP address	TCP IP address
PORT primary TCP port number	TCP port number - integer
APAD access point address	Text string
APUN access point username	Text string
APPW access point password	Text string
GPST GPS timeout interval	Integer
DIST distance report value (metres)	Integer
HEAD heading change report value (degrees)	Integer
JTIM in-journey timed reporting interval (minutes)	Integer
STIM stationary timed report interval (minutes)	Integer
ITIM idling timed report interval (minutes)	Integer
IDLE idle mode start threshold (seconds)	Integer
STPD stop report delay (seconds)	Integer
OSST overspeed threshold (kmh)	Integer
OSHT overspeed hold time (sec)	Integer
OSIT overspeed inhibit time (sec)	Integer
MODE GSM reporting mode	Integer
SMSL maximum monthly SMS usage	Integer
IGNM ignition mode	Integer
GPST maximum GPS location error	Integer
GPSS maximum GPS speed error	integer
ROAM network roaming enable	integer
TCPT TCP mode timeout (seconds)	Integer
TCPM TCP socket mode	Integer
TEMP Temperature recorder mode	Integer
RFSC RFID Site Code	Integer
IBTN iButton Mode	Integer
GSM network operator name	Text string (max 12 chars)
GSM own telephone number	Text string (max 15 chars)

Note: please see next page for PARA? response format used in earlier firmware

Protocol “A” PARA? Response Format (firmware prior to 4.xx):

PARA:	Fixed packet header
Software version number	Floating point number
SERV SMS host number	International format telephone number
IPAD primary TCP IP address	TCP IP address
PORT primary TCP port number	TCP port number - integer
APAD access point address	Text string
APUN access point username	Text string
APPW access point password	Text string
GPST GPS timeout interval	Integer
DIST distance report value	Integer
HEAD heading change report value	Integer
JTIM in-journey timed reporting interval	Integer
STIM stationary timed report interval	Integer
STPD stop report delay	Integer
MODE GSM reporting mode	Integer
SMS maximum monthly usage	Integer
IGNM ignition mode	Integer
GPMS maximum GPS figure of merit	integer
ROAM network roaming enable	integer
IPA2 secondary TCP IP address	TCP IP address or “NONE” if disabled
PRT2 secondary TCP port number	TCP port number – integer
TCPT TCP mode timeout	Integer
TEMP Temperature recorder mode	Integer
GSM network operator name	Text string (max 12 chars)
GSM own telephone number	Text string (max 15 chars)

Acknowledgment

Since both STAT? and PARA? commands result in a reply from the AT100, it is recommended that the standard command acknowledgement is disabled by including the NACK command. The recommended formats for sending STAT? and PARA? are:

STATUS REQUEST: *STAT?# *NACK#

PARAMETER REQUEST: *PARA?# *NACK#

Note: when sending OTA commands from a T-Mobile handset, it is necessary to put an additional character before the first asterisk, otherwise the network will strip off the asterisk and the command syntax will be rejected. An "A" before the first asterisk will prevent this potential problem.

What If I don't get a reply?

The reply to a STAT? or PARA? request should normally be received within a few seconds. If the AT100 does not reply, you should consider the following possibilities:

1. Are you sure that the SMS was sent to the correct number?
2. Are you sure that the command syntax was correct?
3. Could the monthly SMS limit be exceeded for that device?
4. Device is out of GSM coverage?
5. Device is powered down or in a power-saving mode?
6. If using T-Mobile, did you put another character before the first asterisk?
7. Device is faulty.

I get a TCP ACK error in the STAT? response. What should I do?

1. Check that the IPAD and PORT settings are correct.
2. Try increasing the TCP ack timeout using *TCPT=20#
3. Contact your ASP tech support to see if they are aware of any potential causes on their side
4. If error persists, try clearing the current report buffer by sending *ELIV# and/or clear some reports stored in flash memory using the *ELOG# command. The ELOG command can be sent with a numeric argument (e.g. *ELOG=100#) to delete a specified number oldest reports from memory or without an argument (*ELOG#) to delete all reports.

I get persistent GPS or GSM errors. Is there anything else I can try before sending out an engineer?

Most problems should be handled automatically from within the AT100 application firmware. However, you may occasionally be able to clear unspecified errors by resetting the GSM modem or GPS receiver. The following commands can be tried as a last resort before sending an engineer to investigate the problem:

*RSET# modem soft reset
*HSET# modem hard reset
*RBUT# GPS processor reboot