Developer's Guide

Motorola MIB g200 Series Operation v1.10

6889192V31-A

REVISION HISTORY

Revision	Date	Purpose
A	15.01.06	Initial Release

CONTENTS

LIST OF FIGURES

LIST OF TABLES

PREFACE

1.1 SCOPE OF THIS MANUAL

This manual introduces the g200, and describes how system integrators can successfully interface to it. Both AT commands and electrical interface are covered in this manual.

We at Motorola want to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

1.2 WHO SHOULD USE THIS MANUAL

This manual is intended for hardware and software developers who need to communicate using the g200. Hardware developers will primarily be interested in those sections that describe the physical and electrical interfaces. Software developers will primarily be interested in those sections that describe the communication models and available AT commands.

1.3 APPLICABLE DOCUMENTS

- g20 AT Commands – 98-08901C68
- ITU-T Recommendation T.50
- ITU-T Recommendation V.25ter
- MIB g200 MOTAP User Guide – 6889192V30

1.4 PRODUCT SAFETY AND RF ENERGY EXPOSURE INSTRUCTIONS

The information provided in this document supersedes the general safety information contained in user guides published prior to February 2002.

Caution

BEFORE USING THIS WIRELESS MODEM, READ THE FOLLOWING PARAGRAPHS WHICH CONTAIN IMPORTANT OPERATING INSTRUCTIONS FOR SAFE USAGE AND RF ENERGY AWARENESS AND CONTROL INFORMATION AND OPERATIONAL INSTRUCTIONS FOR COMPLIANCE WITH RF ENERGY EXPOSURE LIMITS IN APPLICABLE NATIONAL AND INTERNATIONAL STANDARDS. ALSO READ THE OPERATIONAL INSTRUCTIONS FOR SAFE USAGE. FOR WIRELESS MODEMS THAT HAVE BEEN APPROVED AS INTRINSICALLY SAFE, READ THE INSTRUCTIONS AND INFORMATION ON INTRINSIC SAFETY ON PAGE 5.

1.4.1 RF Energy Exposure Awareness and Control Information and Operational Instructions for Occupational Use

NOTICE: **This wireless modem is intended for use in occupational/controlled conditions where users have full knowledge of their exposure and can exercise control over their exposure to meet the occupational limits in FCC and International standards.**

This wireless modem uses electromagnetic energy in the radio frequency (RF) spectrum to provide communications between two or more users over a distance. It uses radio frequency (RF) energy or radio waves to send and receive data. RF energy is one form of electromagnetic energy. Other forms include, but are not limited to, sunlight and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which when used improperly, can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health, and industry work with organizations to develop standards for safe exposure to RF energy. These standards provide recommended levels of RF exposure for both workers and the general public. These recommended RF exposure levels include substantial margins of protection.

All Motorola wireless modems and radios are designed, manufactured, and tested to ensure they meet government-established RF exposure levels. In addition, manufacturers also recommend specific operating instructions to users of two-way radios and wireless modems. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it.

Please refer to the following websites for more information on what RF energy exposure is and how to control your exposure to assure compliance with established RF exposure limits:

http://www.fcc.gov/oet/rfsafety/rf-faqs.html

http://www.osha.gov/SLTC/radiofrequencyradiation/index.html

1.4.1.1 Federal Communication Commission (FCC) Regulations

The FCC rules require manufacturers to comply with the FCC RF energy exposure limits for portable wireless modems before they can be marketed in the U.S. When wireless modems are used as a consequence of employment, the FCC requires users to be fully aware of and able to control their exposure to meet occupational requirements. Exposure awareness can be facilitated by the use of a product label directing users to specific user awareness information. Your Motorola wireless modem has a RF Exposure Product Label. Also, your Motorola user manual, or separate safety booklet includes information and operating instructions required to control your RF exposure and to satisfy compliance requirements.

Compliance with RF Exposure Standards

Your Motorola wireless modem is designed and tested to comply with a number of national and International standards and guidelines (listed below) for human exposure to radio frequency electromagnetic energy. **This wireless modem complies with the IEEE (FCC) and ICNIRP exposure limits for occupational/ controlled RF exposure environments.**

In terms of measuring RF energy for compliance with these exposure guidelines, your wireless modem generates measurable RF energy only while it is transmitting (during talking), not when it is receiving (listening) or in standby mode.

Your Motorola wireless modem complies with the following RF energy exposure standards and guidelines:

- United States Federal Communications Commission, Code of Federal Regulations; 47CFR part 2 sub-part J
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999
- Australian Communications Authority Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard, 2003
- ANATEL ANNEX to Resolution No. 303 of July 2, 2002 "Regulation of limitation of exposure to electrical, magnetic and electromagnetic fields in the radio frequency range between 9 KHz and 300 GHz" and "Attachment to resolution # 303 from July 2, 2002"

1.4.1.2 RF Exposure Compliance and Control Guidelines and Operating Instructions

To control your exposure and ensure compliance with the occupational/controlled environment exposure limits, always adhere to the following procedures.

Guidelines:

- Do not remove the RF Exposure Label from the device.
- User awareness instructions should accompany device when transferred to other users.
- Do not use this device if the operational requirements described herein are not met.

Operating Instructions:

FCC ID: IHDT56DB2

Industry Canada #: 109O-DB2

Hardware Version: g20 PC4 – P8 / g200 – P4

Software Version: g20 PC4 – 0C.04.76R/g200 – 01.10

Approved Accessories:

- Use only Motorola-approved supplied or replacement antennas, batteries, and accessories. Use of Non-Motorola approved antennas, batteries, and accessories may exceed the FCC (IEEE) and ICNIRP RF exposure guidelines.
- For a list of Motorola-approved accessories, visit the following website, which lists approved accessories for your modem model:
  http://www.motorola.com/cgiss/index.shtml.

Additional Information:

For additional information on exposure requirements or other training information, visit http://www.motorola.com/rfhealth.

1.4.2 Electromagnetic Interference/Compatibility

NOTE: Nearly every electronic device is susceptible to electromagnetic interference (EMI) if inadequately shielded, designed, or otherwise configured for electromagnetic compatibility.

1.4.2.1 Facilities

To avoid electromagnetic interference and/or compatibility conflicts, turn off your radio in any facility where posted notices instruct you to do so. Hospitals or health care facilities may be using equipment that is sensitive to external RF energy.

1.4.2.2 Aircraft

When instructed to do so, turn off your radio when on board an aircraft. Any use of a radio must be in accordance with applicable regulations per airline crew instructions.

1.4.2.3 Medical Devices

Pacemakers

The Advanced Medical Technology Association (AdvaMed) recommends that a minimum separation of 6 inches (15 centimeters) be maintained between a handheld wireless radio and a pacemaker. These recommendations are consistent with those of the U.S. Food and Drug Administration.

Persons with pacemakers should:

- ALWAYS keep the wireless modem more than 6 inches (15 centimeters) from their pacemaker when the radio is turned ON.
- Turn the wireless modem OFF immediately if there is any reason to suspect that interference is taking place.

Hearing Aids

Some digital wireless modems may interfere with some hearing aids. In the event of such interference, you may want to consult your hearing aid manufacturer to discuss alternatives.

Other Medical Devices

If you use any other personal medical device, consult the manufacturer of your device to determine if it is adequately shielded from RF energy. Your physician may be able to assist you in obtaining this information.

Use of Communication Devices While Driving

Always check the laws and regulations on the use of radios in the areas where you drive.

- Give full attention to driving and to the road.
- Use hands-free operation, if available.
- Pull off the road and park before making or answering a call, if driving conditions or regulations so require.

1.4.2.4 Operational Warnings

WARNING

Potentially Explosive Atmospheres
(Explosive atmospheres refers to hazard classified locations that may contain hazardous gas, vapors, or dusts.)

Turn off your wireless modem prior to entering any area with a potentially explosive atmosphere unless it is a portable radio type especially qualified for use in such areas as Intrinsically Safe (for example, Factory Mutual, CSA, UL, or CENELEC).

Blasting Caps and Blasting Areas
To avoid possible interference with blasting operations, turn off your wireless modem when you are near electrical blasting caps, in a blasting area, or in areas posted: "Turn off two-way radio." Obey all signs and instructions.

1.4.2.5 Operational Cautions

Caution

Important
To comply with the FCC RF exposure limits and satisfy the categorical exclusion requirements for transmitters, the following requirements must be met:

Antenna Installation
The antenna installation must provide a minimum separation distance of 20 cm from users and nearby persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

The combined cable loss and antenna gain must not exceed +11 dBi and total system output must not exceed 1.5 W ERP (Cellular) / 3.0 W EIRP (PCS) to qualify for categorical exclusion requirements of 2.1091. OEM installers must be provided with antenna installation instruction and transmitter operating conditions for satisfying RF exposure compliance.

Antennas
Do not use any wireless modem that has a damaged antenna. If a damaged antenna comes into contact with your skin, a minor burn can result.

1.4.2.6 Intrinsically Safe Radio Information

The Intrinsically safe approval unit refers to a product that has been approved as intrinsically safe by an approval agency (for example FM Approvals, CSA, UL, or Cenelec) and certifies that a particular product meets the Agency's applicable intrinsic safety standards for specific types of hazardous classified locations. A portable radio that has been approved for intrinsic safety will have Approval label attached to the radio to identify the unit as being approved for specified hazardous atmospheres. This label specifies the hazardous Class/Division/Group along with the part number of the battery that must be used. The Intrinsically Safe Approval Label will be located on the portable radio unit.

Operational Cautions for Intrinsic Safe Equipment

- Do not operate radio communications equipment in a hazardous atmosphere unless it is a type especially qualified (for example, FM, UL, CSA, or CENELEC approved). An explosion or fire may result.
- Do not operate a radio unit that has been approved as intrinsically safe product in a hazardous atmosphere if it has been physically damaged (for example, cracked housing). An explosion or fire may result.
- Do not replace or charge batteries in a hazardous atmosphere. Contact sparking may occur while installing or removing batteries and cause an explosion or fire.

Warnings for Radios Approved as Intrinsically Safe

Radios must ship from the Motorola manufacturing facility with the hazardous atmosphere capability and the intrinsic safety approval labelling (FM, UL, CSA, CENELEC). Radios will not be upgraded to this capability and labeled once they have been shipped to the field.

A modification changes the unit's hardware from its original design configuration. Modifications can only be made by the original product manufacturer.

Do not replace or change accessories in a hazardous atmosphere. Contact sparking may occur while installing or removing accessories and cause an explosion or fire.

Turn the radio off before removing or installing a battery or accessory.

Do not disassemble an intrinsically safe product in any way that exposes the internal circuits of the unit.

Failure to use an intrinsically safe approved battery or Approved accessories specifically approved for the radio unit may result in the dangerously unsafe condition of an unapproved radio combination being used in a hazardous location.

Unauthorized or incorrect modification of the intrinsically safe approved Product will negate the approval rating of the product.

Incorrect repair or relabeling of any intrinsically safe Agency-approved radio could adversely affect the Approval rating of the unit.

Use of a radio that is not intrinsically safe in a hazardous atmosphere could result in serious injury or death.

Repair

REPAIRS FOR MOTOROLA PRODUCTS WITH INTRINSICALLY SAFE APPROVAL ARE THE RESPONSIBILITY OF THE USER.

Repairs to a Motorola FM approved radio product should only be done at a location that has been FM audited under the FM 3605 repairs and service standard.

Contact Motorola for assistance regarding repairs and service of Motorola intrinsically safe equipment.

A repair constitutes something done internally to the unit that would bring it back to its original condition.

Items not considered as repairs are those in which an action is performed on a unit which does not require the outer casing of the unit to be opened in a manner that exposes the internal electrical circuits of the unit.

Do Not Substitute Options or Accessories

The Motorola communications equipment certified as intrinsically safe by the approving agency, (FM, UL, CSA, CENELEC) is tested as a complete system which consists of the listed agency Approved portable, Approved battery, and Approved accessories or options, or both. This Approved portable and battery combination must be strictly

observed. There must be no substitution of items, even if the substitute has been previously Approved with a different Motorola communications equipment unit. Approved configurations are listed by the Approving Agency (FM, UL, CSA, CENELEC).

The Intrinsically Safe Approval Label affixed to radio refers to the intrinsically safe classification of that radio product, and the approved batteries that can be used with that system.

The manual PN referenced on the Intrinsically Safe Approval Label identifies the approved Accessories and or options that can be used with that portable radio unit.

Using a non Motorola intrinsically safe battery and or accessory with the Motorola approved radio unit will void the intrinsically safe approval of that radio unit.

1.5 WARRANTY INFORMATION

Motorola warrants that the Products will, under normal use, comply with their specifications in all material respects and are free from defects in materials and workmanship for a period of twelve (12) months from the date of delivery (**"Warranty Period"**). Normal use includes storage, installation, commissioning, operation and maintenance in accordance with Motorola's instruction and good industry practice (**"Normal Use"**). The Warranty Period will not be extended for repairs or replacements.

A.2 Warranty claims shall be made in writing within the Warranty Period to Motorola's Distributor who has sold the Product. The Customer shall be responsible for the costs of returning the Product to the Distributor.

A.3 If the Customer notifies Motorola's distributor of a defect in the Product in accordance with Clause [A.2] during the Warranty Period and Motorola agrees that there is a defect, then Motorola, at its option, will repair or replace the defective Products. Motorola reserves the right to subcontract the performance of warranty service to third parties.

A.4 Motorola's warranties to [the Customer] shall be invalidated if the Product (a) is used in a manner other than Normal Use; or (b) is modified, repaired, or a replacement part is fitted to the Product by anyone other than Motorola or its authorised service subcontractors; or (c) is connected, attached, used or operated with any ancillary item, other than [in accordance with the Product specification] [items purchased from Motorola for use with such Product]; or (d) markings or labelling have been altered, obscured, removed or otherwise interfered with; or (e) defect arises from [the Customer's] design, formulae or specification.

A.5 THIS WARRANTY IS IN PLACE OF AND EXCLUDES ALL OTHER WARRANTIES AND CONDITIONS, WHETER ORAL, WRITTEN, STATUTORY, EXPRESS OR IMPLIED. IMPLIED WARRANTIES OR CONDITIONS OF FITNESS AND QUALITY SHALL NOT APPLY. MOTOROLA'S LIABILITIES AND [THE CUSTOMER'S] REMEDIES IN RESPECT OF DEFECTS IN THE PRODUCTS AND ANY DAMAGE TO THE PRODUCTS WHETHER ARISING FROM BREACH OF CONTRACT, STATUTORY DUTY, WARRANTY, NEGLIGENCE OR OTHERWISE ARE SOLELY AND EXCLUSIVELY AS STATED IN THIS WARRANTY CLAUSE, AND MOTOROLA SHALL HAVE NO LIABILITY OF ANY KIND FOR ANY SUCH DEFECT OR DAMAGE WHICH APPEARS AFTER EXPIRY OF THE WARRANTY PERIOD.

Limitation of Liability.

IN NO EVENT WILL MOTOROLA BE LIABLE, WHETHER IN CONTRACT, TORT, OR OTHERWISE, FOR ANY INCIDENTAL, SPECIAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, OR LOST PROFITS, SAVINGS, OR REVENUES TO THE FULL EXTENT THESE MAY BE DISCLAIMED BY LAW.

MOTOROLA'S TOTAL LIABILITY FOR ANY AND ALL COSTS, DAMAGES, CLAIMS, INDEMNIFIABLE CLAIMS, OR LOSSES WHATSOEVER ARISING OUT OF OR IN CONNECTION WITH THIS PRODUCT(S) SUPPLIED UNDER THIS AGREEMENT IS LIMITED TO THE AGGREGATE AMOUNT PAID TO MOTOROLA IN CONNECTION WITH THE PARTICULAR PRODUCT(S) SOLD HEREUNDER WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED.

1.6 TERMS AND ABBREVIATIONS

Table 1 provides definitions for terms and abbreviations used in this manual.

Table 1. Terms and Abbreviations

Acronym/Term	Definition/Description
APN	Access Point Name
CTS	Clear To Send
DCD	Data Carrier Detect
DCE	Data Communication Equipment (g200)
DSR	Data Set Ready
DTE	Date Terminal Equipment (terminals, PCs and so on)
DTR	Data Terminal Ready
DUN	Dial Up Networking
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
ICMP	Internet Control Message Protocol
IP	Internet Protocol
M2M	Machine to Machine
MO	Mobile Originated
Modem	Synonymous with the g200
Module	Synonymous with the GSM device that is embedded in the g200
MOTAP	Motorola Over The Air Protocol
MT	Mobile Terminated
RI	Ring Indicator
RTS	Ready To Send
SIM	Subscriber Identity Module
SMS	Short Message Service
TCP	Transmission Control Protocol
TE	Terminal Equipment
UDP	User Datagram Protocol

1.7 HOW THIS MANUAL IS ORGANIZED

This manual contains the following chapters:

- **Chapter 1** contains this preface.
- **Chapter 2** introduces the main product features and provides a list of available AT commands.
- **Chapter 3** provides information on the use of Microsoft DUN.
- **Chapter 4** provides a quick introduction to AT commands, and includes a general explanation of the format and usage.
- **Chapter 5** provides a reference for all available AT commands, including examples, where relevant.
- **Chapter 6** provides scenarios and examples for implementing various g200 functions.

ELECTRICAL SPECIFICATIONS

2.1 GENERAL OVERVIEW

MIB g200 series products are based on the Motorola g20 GSM module, and have been designed to support a wide variety of Machine To Machine (M2M) applications. When connected to a PC or a host device, the g200 can send data wirelessly to another device:

- Using GPRS over the Internet, or
- Using SMS

Diagnostic LEDs and external SIM card access are provided on the front of the g200, as shown in Figure 1.

Figure 1. g200 Front View

Figure 2 shows the g200 connectors that are located on the rear side.

Figure 2. g200 Rear View

2.1.1 M2M Applications

Many M2M applications include remote devices that communicate with an Internet-based client or server. For these systems, the g200 manages a GPRS connection to the Internet and provides a TCP or UDP PAD for the host device. Typical telemetry applications are shown in Figure 3.

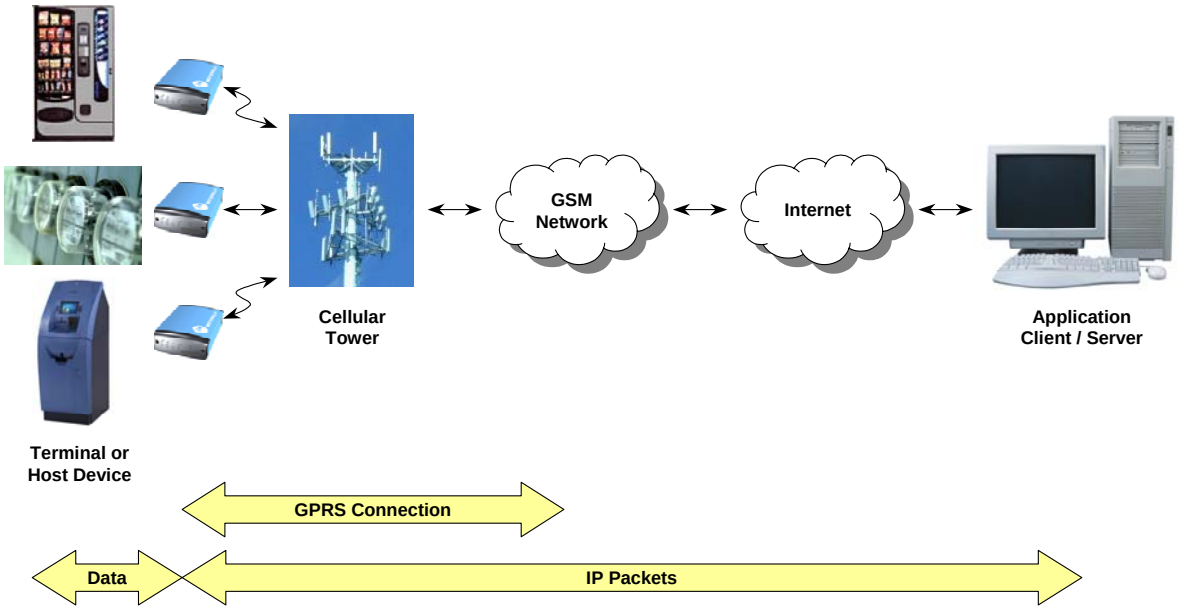


Figure 3. M2M Applications Over GPRS

For M2M applications, the g200 offers:

- A variety of software interfaces
  - Direct Access modes allow for direct communications with the GSM module
  - There is a custom AT command interface
  - A UDP PAD allows terminal data to be sent over the Internet in UDP packets
  - A TCP PAD allows terminal data to be sent over the Internet in TCP packets
  - Serial communications take place at standard baud rates between 1200 and 115,200

- Management of the GSM network connection
  - Allows for SMS or GPRS based communications
  - Establishes, manages and terminates GPRS data sessions over an internal PPP link
  - Implements a single-session TCP stack with dynamically-assigned IP addresses
  - Implements a single-session UDP stack with dynamically-assigned IP addresses

- Security and remote access
  - An internal firewall can be configured to authorize select IP address ranges
  - MOTAP messages can be used to review and modify configurable parameters

- Power control and management
  - Power to the module is controlled by the micro controller
  - Appropriate activation signals of the correct voltage and timing are used

- Diagnostic features
  - Protocol debugging can be performed at various layers in the communication stack

2.1.2 Computing Applications

The g200 can also provide a basic connection to the Internet, and is capable of supporting typical computing applications. By way of example, Figure 4 shows that a computer can browse the Internet, send and receive email, or access a corporate database using the g200.

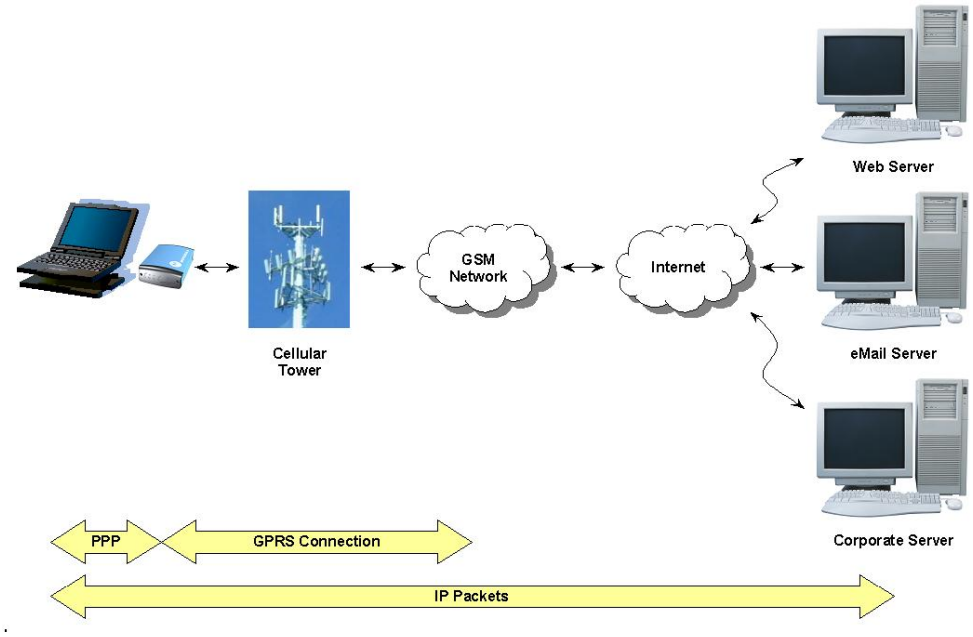


Figure 4. Computing Applications Over GPRS

For computing applications, the g200 should be configured to enter a Direct Access mode shortly after power up. This gives the PC direct access to the GSM module, and will allow the PC to easily establish a PPP connection. For those users that are unfamiliar with PC communications and PPP, a guide to the Microsoft DUN service is provided in Chapter 3.

For computing applications, the g200 offers:

- Serial communications at standard baud rates between 300 and 115,200
- Standard GSM AT command support
- SMS messaging support
- A PPP interface for data sessions

2.1.3 What Do I Need Now?

2.1.3.1 Serial Cable

Any standard 9-pin serial extension cable can be used to interface with the g200. Maximum recommended cable length is 25 feet. Table 2 gives the serial connector pins details.

Table 2. Serial Connector Pins

Signal	Direction	Function	Pin
DCD	OUTPUT	Data Carrier Detect. Used to indicate the modem is currently connected to the network.	1
RXD	OUTPUT	Received Data. Data packets received by the modem from the network, destined for the local terminal	2
TXD	INPUT	Transmit Data. Data packets received by the modem from the local terminal, destined for transmission to the network.	3
DTR	INPUT	Data Terminal Ready. Signal used to indicate the local terminal is ready to accept a data session from the modem.	4
GND	GROUND	Signal Level Reference	5
DSR	OUTPUT	Data Set Ready. Signal used to indicate to the terminal that the remote server is accessible.	6
RTS	INPUT	Request To Send. Data flow control signal used to indicate the local terminal can receive data bytes.	7
CTS	OUTPUT	Clear To Send. Data flow control signal used to indicate the modem can receive data bytes	8
RI	OUTPUT	Ring Indicator. Signal used to indicate that a remote server is attempting to initiate a session with the local terminal.	9

2.1.3.2 Power Supply

The g200 is equipped with a small barrel jack (CUI part PJ1-022-SMT). This jack is center positive and accepts a standard 2.35mm plug, such as CUI part PP-012. Table 3 gives the g200 supply voltage information. Table 4 gives the g200 operating current information.

Table 3. Supply Voltage Information

Maximum Operating Input Voltage	30 volts DC
Recommended Supply Voltage	13.6 volts DC
Minimum Input Voltage	12 volts DC
Maximum Voltage Ripple	50 millivolts

Table 4. Operating Current

Peak Current	0.5 amps
Average Operating Current	0.12 amps

2.1.3.3 Configuring the g200

The g200 is flexible and must be configured before supporting any application. The g200 is configured using AT commands and can be provisioned:

- By the host device, at run time
- In advance, using any terminal emulator such as Microsoft ® HyperTerminal
- In advance, using the g200 Configuration Wizard

The g200 Configuration Wizard is an easy to use PC utility that simplifies the configuration process. It is provided free of charge. With the g200 Configuration Wizard, you can easily:

- Specify whether the g200 will be used for an M2M or computing application
- Review and modify all settings
- Maintain configuration profiles on your computer
- Confirm g200 communications

2.1.3.4 Cellular Antenna

A cellular antenna must be attached for efficient communications, and the g200 provides an SMA end launch female RF coaxial connector for this purpose. The design of the g200 complies with FCC guidelines and international standards for RF emissions. However, the following warnings must be observed.

Warning!	The g200 must be installed in a manner that provides a minimum separation distance of 20 cm (8 inches) between the antenna and users or nearby persons to satisfy FCC RF exposure requirements.

Warning!	Use only approved cellular antennas. The use of unauthorized antennas or modifications could impair operation of your g200, void your warranty, and/or result in the violation of FCC regulations.

The recommended antenna for North America users is: Mobile Mark antenna, model No. PSKN3-900/1900S.

2.1.3.5 SIM Card

A SIM card can be provided by your local GSM operator. The SIM card must be installed in the g200 before it can register on the GSM network and communicate wirelessly.

For GPRS communications, your operator will also provide you with the APN, account username, and account password to enable GPRS access. The g200 must be configured with these values.

Step	Instructions	Diagram
1	Remove the SIM socket cover.	
2	Insert the SIM as shown on the case. Verify that the gold contacts are facing up, and the notched corner is on the left hand side of the SIM. Press the end of SIM and ensure it is inserted and locked all the way.	
3	Install the SIM socket cover.	

2.2 DIRECT ACCESS MODES

A variety of Direct Access modes are provided which allow a terminal to directly access the GSM module's serial interface. When a Direct Access mode is active, the terminal can issue any of the AT commands that can be accepted by the GSM module.

Each of the Direct Access modes has specific initiation and termination mechanisms. Some of the modes are more appropriate when connecting the g200 to a PC, and some are better when used in an M2M application.

2.3 AT COMMAND INTERFACE

Upon power up, the g200 starts in command mode. When command mode is active, the g200 accepts and responds to a simple Hayes-style AT command set. Some of the commands are standard or familiar V.25ter equivalents. However, many of them are custom and have been created to support the special features that are offered by the g200. The g200 AT command set is described in Chapter 5.

When the g200 is in a Direct Access mode, the supported AT commands are described in the following Motorola manual:

- g20 AT Commands – 98-08901C68

2.4 UDP PAD OPERATION

When a UDP PAD is active, all bytes entered by the terminal are encapsulated by the g200 within UDP packets and sent to a destination address and port. GPRS services are used to communicate over the Internet. Figure 5 shows that the terminal does not need to maintain a protocol stack, and does not need to know anything about the UDP or IP protocols.

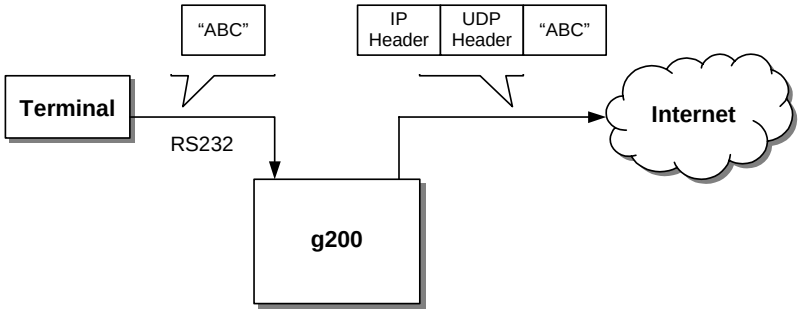


Figure 5. Sending UDP Packets

The converse is also true. Figure 6 shows that when the g200 receives a packet from the Internet, it strips off the protocol information and delivers the payload to the terminal.

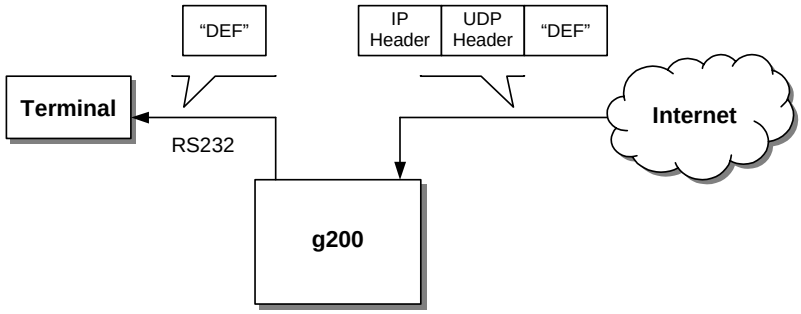


Figure 6. Receiving UDP Packets

Two different mechanisms are used to start a UDP PAD. These mechanisms have been provided so that integrators can choose the communication model that works best for their specific application.

- The terminal can use an AT command to start a UDP PAD session.
- The terminal can enable a listen mode within the g200. If listen mode is enabled, the g200 will start a UDP PAD session if it receives an acceptable packet from the Internet.

Once a PAD has started, the g200 restricts communications to a specific IP address and port. Packets from any other address or port are discarded.

Some additional security features are provided for listen mode. If a PAD is not currently active:

- The g200 rejects packets unless they are destined for a specific port number (listen port).
- The g200 can be configured to reject packets unless they come from an authorized IP address (firewall).

The g200 holds characters from the terminal in a buffer until it determines that a packet needs to be sent. There are three possible triggers:

- The g200 can be configured to send a packet when an idle timer expires.
- The g200 can be configured to send a packet when a specific character is received.
- The g200 will send a packet if the amount of data in the buffer exceeds a configured threshold.

A number of different mechanisms can be used to terminate a UDP PAD. When a UDP PAD is terminated, the g200 returns to command mode.

- The terminal can clear the DTR hardware line.
- The terminal can send a configurable escape sequence.
- The g200 can be configured to automatically terminate PADs that have been idle for a prolonged amount of time.

2.5 TCP PAD OPERATION

When a TCP PAD is active, all bytes entered by the terminal are encapsulated by the g200 within TCP packets and sent to a destination address and port. GPRS services are used to communicate over the Internet. Figure 7 shows that the terminal does not need to maintain a protocol stack, and does not need to know anything about the TCP or IP protocols.

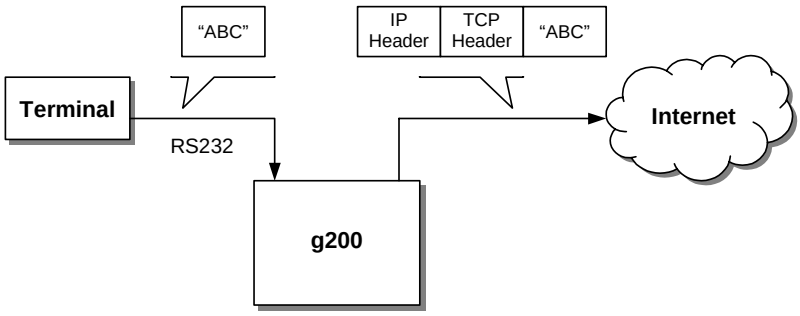


Figure 7. Sending TCP Packets

The converse is also true. Figure 8 shows that when the g200 receives a packet from the Internet, it strips off the protocol information and delivers the payload to the terminal.

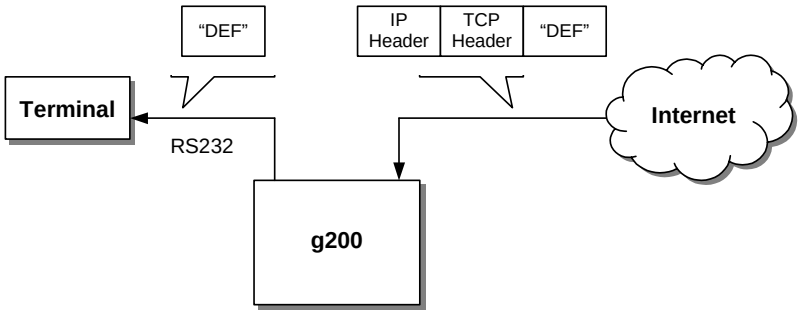


Figure 8. Receiving TCP Packets

Two different mechanisms can be used to start a TCP PAD. These mechanisms have been provided so that integrators can choose the communication model that works best for their specific application.

- The terminal can use an AT command to start a TCP PAD session.
- The terminal can enable a listen mode within the g200. If listen mode is enabled, the g200 will start a TCP PAD session if it receives an acceptable packet from the Internet.

Once a PAD has started, the g200 restricts communications to a specific IP address and port. Packets from any other address or port are quietly discarded.

Some additional security features are provided for listen mode. If a PAD is not currently active:

- The g200 rejects packets unless they are destined for a specific port number (listen port).
- The g200 can be configured to reject packets unless they come from an authorized IP address (firewall).

The g200 holds characters from the terminal in a buffer until it determines that a packet needs to be sent. There are three possible triggers:

- The g200 can be configured to send a packet when an idle timer expires.
- The g200 can be configured to send a packet when a specific character is received
- The g200 will send a packet if the amount of data in the buffer exceeds a configured threshold.

A number of different mechanisms can be used to terminate a TCP PAD. When a TCP PAD is terminated, the g200 returns to command mode.

- The terminal can clear the DTR hardware line.
- The terminal can send a configurable escape sequence.
- The remote device can request termination.
- The g200 can be configured to automatically terminate PADs that have been idle for a prolonged amount of time.

2.6 SMS OPERATION

2.6.1 M2M Applications

The g200 supports SMS based communications. SMS is well suited to some communication models, and also allows the g200 to be deployed in areas without good GPRS coverage.

A terminal uses custom AT commands to send SMS messages. Both 7-bit and 8-bit messages are supported.

The g200 can be configured to send incoming messages directly to the terminal, or to hold them in a queue.

2.6.2 Computing Applications

When the g200 is in a Direct Access mode, the supported AT commands are described in the following Motorola manual:

- g20 AT Commands – 98-08901C68

2.6.3 Message Queuing

In some communication models, all sessions are initiated by the terminal that is connected to the g200 (MO). In other models, communication sessions can be initiated by another device or a server (MT). Message queuing is used to help manage the latter case.

If message queuing is enabled, the g200 will use a hardware line (RI) to notify the terminal when an incoming data has arrived. When the terminal is able to accept this information, it can acquire it from the g200 using AT commands. Primarily, this allows the terminal to employ power management without concerns over data loss.

2.7 SECURITY

The g200 is equipped with a firewall that can be used in M2M applications. The firewall is optional but if it is enabled, the user can define ranges of acceptable IP addresses.

- If the g200 is idle, and if the firewall is disabled, incoming UDP and TCP packets are accepted and processed.
- If the g200 is idle, and if the firewall is enabled and the originating IP address is approved, incoming UDP and TCP packets are accepted and processed.
- If the g200 initiates a PAD session to a remote address, replies from that address are accepted regardless of the firewall configuration.

2.8 REMOTE ACCESS

MOTAP is a Motorola protocol that uses UDP packets for transport. It has been incorporated within the g200 and allows:

- The g200 to contact a client whenever the GSM module acquires a new IP address.
- A client to request identification specifics from a g200 (i.e. firmware, manufacturer, product name, IMSI, IMEI).
- A client to read or modify configurable parameters remotely.

2.9 DIAGNOSTICS

2.9.1 LEDs

Four diagnostic LEDs on the g200 blink once when power is applied. Thereafter, they are used to indicate:

LED Name	Indication
PWR	Power is applied
SVC	Service
RX	Receive
TX	Transmit

2.9.1.1 M2M Applications

LED Name	Indication
SVC	• Blink slowly - GSM module is trying to find and register on a GSM network. • Blink quickly - until the module is able to establish a data connection and acquires an IP address. • Solid - when a data connection is available.
RX	Blink - every time packets are received wirelessly.
TX	Blink - every time packets are transmitted wirelessly.

2.9.1.2 Computing Applications

LED Name	Indication
SVC	Normally off.
RX	Blink - every time the terminal receives characters from the g200.
TX	Blink - every time the terminal transmits characters to the g200.

2.9.2 Serial Diagnostics

Some high-level and low-level serial diagnostics are provided by the g200.

- High-level diagnostics can be used to acquire more information about GSM registration, TCP connection errors, or basic communications. For example, there is a command that allows the user to send an ICMP PING to an IP address, and can be used to confirm GPRS communications.

- Low-level diagnostics can be used to monitor state engine operation, and to monitor incoming and outgoing data packets. Data packets can be displayed at the ICMP, IP, PPP, TCP, or UDP level.

All serial diagnostic features can be accessed or enabled using custom AT commands.

2.10 AT COMMAND SUMMARY

Table 5 contains a summary of all the AT commands supported by the g200, sorted by functionality.

Table 5. AT Commands

AT Command	Description	Page
Product Identity		
Subscriber Unit Identity		
I	This command requests various g200 information items	49
Product Profile		
Configuration Commands		
&F	This command restores the factory defined configuration	50
&V	This command reviews the current configuration settings	51
&W	This command saves the current configuration settings	52
Z	This command resets and uses the saved configuration values	53
Host Interface		
Interface Line Commands		
&C	This command specifies how DCD should be driven	53
&D	This command specifies how DTR transitions are to be interpreted	54
&K	This command configures flow control	53
&L	This command configures the baud rate, data size, parity, and stop bit length	56
&S	This command specifies how DSR should be driven	58
Interface Content Commands		
E	This command specifies whether characters are echoed locally	59
Q	This command specifies whether result codes are required	60
S100	This command specifies whether line feeds are required	61
V	This command specifies whether verbose result codes are required	62

AT Command	Description	Page
Module Interface		
Status Commands		
*GSTAT	This command checks the module registration status	63
*GRPT	This command enables automatic registration status reporting	65
*GIP	This command acquires the currently assigned IP address	66
Validation Commands		
*GIVA	This command defines the address that is to be used for context validation	67
*GIVT	This command enables periodic communication validation	68
Access Commands		
*GAPN	This command specifies the APN required for GPRS communications	69
*GBAUD	This command specifies the baud rate for the GSM module	70
*GMODE	This command selects a GPRS or SMS communication model	71
*GPASS	This command specifies the password required for GPRS communications	72
*GUSER	This command specifies the username required for GPRS communications	73
General PAD		
Memory Commands		
*PMRX	This command specifies the buffer size for incoming packets	74
*PMTX	This command specifies the buffer size four outgoing packets	75
Packet Commands		
S50	This command specifies the PAD data forwarding idle timeout	76
S51	This command specifies the PAD data forwarding character	77
S52	This command specifies the PAD data escape character	78

AT Command	Description	Page
Connection Commands		
&Z	This command specifies the default destination for PAD connections	80
S53	This command specifies the PAD source port number	82
S54	This command specifies the PAD listen port number	83
D	This command is used to dial / initiate PAD connections	84
*PEXIT	This command specifies the escape sequence for PAD termination	86
TCP PAD		
PAD Control Commands		
S60	This command enables TCP PAD listen mode	87
S61	This command specifies the TCP PAD connection timeout	88
S62	This command specifies the TCP PAD idle timeout	89
UDP PAD		
PAD Control Commands		
S65	This command enables UDP PAD listen mode	90
S66	This command specifies the UDP PAD idle timeout	91
PAD Content Commands		
S67	This command enables the UDP PAD identification option	92
SMS		
SMS Message Transmission		
*SDA	This command specifies the SMS destination address	94
*STXA	This command sends an ASCII (7-bit) SMS message	95
*STXB	This command sends a binary (8-bit) SMS message	96

AT Command	Description	Page
Communication Parameter Commands		
*MCA	This command specifies the client address to use when sending indications	109
*MCP	This command specifies the MOTAP client port number	110
*MIP	This command specifies the MOTAP indication period	113
*MIR	This command specifies the MOTAP indication retry limit	114
*MLP	This command specifies the MOTAP local port number	110
*MUS	This command specifies the MOTAP unit ID string	112
*MUT	This command specifies the MOTAP unit ID type	111
Diagnostics		
High Level Diagnostics		
*PING	This command sends a PING to an IP address	115
S200	This command acquires the last GSM module registration error	117
S201	This command acquires the last TCP PAD connection error	118
Low Level Diagnostics		
*DBICMP	This command enables ICMP packet debugging	119
*DBIP	This command enables IP packet debugging	120
*DBMT	This command enables MOTAP packet debugging	120
*DBPPP	This command enables PPP packet debugging	120
*DBTCP	This command enables TCP packet debugging	122
*DBUDP	This command enables UDP packet debugging	122

3.1 OVERVIEW

Microsoft Windows operating systems, such as Windows XP or Windows 2000, include software that can be used to establish data communications through a modem. Three steps that need to be completed before PC applications can access the Internet using the g200:

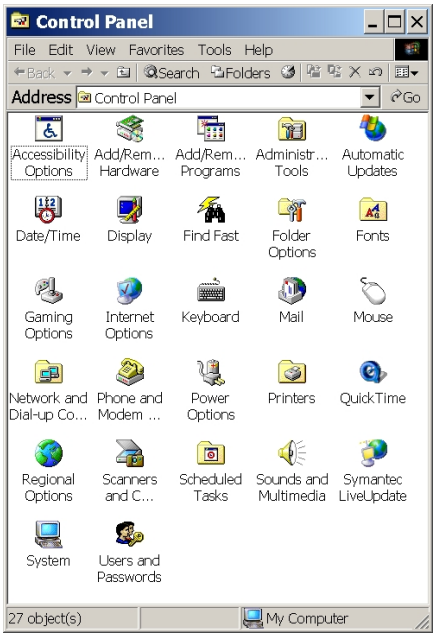
- Define a modem
- Define a Dial-Up Networking connection
- Ensure the new connection is only used when required

All of these steps are described in this section of the manual for Windows 2000. Similar instructions can also be found on Microsoft's web site.

3.2 DEFINING A MODEM

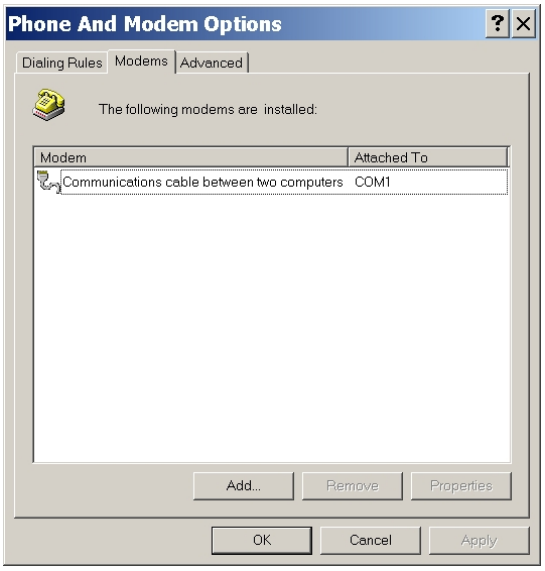
3.2.1 Step 1: Open the Control Panel

Start → Settings → Control Panel



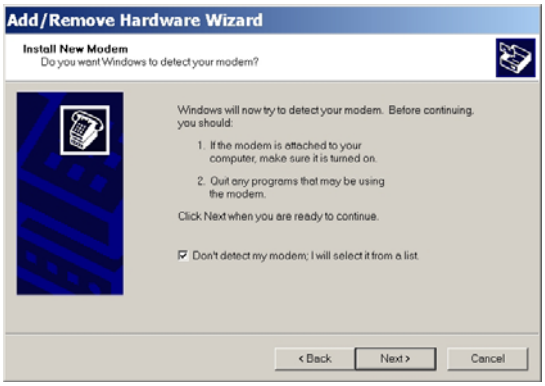
3.2.2 Step 2: Open Phone and Modem Options

Double click the **Phone and Modem Options** icon, and select the **Modems** tab.

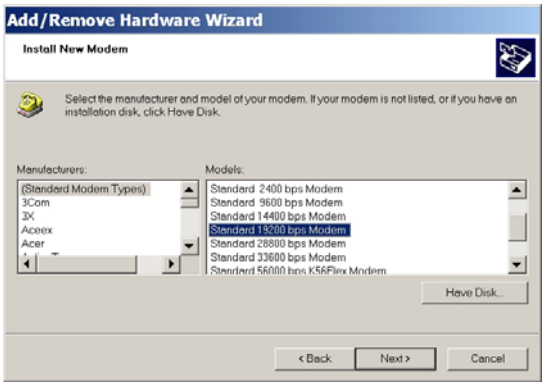


3.2.3 Step 3: Add a New Modem

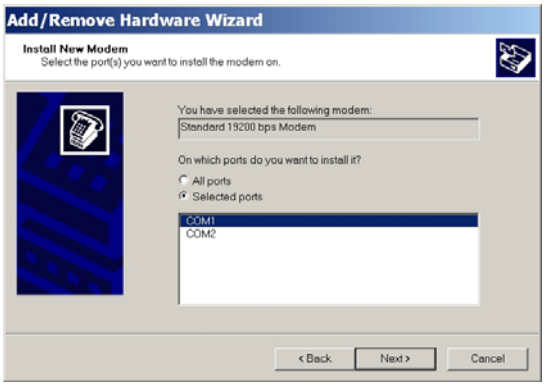
Press the **Add** button, and click the checkbox that allows you to select from a list.



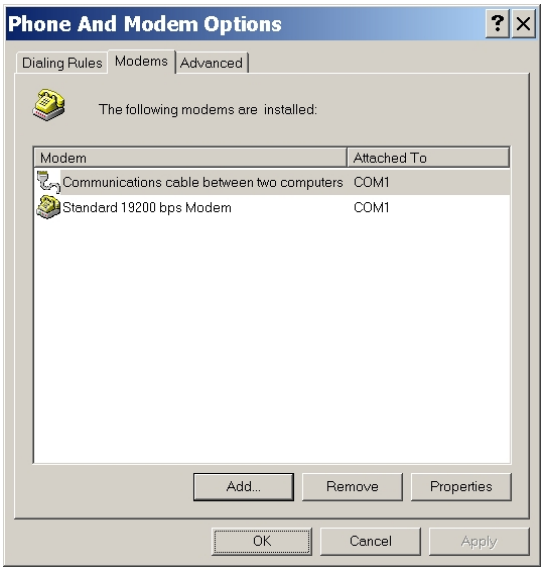
Press the **Next** button and select any standard modem you wish. By default, the GSM modules are configured to support autobauding and can detect rates up to and including 115200 baud. This example uses 19200 baud.



Press the **Next** button, and select the COM port you wish to use. This example uses COM1.

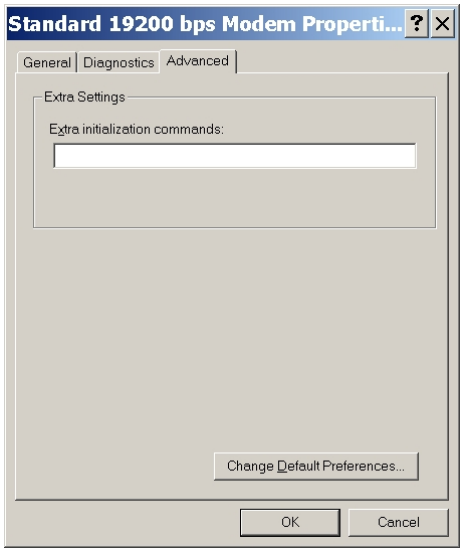


Press the **Next** button, followed by the **Finish** button.

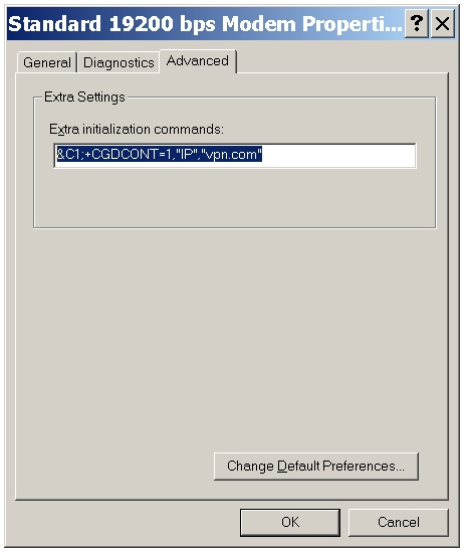


3.2.4 Step 4: Configure the Modem

Highlight the newly created modem, press the **Properties** button, and select the **Advanced** tab.



Ensure that DCD is used properly, and that the operator's APN is specified. The APN will be provided by your GSM operator at the time you purchase a data account and after receiving a SIM card. In this example, the operator's public APN is **vpn.com** so the required configuration string is **&C1;+CGDCONT=1,"IP","vpn.com"**



Press all required **OK** buttons to complete the configuration.

3.3 DEFINING A DIAL-UP NETWORKING CONNECTION

3.3.1 Step 1: Make a New Connection

Start → Settings → Network and Dial-Up Connections → Make New Connection

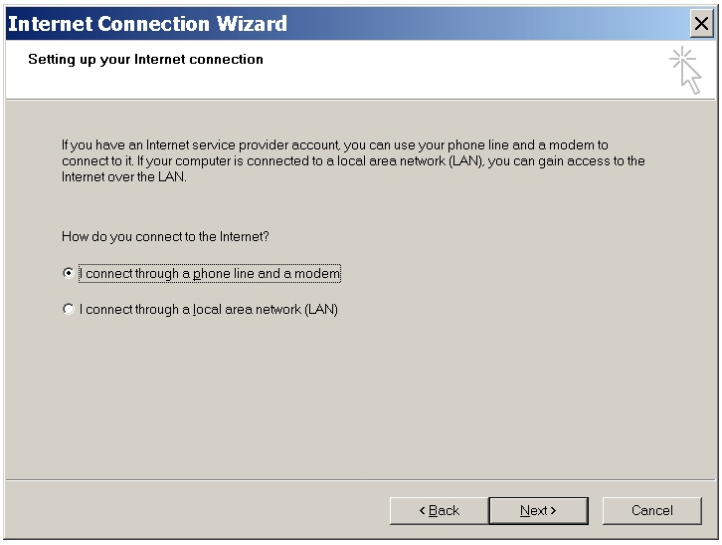
Press the **Next** button, and select the option **Dial-up to the Internet**.

Press the **Next** button.

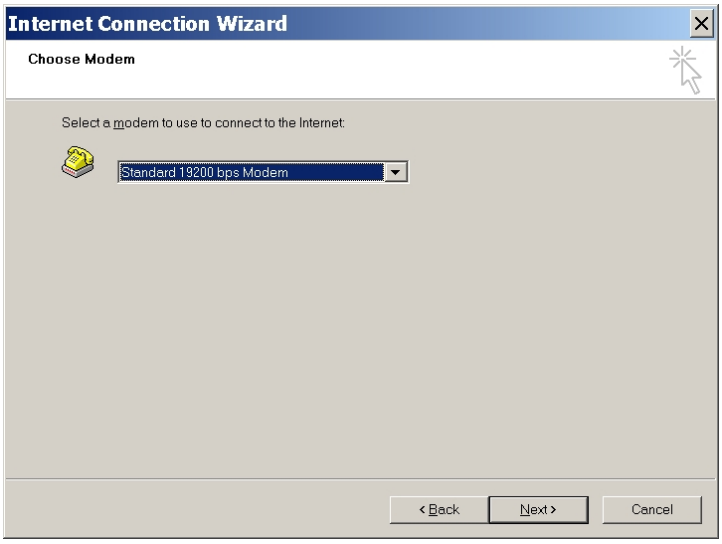
3.3.2 Step 2: Run the Internet Connection Wizard

The Internet Connection Wizard will be invoked automatically. Select the option to define the connection manually.

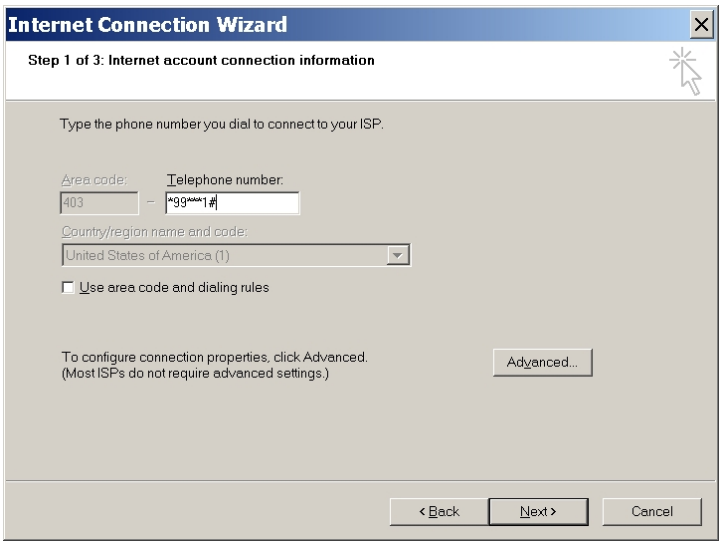
Press the **Next** button.



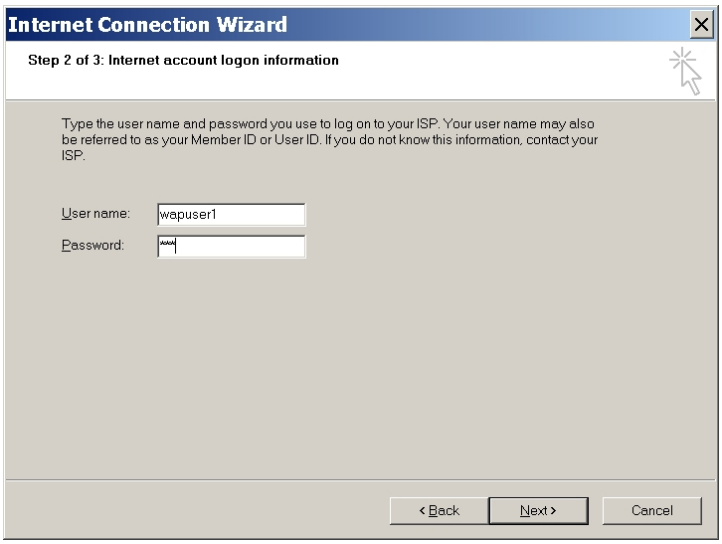
The phone line and modem are selected by default, so press the **Next** button. Select the newly created modem in the drop down list.



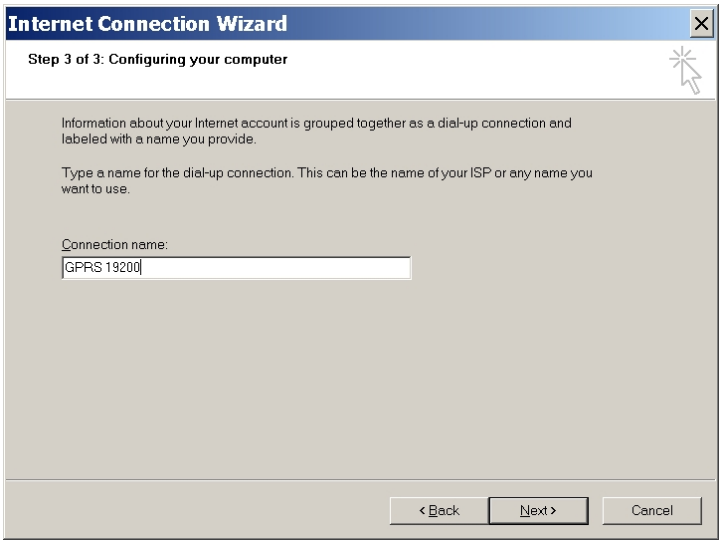
Press the **Next** button, enter ***99***1#** for the phone number, and deselect the area code and dialing rule box.



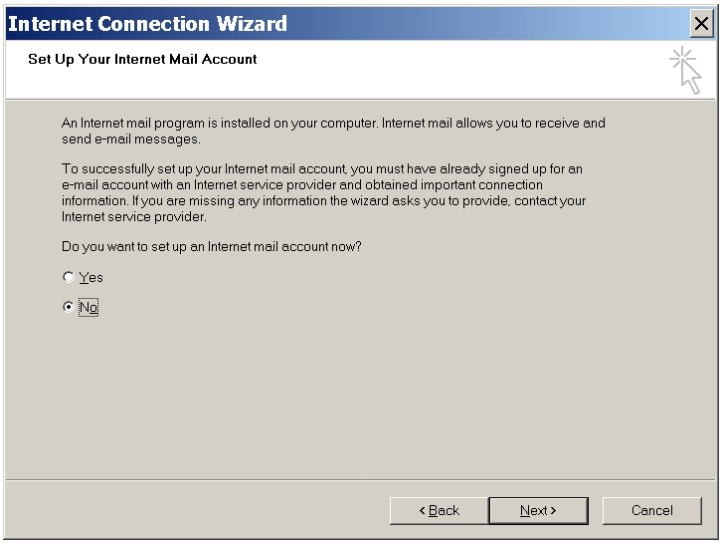
Press the **Next** button. Then enter the user name and password required for GPRS access. This information will be provided by your GSM operator at the time you purchase a data account and after receiving a SIM card. In this example, the user name for the operator's account is **wapuser1** and the password is **wap**.



Press the **Next** button. Enter a meaningful name for the dial-up connection. Since the selected modem communicates at 19200 baud, this example uses **GPRS 19200**.



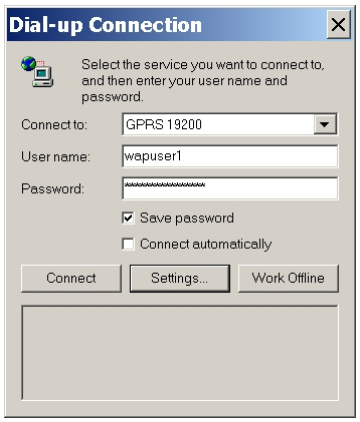
Press the **Next** button, and indicate that no mail account setup is required.



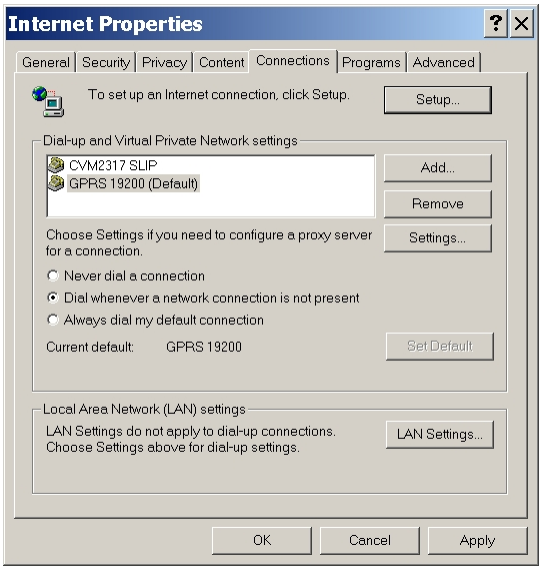
Press the **Next** button, and then the **Finish** button.

3.4 ENSURING THE NEW CONNECTION IS USED ONLY WHEN REQUIRED

Start Internet Explorer. You may see a dialog box similar to the one shown below.



If the dialog box appears, press the **Settings** button, and then select the option to **Dial whenever a network connection is not present**.



Press the **Apply** button and the **OK** button.

3.5 USING DUN

To use the g200 for Internet access:

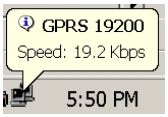
1. Connect the GSM antenna.
2. Connect the g200 to the PC using a standard serial cable.
3. Apply power to the g200.
4. Wait approximately 30 seconds for the GSM module to initialize and register on the network.
5. Start a communication session. In this example, the DUN connection has been named GPRS 19200.

Start → Settings → Network and Dial-Up Connections → GPRS 19200

Press the **Dial** button. The DUN connection quickly cycles between a series of dialogs that state something similar to:

- Dialing…
- Verifying username and password…
- Registering your computer on the network…
- Authenticated

Once a connection has been established, an icon will appear in the tray next to the current time.



You can now start an Internet-based application, such as an Internet browser. The icon blinks to show you when it is transmitting and receiving data packets.

You can terminate the DUN session by closing your Internet applications. Right-click on the tray icon and select the **Disconnect** option.

INTRODUCTION TO AT COMMANDS

4.1 AT COMMANDS OVERVIEW

AT commands are sets of commands used for communicating with the g200.

AT commands are comprised of assemblies of ASCII characters that start with the "AT" prefix. The AT prefix is derived from the word Attention, which asks the modem to pay attention to the current request (command).

AT commands are used to request services from the g200, such as:

- Profile Management: Configuration review and modification
- Data Management: PAD initialization, SMS transmission and receipt
- Diagnostics: Direct Access initialization, communication tests

4.1.1 General Symbols Used by AT Commands

The following syntax definitions apply in this chapter:

Table 6. Syntax Definitions

Syntax	Definition
<CR>	Carriage return character. Decimal 13.
<LF>	Line feed character. Decimal 10.
<…>	Name enclosed in angle brackets is a syntax element. The brackets themselves do not appear in the command line.
[…]	Optional sub-parameter of a command or an optional part of terminal information response, enclosed in square brackets. The brackets themselves do not appear in the command line. When the sub-parameter is not provided in the parameter type commands, the new value equals its previous value. In action type commands, the action should be performed on the basis of the recommended default setting of the sub-parameter.
//	Denotes a comment, and should not be included in the command.

4.1.2 General System Abbreviations

The basic system configuration contains the g200 and a terminal.

The g200 contains a GSM module and may be referred to as the DCE, the mobile or the radio.

The terminal may be referred to as the host, DTE or the TE.

4.2 AT COMMANDS PROTOCOL

Figure 9 below shows a general messaging sequence of AT commands protocol between the terminal and the g200.

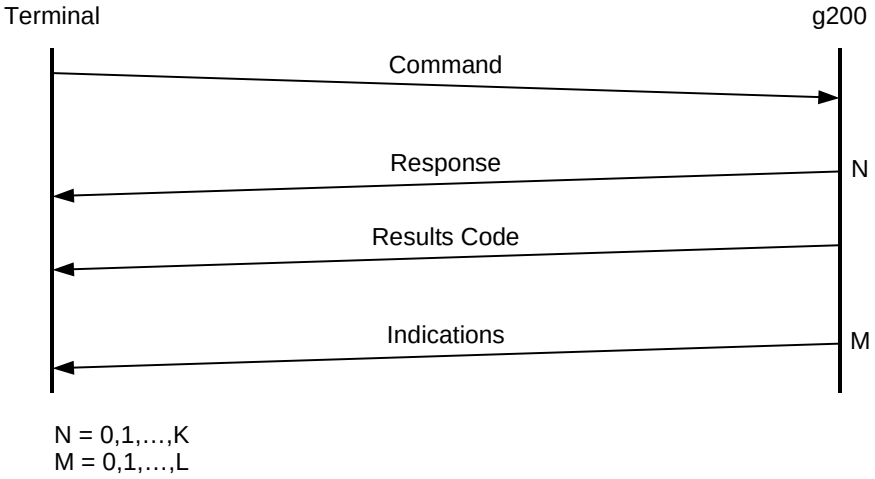


Figure 9. AT Commands Protocol

The AT commands interface is basically a Modem Services Upon Request.

Communication (almost) always begins from the terminal side. This means that any service should be requested from the terminal. Thus a request is called a “command”.

Each command must be answered by a “result code” from the g200. The result code reports the command status to the terminal.

Some commands may include several “Response” requests (between 0 to K) to send data back to the terminal.

Some commands may initiate a mode in which, when specified events are generated in the g200, “Indicator” messages are sent asynchronously. Indicators can be between 0 to L.

The g200 can echo characters received from the terminal (commands) back to the terminal.

4.3 AT COMMANDS STRUCTURE

4.3.1 Command Structure

An AT command line may contain one or more command. Delimiters are used to separate the commands from one another, according to the following structure.

Prefix	Command1	Delimiter	Command2	Delimiter	…	CommandN	Suffix

Each AT command has the "AT" prefix string.

Each AT command has the suffix **<CR>**.

The delimiter is either nothing or a space for most AT commands. Some of the extended commands have no delimiter and need to appear at the end of a command line.

Each AT command has the following structure:

Token	Mode	Arguments

Figure 10 outlines the basic structure of an AT command line:

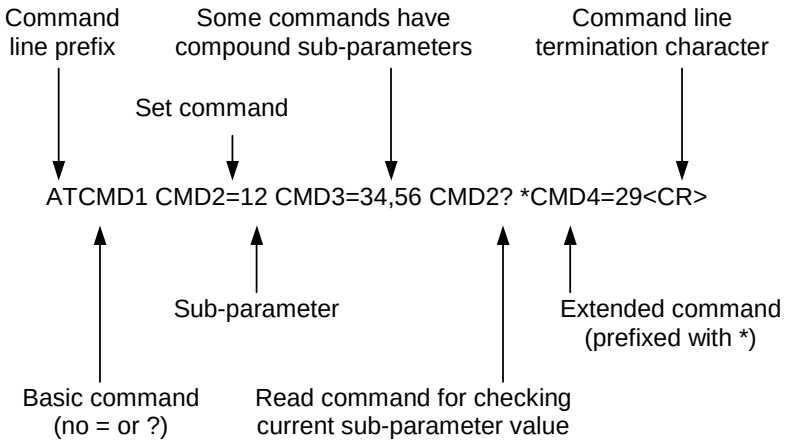


Figure 10. Basic Structure of a Command Line

The following rules must be observed when issuing a command to the g200:

- Every command must begin with the letters AT.
- Several commands can be concatenated as one line, as long as the total line does not exceed 298 characters.
- Spaces between commands are permitted and are ignored. Spaces within a command are invalid.
- Commands can use uppercase or lowercase characters.
- To execute the command line, send the **<CR>** ASCII character.

4.3.2 Result Code Structure

When a command is issued, the g200 responds with a message, called a "Result Code", which tells the terminal the result of the command that was requested. Result codes can indicate, for example, the execution status of the command.

Result codes can be represented either as numerical codes or as verbal responses. The g200 replies with verbal response codes by default.

The result code has the following structure:

Code	Suffix

Where:

The result code suffix is **<CR><LF>**.

4.3.3 Response and Indications Structure

The following is the information response and indications structure:

Response	Suffix

Where:

The response suffix is **<CR><LF>**.

Figure 11 is an example of a response and a result code:

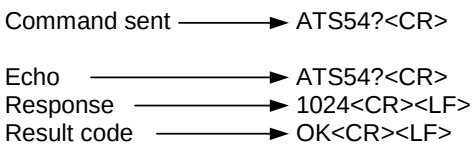


Figure 11. Response to a Command Line

If verbose responses are enabled (using the command V1) and all the commands in a command line have been performed successfully, the result code OK<CR><LF> is sent from the g200 to the terminal. If numeric responses are enabled (using the command V0), the result code 0<CR><LF> is sent instead.

If verbose responses are enabled (using the command V1) and sub-parameter values of a command are not accepted by the g200 (or if the command itself is invalid or cannot be performed for any reason), the result code ERROR<CR><LF> is sent to the terminal and no subsequent commands in the command line are processed. If the numeric responses are enabled (using the command V0), the result code 4<CR><LF> is sent instead.

4.4 AT COMMANDS PROTOCOL & STRUCTURE CONFIGURATION

The AT commands message structure may be configured by the terminal.

The g200 can be configured not to follow a command with an echo and/or result code. It can also be configured to transmit the result code in either of two ways: Verbose or Numeric. This (and other) configuration items can be set using the following commands:

S100=<value>	Line feed suppression (default 0, meaning the g200 transmits line feeds)
E<value>	Command echo (default 1, meaning the g200 echoes commands)
Q<value>	Result code suppression (default 0, meaning the g200 transmits result codes)
V<value>	Response format (default 1, meaning the g200 transmits verbose result codes)

Figure 12 shows the structure configuration commands:

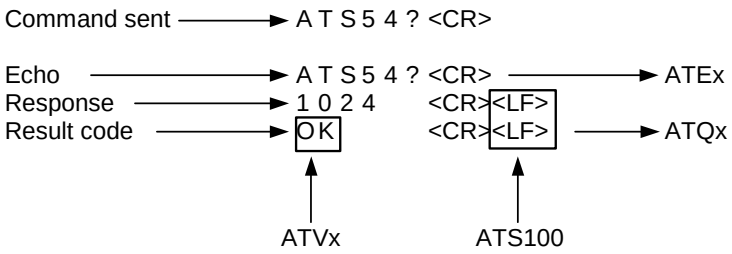


Figure 12. Structure Configuration Commands

4.5 COMMAND TOKEN TYPES

4.5.1 Basic Syntax Command Format

The format of Basic Syntax commands (except for D, S and &L commands) is: **<command>[number]**

Where:

<command> is either a single character, or the "&" character (IA5 2/6) followed by a single character. Characters used in **<command>** are taken from the set of alphabetic characters.

<number> may be a string of one or more characters from "0" through "9" representing a decimal integer value.

4.5.2 S-Parameters

Commands that begin with the letter S constitute a special group of parameters known as “S-parameters”. These differ from other commands in important respects:

- The number following the S indicates the “parameter number” being referenced. If the number is not recognized as a valid parameter number, an ERROR result code is issued.
- Immediately following this number, either a “?” or “=” character (IA5 3/15 or 3/13, respectively) appears:

  “?” is used to read the current value of the indicated S-parameter.

  “=” is used to set the S-parameter to a new value.

  If the “=” is used, the new value to be stored in the S-parameter is specified in decimal form following the “=”.

4.5.3 Extended Syntax Command Format

Both actions and parameters have names, which are used in the related commands. Names always begin with the “*” character (IA5 2/10). Following the “*”, from one to sixteen (16) additional characters appear in the command name.

Related commands often have a common prefix. For example, low level diagnostic commands have the prefix “*DB” and commands that pertain to the GSM module interface have the prefix “*G”.

4.6 COMMAND ARGUMENT TYPES

<value> consists of either a numeric constant or a string constant.

<compound_value> consists of several <value> parameters separated by commas.

Example of <compound_value>: <value1>,<value2>,…,<valueN>

4.6.1 Numeric Constants

Numeric constants are expressed in decimal, hexadecimal or binary form. In the g200, the definition of each command specifies which form is used for values associated with that command.

4.6.2 String Constants

String constants consist of a sequence of displayable ASCII characters.

- String constants are **not** bounded at the beginning and end by quotation characters.
- String constants are terminated by the command suffix, <CR>, and for some commands an empty string is acceptable.

4.7 COMMAND MODE TYPES

4.7.1 Parameter Set Command Syntax

The terminal may store a value or values in a parameter by using the SET command.

The parameter definition indicates, for each value, whether the specification of that value is mandatory or optional. For optional values, the definition indicates the assumed (default) value if none is specified. The assumed value may be either a previous value (that is, the value of an omitted sub-parameter retains its previous value), or a fixed value (for example, the value of an omitted sub-parameter is assumed to be zero). Generally, the default value for numeric parameters is 0, and the default value for string parameters is an empty string.

The following syntax are used for:

- Actions that have no sub-parameters: ***<name>**
- Parameters that accept a single value: ***<name>=<value>**
- Parameters that accept more than one value: ***<name>=<compound_value>**

4.7.2 Parameter Read Command Syntax

The terminal can determine the current value or values stored in a parameter by using the following syntax:
***<name>?**

4.7.3 Parameter Test Command Syntax

The test syntax is not supported by the g200.

4.8 ABORTING COMMANDS

No mechanism is provided to abort those action commands that require some time to complete.

5.1 PRODUCT IDENTITY

5.1.1 Subscriber Unit ID

5.1.1.1 I, Request Identification Information

This command requests various g200 information items.

Command	Response/Action
ATI<n>	<information item n>

The following table shows the information items that are supported by the g200.

Table 7. I Parameters

Command	Description
ATI ATI0	Reports the GSM IMSI
ATI1	Reports g200 firmware version
ATI2	Reports manufacturer
ATI3	Reports product name
ATI4	Reports the GSM IMEI
ATI5	Reports GSM module firmware version

The IMSI is a 15-digit number that is assigned to the SIM card and can be used as a means of identification.

The IMEI is a 15-digit number that is assigned to the GSM module and can be used as a means of identification.

Example

ATI0

302720105000680

OK

ATI1

01.10 Aug 24 2005 09:57:07

OK

ATI2

Motorola Inc.

OK

ATI3

MIB g200

OK

ATI4

010186000160049

OK

ATI5

G208_G_0C.04.61R

OK

5.2 PRODUCT PROFILE

5.2.1 Configuration Commands

These commands allow the user to review or save configuration parameters for the g200.

5.2.1.1 &F, Restore Factory Defined Configuration

This command restores the factory default configuration profile. The g200 only supports one factory default profile.

Set Command

Command	Response/Action
AT&F AT&F<value>	OK

Read Command

Command	Response/Action
AT&F?	<current profile number>

The following table shows the &F parameters.

Table 8. &F Parameters

<Parameter>	Description
<value>	0 Factory default configuration profile. This is the only value supported.

Example

AT&F

OK

AT&F0

OK

AT&F?

0

OK

5.2.1.2 &V, View Profile

This command displays a configuration profile. The g200 only supports one profile.

Read Command

Command	Response/Action
AT&V AT&V<value>	<configuration profile>

The following table shows the &V parameters.

Table 9. &V Parameters

<Parameter>	Description
<value>	0 Current configuration profile. This is the only value supported.

Example

AT&V

…

OK

5.2.1.3 &W, Save Profile

This command stores the current g200 settings in a configuration profile and reboots. The g200 only supports one profile. The g200 reboots to ensure that all configuration changes take effect.

Set Command

Command	Response/Action
AT&W AT&W<value>	HELLO

The following table shows the &W parameters.

Table 10. &W Parameters

<Parameter>	Description
<value>	0 User profile 0. This is the only value supported.

Example

AT&W

HELLO

5.2.1.4 Z, Reset to Stored Configuration

This command terminates all processing, reboots and resorts to a stored profile. The g200 only supports one profile.

Execute Command

Command	Response/Action
ATZ ATZ<value>	HELLO

The following table shows the Z parameters.

Table 11. Z Parameters

<Parameter>	Description
<value>	0 Current configuration profile. This is the only value supported.

Example

ATZ

HELLO

5.3 HOST INTERFACE

5.3.1 Interface Line Commands

These commands allow the user to review and modify the operation of the hardware interface lines. The hardware interface includes flow control lines (RTS and CTS), as well as modem control lines (DTR, DSR and DCD).

5.3.1.1 &C, DCD Behavior

This command determines how the g200 drives DCD (Data Carrier Detect). The DCD is an output line that indicates if the g200 is ready to communicate.

Set Command

Command	Response/Action
AT&C AT&C<param>	OK or ERROR

If a parameter is not provided, it is assumed to be 0.

Read Command

Command	Response/Action
AT&C?	<param>

The following table shows the &C parameters.

Table 12. &C Parameters

<Parameter>	Description
<param>	0 Always assert DCD. 1 Assert DCD while in a data mode. 2 Assert DCD once the modem has an IP address. The default value is 2.

Example

AT&C?

2

OK

AT&C1

OK

5.3.1.2 &D, DTR Behavior

This command determines how the g200 interprets DTR (Data Terminal Ready), and how it responds when the DTR status changes during a data session. The DTR is an input line that indicates if the terminal is ready.

The DTR line must normally be asserted before the g200 will start a data session. However, the g200 can be instructed to ignore DTR.

Once a data session has been started, DTR transitions from ON to OFF will normally terminate the data session. Again, the g200 can be instructed to ignore these transitions.

Set Command

Command	Response/Action
AT&D AT&D<param>	OK or ERROR

If a parameter is not provided, it is assumed to be 0.

Read Command

Command	Response/Action
AT&D?	<param>

The following table shows the &D parameters.

Table 13. &D Parameters

<Parameter>	Description
<param>	0 Ignore DTR. 1 Normal DTR control. DTR must be asserted prior to a data session. DTR de-assertions will terminate an active data session. The default value is 1.

Example

AT&D?

1

OK

AT&D2

ERROR

AT&D0

OK

5.3.1.3 &K, Flow Control

This command configures flow control for the serial port interface. Hardware flow control is supported (RTS / CTS). Software flow control is not supported (Xon / Xoff).

The RTS (Request To Send) is an input line. The g200 receives RTS from a terminal and, when asserted, indicates that the g200 can send more data to the terminal. The CTS (Clear To Send) is an output line. The CTS signal is sent to the terminal and indicates, when asserted, that the g200 is capable of receiving data from the terminal.

Set Command

Command	Response/Action
AT&K AT&K<param>	OK or ERROR

If a parameter is not provided, it is assumed to be 0.

Read Command

Command	Response/Action
AT&K?	<param>

The following table shows the &K parameters.

Table 14. &K Parameters

<Parameter>	Description
<param>	0 Disable flow control. 3 Enable RTS / CTS flow control. 6 Enable RTS / CTS flow control. The default value is 0.

Example

AT&K?

0

OK

AT&K3

OK

5.3.1.4 &L, Local Terminal Settings

This command is responsible for reviewing and modifying the desired baud rate, word size, parity and number of stop bits.

The UART is able to support 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 baud rates. Auto baud rate detection is not available.

If settings are modified they do not take effect until the configuration is saved.

Set Command

Command	Response/Action
AT&L<baud rate>, <size><parity><stop>	OK or ERROR

Read Command

Command	Response/Action
AT&L?	<baud rate>,<size><parity><stop>

The following table shows the &L parameters.

Table 15. &L Parameters

<Parameter>	Description
<baud rate>	1200 2400 4800 9600 19200 38400 57600 115200 The default value is 19200.
<size>	7 8 The default is 8 bit data.
<parity>	O Odd E Even N None The default is no parity.
<stop>	1 2 The default is 1 stop bit.

Example

AT&L?

19200,8N1

OK

AT&L4800,8N1

OK

AT&W

HELLO // New settings in effect when this string issued

5.3.1.5 &S, DSR Behavior

This command determines how the g200 drives DSR (Data Set Ready). The DSR is an output line that indicates if the g200 is ready to communicate.

Set Command

Command	Response/Action
AT&S AT&S<param>	OK or ERROR

If a parameter is not provided, it is assumed to be 0.

Read Command

Command	Response/Action
AT&S?	<param>

The following table shows the &S parameters.

Table 16. &S Parameters

<Parameter>	Description
<param>	0 Always assert DSR. 1 Assert DSR once the modem has an IP address. 2 Assert DSR while in a data mode. The default value is 2.

Example

AT&S?

2

OK

AT&S1

OK

5.3.2 Interface Content Commands

These commands allow the user to review and modify the g200's serial content. They are often used to adjust the g200's serial data output, so that it can be successfully interpreted by a parser on the terminal.

5.3.2.1 E, Command Echo

This command defines whether input characters are echoed to output. If so, these characters are echoed at the same rate, parity and format at which they were received.

Set Command

Command	Response/Action
ATE<param>	OK or ERROR

Read Command

Command	Response/Action
ATE?	<param>

The following table shows the E parameters.

Table 17. E Parameters

<Parameter>	Description
<param>	0 Does not echo characters. 1 Echoes characters. The default value is 1.

Example

ATE?

1

OK

ATE0

OK

5.3.2.2 Q, Result Code Suppression

This command dictates whether the g200 should output result codes, such as OK or ERROR. Information text transmitted in response to commands and queries is not affected by the setting of this parameter.

Set Command

Command	Response/Action
ATQ<param>	OK or ERROR

Read Command

Command	Response/Action
ATQ?	<param>

The following table shows the Q parameters.

Table 18. Q Parameters

<Parameter>	Description
<param>	0 Transmit result codes. 1 Suppress result codes. The default value is 0.

Example

ATQ?

0

OK

ATQ2
ERROR

ATQ1 // No response since result code suppressed
ATQ2 // No response since result code suppressed

5.3.2.3 S100, Line Feed Suppression

This command dictates whether the g200 should output line feed characters for responses and result codes.

Set Command

Command	Response/Action
ATS100=<param>	OK or ERROR

Read Command

Command	Response/Action
ATS100?	<param>

The following table shows the S100 parameters.

Table 19. S100 Parameters

<Parameter>	Description
<param>	0 Output line feed characters. 1 Suppress line feed characters. The default value is 0.

Example

ATS100?
0
OK

ATS100=1
OK // Line feed suppressed

AT&L?
19200,8N1 // Line feed suppressed
OK // Line feed suppressed

5.3.2.4 V, Verbose Response

This command determines whether verbose (textual) or terse (numeric) result codes are required.

Set Command

Command	Response/Action
ATV<param>	OK or ERROR

Read Command

Command	Response/Action
ATV?	<param>

The following table shows the V parameters.

Table 20. V Parameters

<Parameter>	Description
<param>	0 Transmit terse (numeric) result codes. 1 Transmit verbose (textual) result codes. The default value is 1.

The following table shows the correspondence between terse and verbose result codes.

Table 21. V Result Codes

Terse Codes	Verbose Codes
0	OK
1	CONNECT
2	RING
3	NO CARRIER
4	ERROR
5	NO SOCKETS
7	BUSY
8	NO ANSWER
9	HELLO

Example

ATV?

1

OK

ATV0

0

ATV3

4

5.4 MODULE INTERFACE

5.4.1 Status Commands

These commands allow the user to acquire information about the ability of the g200 to communicate.

If the g200 appears unable to communicate after a prolonged period, there are additional diagnostic commands that can also be invoked. Diagnostic commands are listed in section 5.10.

5.4.1.1 *GSTAT, Module Registration Status

This command provides the current module status. Terminals should use this command to confirm that the g200 is able to communicate before attempting to establish a data session.

Read Command

Command	Response/Action
AT*GSTAT AT*GSTAT?	<status>

The following table shows the *GSTAT parameters.

Table 22. *GSTAT Parameters

<Parameter>	Description
<status>	This is a 6-character sequence. From left to right, the five characters indicate: A g200 can communicate with GSM module B SIM is OK C g200 has read the IMSI, IMEI, and GSM firmware version D Module is registered on the GSM network E Module is GPRS attached F g200 is ready Conditions are satisfied in order, and ABCDEF indicates that a data session can be initiated. The letter X is used when a condition has not yet been satisfied. So, if the g200 has determined that the SIM is OK but has not yet retrieved the IMSI, IMEI, and GSM firmware version, the reply will be ABCXXX.

Example

AT*GSTAT?

AXXXXX

OK

AT*GSTAT?

ABXXXX

OK

AT*GSTAT?

ABCDXX

OK

5.4.1.2 *GRPT, Automatic Status Reporting

This command can be used to enable or disable autonomous status reports. If the feature is enabled, every time the status of the device changes, a report is issued out the serial port. The reports have the same format as the replies from *GSTAT.

Since these strings are interleaved with all other communications, it is suggested that developers only use autonomous reporting during system integration.

Set Command

Command	Response/Action
AT*GRPT=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*GRPT?	<param>

The following table shows the *GRPT parameters.

Table 23. *GRPT Parameters

<Parameter>	Description
<param>	0 Autonomous reports disabled. 1 Autonomous reports enabled. The default value is 0.

Example

AT*GRPT?

0

OK

AT*GRPT=1

OK

AT&W // Save configuration and reboot

HELLO

AXXXXX // The g200 can talk to the module

ABXXXX // The module has indicated the SIM is OK

ABCXXX // The module is attempting to register

ABCDXX // The module has registered on the network

ABCDEX // The module is GPRS attached

ABCDEF // The module has been assigned an IP address

5.4.1.3 *GIP, IP Address

This command allows the user to acquire the IP address that is currently assigned to the module. The IP address is dynamically assigned by the GSM network.

Read Command

Command	Response/Action
AT*GIP AT*GIP?	<address>

If the module has not been assigned an IP address, the value 0.0.0.0 is displayed.

The following table shows the *GIP parameters.

Table 24. *GIP Parameters

<Parameter>	Description
<address>	An IP address in dotted decimal notation.

Example

AT*GSTAT?

ABCXXX // Module not yet registered on the network

OK

AT*GIP?

0.0.0.0 // IP address not yet assigned

OK

AT*GSTAT?

ABCDEF // Module has an IP address now

OK

AT*GIP?

172.10.11.12

OK

5.4.2 Validation Commands

These commands allow the g200 to ascertain whether data connections are still valid, and are recommended in environments where the g200 will be powered up for several consecutive hours or days.

When validation checking is enabled, the g200 sends a PING to an IP address at a prescribed interval. If it fails to receive replies, then it knows its IP address is no longer valid and automatically acquires a new address.

Periodic checks are performed only if the g200 is idle. Periodic checks are not performed when the g200 is in active data session.

5.4.2.1 *GIVA, IP Context Validation Address

This command allows the user to define the IP address that the g200 will send packets to for context validation purposes.

Set Command

Command	Response/Action
AT*GIVA=<IP addr>	OK or ERROR

Read Command

Command	Response/Action
AT*GIVA?	<IP addr>

The following table shows the *GIVA parameters.

Table 25. *GIVA Parameters

<Parameter>	Description
<IP addr>	This is an IP address in dotted decimal notation. The default value is 0.0.0.0.

If the context validation address is defined as 0.0.0.0, the g200 will simply PING itself.

Example

AT*GIVA?

0.0.0.0

OK

AT*GIVA=123.29.4.15
OK

5.4.2.2 *GIVT, IP Context Validation Timer

This command allows the user to enable or disable periodic context validation checking.

Set Command

Command	Response/Action
AT*GIVT=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*GIVT?	<param>

The following table shows the *GIVT parameters.

Table 26. *GIVT Parameters

<Parameter>	Description
<param>	0 Context validation disabled. 1 to 60 Context validation period in minutes. The default value is 0.

Example

AT*GIVT?
0
OK

AT*GIVT=2
OK

5.4.3 Access Commands

These commands are used to help the module gain network access. One command allows the user to choose between a GPRS or SMS communication model. In the case of GPRS, some of the commands specify the parameters that are required to establish a PDP Context and acquire an IP address.

5.4.3.1 *GAPN, GPRS Access Point Name

This command allows the user to specify the APN required for GPRS communications. The APN is operator-specific.

Set Command

Command	Response/Action
AT*GAPN=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*GAPN?	<param>

The following table shows the *GAPN parameters.

Table 27. *GAPN Parameters

<Parameter>	Description
<param>	This is a string that can be up to 40 characters in length. The default value is an empty string.

Example

AT*GAPN?

(none)

OK

AT*GAPN=internet.com // APN for Rogers Wireless

OK

5.4.3.2 *GBAUD, GSM Baud Rate

This command allows the user to change the baud rate for communications between the g200 and the embedded Motorola GSM module. The parameter has little bearing on system operation and users are encouraged to use the default setting.

If the g200 is having problems communicating with the GSM module, it will automatically try different baud rate until communications can be established.

Set Command

Command	Response/Action
AT*GBAUD=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*GBAUD?	<param>

The following table shows the *GBAUD parameters.

Table 28. *GBAUD Parameters

<Parameter>	Description
<param>	This is a baud rate value. 1200 2400 4800 9600 19200 38400 57600 115200 The default value is 19200.

Example

AT*GBAUD?

19200

OK

AT*GBAUD=9600

OK

5.4.3.3 *GMODE, GSM Operational Mode

This command allows the user to select between a GPRS and SMS communication model.

In the GPRS communication model, the g200 automatically tries to acquire an IP address on power up. Once an IP address has been acquired, the terminal is free to use a PAD (TCP or UDP) to send data over the Internet.

In the SMS communication model, the g200 does not attempt to acquire an IP address. All data is sent and received using SMS messages.

Every time the communication model is changed, the g200 resets the GSM module.

Set Command

Command	Response/Action
AT*GMODE=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*GMODE?	<param>

The following table shows the *GMODE parameters.

Table 29. *GMODE Parameters

<Parameter>	Description
<param>	0 SMS communication model. 1 GPRS communication model. The default value is 1.

Example

AT*GMODE?

1

OK

AT*GMODE=0

OK

5.4.3.4 *GPASS, GPRS PAP Account Password

This command allows the user to specify the account password required for GPRS communications. The account password is operator-specific.

Set Command

Command	Response/Action
AT*GPASS=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*GPASS?	<param>

The following table shows the *GPASS parameters.

Table 30. *GPASS Parameters

<Parameter>	Description
<param>	This is a string that can be up to 20 characters in length. The default value is an empty string.

Example

AT*GPASS?

(none)

OK

AT*GPASS=wap // Password for Rogers Wireless

OK

5.4.3.5 *GUSER, GPRS PAP Account Username

This command allows the user to specify the account username required for GPRS communications. The account username is operator-specific.

Set Command

Command	Response/Action
AT*GUSER=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*GUSER?	<param>

The following table shows the *GUSER parameters.

Table 31. *GUSER Parameters

<Parameter>	Description
<param>	This is a string that can be up to 30 characters in length. The default value an empty string.

Example

AT*GUSER?

(none)

OK

AT*GUSER=wapuser1 // Username for Rogers Wireless

OK

5.5 GENERAL PAD

5.5.1 Memory Commands

The g200 has a memory pool that is used heavily for communication buffering. One large buffer is allocated for packets that the g200 receives from the embedded Motorola GSM module. Another is allocated to hold data packets from the terminal. The remainder of the memory is allocated for various g200 functions.

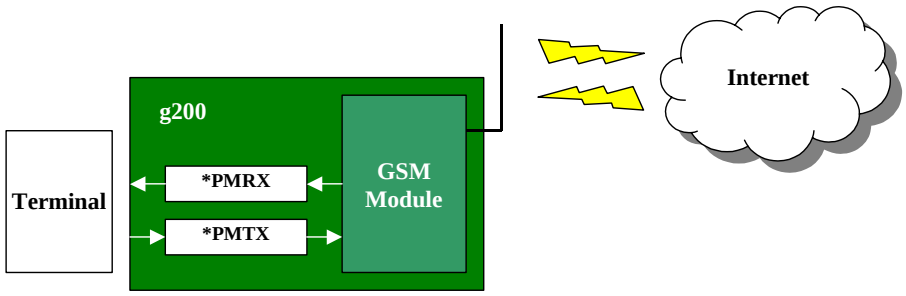


Figure 13. Memory Buffers

Users are encouraged to consider the packet sizes they need to support, and then adjust these parameters judiciously.

5.5.1.1 *PMRX, Maximum Receive Unit

The g200 automatically establishes a PPP connection with the Motorola GSM module and uses this connection to send and receive packets over the Internet. The g200 allocates a buffer to hold packets as they arrive from the Internet and the value of the MRU parameter defines the buffer size.

Since the MRU buffer is allocated during power up initialization, the configuration profile should be saved and the g200 should be rebooted any time this parameter is changed.

It is important to note that the g200 will not be capable of receiving packets from the Internet that are larger than the MRU size.

Set Command

The Set command defines the MRU buffer size. If an attempt is made to set the MRU to a value less than the minimum, the g200 will override this value with the default setting.

Command	Response/Action
AT*PMRX=<n>	OK or ERROR

Read Command

The Read command returns the current MRU buffer size.

Command	Response/Action
AT*PMRX?	<n>

The following table shows the *PMRX parameters.

Table 32. *PMRX Parameters

<Parameter>	Description
<n>	The MRU buffer size in bytes: 128 Minimum setting 1500 Maximum setting The default is 576.

Example

AT*PMRX=576

OK

AT*PMRX=5000

ERROR

AT*PMRX?

576

OK

5.5.1.2 *PMTX, Maximum PAD Payload Size

When a PAD is active, the g200 collects bytes from the terminal and retains them in a pre-allocated buffer until a complete packet has been received. The packet is then encapsulated as a TCP or UDP payload and is sent over the Internet to the destination address.

Since the PAD buffer is allocated during power up initialization, the configuration profile should be saved and the g200 should be rebooted any time this parameter is changed.

It is important to note that if the terminal attempts to send a packet that is larger than the maximum PAD payload size, it will be fractured into two or more packets by the g200.

Set Command

Command	Response/Action
AT*PMTX=<n>	OK or ERROR

Read Command

Command	Response/Action
AT*PMTX?	<n>

The following table shows the *PMTX parameters.

Table 33. *PMTX Parameters

<Parameter>	Description
<n>	The PAD buffer size in bytes: 64 Minimum setting 1006 Maximum setting The default is 536.

Example

AT*PMTX?

536

OK

AT*PMTX=600

OK

5.5.2 Packet Commands

These commands help the g200 understand when the terminal has sent a complete packet while in PAD mode.

5.5.2.1 S50, PAD Data Forwarding Idle Timeout

This command allows the user to define the PAD Data Forwarding Idle Timeout in tenths of a second.

When a PAD is active, data from the host is collected and maintained in a buffer. If the amount of time between two successive characters exceeds the PAD Data Forwarding Idle Timeout, the g200 will take the characters in the buffer, encapsulate them within a datagram, and send them to the destination IP address.

Set Command

Command	Response/Action
ATS50=<timeout>	OK or ERROR

Read Command

Command	Response/Action
ATS50?	<timeout>

The following table shows the S50 parameters.

Table 34. S50 Parameters

<Parameter>	Description
<timeout>	The timeout value is defined in tenths of a second. 0 Feature disabled 1 Minimum timeout (0.1 seconds) 255 Maximum timeout (25.5 seconds) The default value is 5 (0.5 seconds).

Example

ATS50?

5

OK

ATS50=3

OK

5.5.2.2 S51, PAD Data Forwarding Character

This command allows the user to define the PAD Data Forwarding Character.

When a PAD is active, data from the host is collected and maintained in a buffer. If the PAD Data Forwarding Character is received, the g200 will take the characters in the buffer, encapsulate them within a datagram, and send them to the destination IP address. The PAD Data Forwarding Character will be the last character in the packet.

Set Command

Command	Response/Action
ATS51=<character>	OK or ERROR

Read Command

Command	Response/Action
ATS51?	<character>

The following table shows the S51 parameters.

Table 35. S51 Parameters

<Parameter>	Description
<character>	The ASCII equivalent of the character. 0 Feature disabled 1 Minimum valid character 255 Maximum valid character The default value is 13 (Carriage Return).

Example

ATS51?

13

OK

ATS51=0

OK

5.5.2.3 S52, PAD Data Escape Character

This command allows the user to define the PAD Data Escape Character.

If the PAD Data Forwarding Character is defined (S51), a packet is sent every time the g200 receives the PAD Data Forwarding Character. In other words it is normally impossible to embed one or more PAD Data Forwarding Characters within a packet.

When the PAD Data Escape Character is detected, it is discarded and the next character from the terminal will be added to the PAD buffer. It can be used to force the transmission of special characters, such as the PAD Data Forwarding Character (S51).

Set Command

Command	Response/Action
ATS52=<character>	OK or ERROR

Read Command

Command	Response/Action
ATS52?	<character>

The following table shows the S52 parameters.

Table 36. S52 Parameters

<Parameter>	Description
<character>	The ASCII equivalent of the character. 0 Feature disabled 1 Minimum valid character 255 Maximum valid character The default value is 0.

Example

ATS51?

13 // Carriage Return

OK

ATS52?

0

OK

ATS52=49 // The ‘1’ character

OK

ATDP1.2.3.4/56

OK

CONNECT

abc<CR>	// Sends abc<CR>
1a1b1c<CR>	// Sends abc<CR>
111111<CR>	// Sends 111<CR>
abc1<CR><CR>	// Sends abc<CR><CR>
(Enter escape sequence)	
NO CARRIER	

5.5.3 Connection Commands

These commands are used to support the establishment of PAD data sessions.

5.5.3.1 &Z, Default Destination

When using the D command to establish a PAD connection, the terminal has the ability to specify the PAD type, destination IP address, and destination port. However, this is not mandatory. A default destination can be maintained within the g200.

Set Command

Command	Response/Action
AT&Z=[mode]<IP address[/port]>	OK or ERROR

Read Command

Command	Response/Action
AT&Z?	<mode><IP address>/<port>

The following table shows the &Z parameters.

Table 37. &Z Parameters

<Parameter>	Description
[mode]	This parameter specifies the default PAD mode and is optional: T TCP PAD P UDP PAD The default value is P.
<IP address>	This parameter specifies the default destination IP address. It must be entered in dotted decimal notation. The default value is 0.0.0.0.
[/port]	This parameter specifies the default destination port number and is optional. 0 Minimum value 65535 Maximum value The default value is 1024.

Example

AT&Z?

P0.0.0.0/1024

OK

AT&Z=156.10.11.12

OK

AT&Z=156.10.11.12/2000

OK

AT&Z=T156.10.11.12

OK

AT&Z?

T156.10.11.12/2000

OK

5.5.3.2 S53, PAD Source Port Number

This command can be used to define the source port number for both TCP and UDP PADs. If this value is not defined:

- UDP PADs use S54 as the source port number.
- TCP PADs use a rolling algorithm and select a number between 1025 and 2048.

Set Command

Command	Response/Action
ATS53=<port>	OK or ERROR

Read Command

Command	Response/Action
ATS53?	<port>

The following table shows the S53 parameters.

Table 38. S53 Parameters

<Parameter>	Description
<port>	This parameter specifies the source port number. 0 Port undefined 1 to 65535 Port numbers The default value is 0.

Example

ATS53?

0

OK

ATS53=1500

OK

5.5.3.3 S54, PAD Listen Port Number

This command can be used to define a port number that the g200 can monitor when there are no active PADs. It is only used if TCP listen mode (S60) or UDP listen mode (S65) is enabled.

Set Command

Command	Response/Action
ATS54=<port>	OK or ERROR

Read Command

Command	Response/Action
ATS54?	<port>

The following table shows the S54 parameters.

Table 39. S54 Parameters

<Parameter>	Description
<port>	This parameter specifies the source port number. 0 Minimum value 65535 Maximum value The default value is 1024.

Example

ATS54?

1024

OK

ATS54=1500

OK

5.5.3.4 D, Dial Command

This command allows the terminal to establish a data session, and this will either be a UDP PAD or a TCP PAD between the g200 and a destination IP address.

DTR must be asserted before dialing. If DTR cannot be controlled, then the g200 can be instructed to ignore it using &D.

The source IP address is assigned by the network and can be viewed using *GIP.

For UDP PADs, the source port is defined in S53, or S54 if S53 has not been defined. For TCP PADs, the source port is defined in S53, or is selected using a rolling algorithm if S53 has not been defined.

Execute Command

Command	Response/Action
ATD[mode][IP address[/port]]	OK or ERROR

If the g200 replies with OK, it will subsequently issue one of the following result codes:

CONNECT	// Connection established
NO SOCKETS	// TCP specific error
BUSY	// TCP specific error
NO ANSWER	// TCP specific error

Further, once the connection is terminated the g200 issues the following result code:

NO CARRIER	// Connection lost

The following table shows the D parameters.

Table 40. D Parameters

<Parameter>	Description
[mode]	This parameter specifies the desired PAD mode and is optional: T TCP PAD P UDP PAD If this parameter is not provided, the default value stored with &Z is used.
[IP address]	This parameter specifies the destination IP address and is optional. It must be entered in dotted decimal notation. If this parameter is not provided, the default value stored with &Z is used.
[/port]	This parameter specifies the destination port number and is optional. 0 Minimum value 65535 Maximum value If this parameter is not provided, the default value stored with &Z is used.

Example

ATD

OK

CONNECT

(Data exchanged and PAD terminated)

NO CARRIER

ATDT158.4.0.123/2001

OK

NO ANSWER

ATD160.50.0.120

OK

CONNECT

(Data exchanged and PAD terminated)

NO CARRIER

5.5.3.5 *PEXIT, Escape Sequence

This command allows the user to define a string that can be used to terminate an active PAD. The escape sequence must be preceded by a conventional +++.

Set Command

Command	Response/Action
AT*PEXIT=<sequence>	OK or ERROR

Read Command

Command	Response/Action
AT*PEXIT?	<sequence>

The following table shows the *PEXIT parameters.

Table 41. *PEXIT Parameters

<Parameter>	Description
<sequence>	This is a string that can range from 0 to 10 characters in length. The default value is EXIT.

Example

```
AT*PEXIT?
EXIT                          // Full escape sequence is +++EXIT
OK

AT*PEXIT=                     // Full escape sequence is +++
OK

AT*PEXIT=123                  // Full escape sequence is +++123
OK
```

5.6 TCP PAD

5.6.1 PAD Control Commands

The commands in this section can be used to control the operation of a TCP PAD.

It remains to be determined how effective TCP listen mode can be in an environment where IP addresses are dynamically assigned. Users are encouraged to exercise caution when defining their communication model.

5.6.1.1 S60, TCP Listen Mode

If TCP listen mode is enabled, the g200 will monitor for incoming TCP packets from an acceptable address that have a valid destination port number. If a packet is acceptable, the g200 will start a passive TCP PAD session and will notify the host using DSR and the serial interface:

RING

CONNECT

If a UDP session is active, incoming TCP packets are rejected. Likewise, once a TCP session starts, incoming UDP packets are ignored.

Set Command

Command	Response/Action
ATS60=<value>	OK or ERROR

Read Command

Command	Response/Action
ATS60?	<value>

The following table shows the S60 parameters.

Table 42. S60 Parameters

<Parameter>	Description
<value>	0 TCP listen mode disabled 1 TCP listen mode enabled The default value is 0.

Example

ATS60?

0

OK

ATS60=1

OK

5.6.1.2 S61, TCP Connection Timeout

This command allows the user to define a TCP connection timeout value in seconds.

If a TCP connection timeout is defined, TCP dial (D) attempts will fail if the g200 is unable to establish a connection within the prescribed amount of time. If a connection times out, the terminal is notified:

NO ANSWER

Connection timeout failures can also be confirmed using diagnostics, such as S201.

Set Command

Command	Response/Action
ATS61=<timeout>	OK or ERROR

Read Command

Command	Response/Action
ATS61?	<timeout>

The following table shows the S61 parameters.

Table 43. S61 Parameters

<Parameter>	Description
<timeout>	0 Connection timer disabled 1 Minimum timeout value in seconds 255 Maximum timeout value in seconds The default value is 60.

Example

ATS61?

60

OK

ATS61=25

OK

ATDT1.2.3.4/56

(Wait 25 seconds)

NO ANSWER

5.6.1.3 S62, TCP Idle Timeout

Once a TCP session has been started, it is normally terminated by either the terminal (active termination) or the remote address (passive termination). When a session is terminated, the g200 notifies the terminal using DSR and a result code:

NO CARRIER

This feature allows the terminal to configure an idle timer (in seconds) for TCP sessions. If the g200 fails to receive a TCP datagram for the prescribed period, it will infer there is a problem and will automatically terminate the session. Once a data session is terminated, the g200 will be capable of processing AT commands from the terminal, and will also be capable of receiving UDP packets from other IP addresses (if listen mode is enabled).

Set Command

Command	Response/Action
ATS62=<timeout>	OK or ERROR

Read Command

Command	Response/Action
ATS62?	<timeout>

The following table shows the S62 parameters.

Table 44. S62 Parameters

<Parameter>	Description
<timeout>	0 Idle timer disabled 1 Minimum timeout value in seconds 65535 Maximum timeout value in seconds The default value is 30.

Example

ATS62?

30

OK

ATS62=25

OK

5.7 UDP PAD

5.7.1 PAD Control Commands

The commands in this section can be used to control the operation of a UDP PAD.

It remains to be determined how effective UDP listen mode can be in an environment where IP addresses are dynamically assigned. Users are encouraged to exercise caution when defining their communication model.

5.7.1.1 S65, UDP Listen Mode

If UDP listen mode is enabled, the g200 will monitor for incoming UDP packets from an acceptable address that have a valid destination port number. If a packet is acceptable, the g200 will start a UDP PAD session and will notify the host using DSR and the serial interface:

RING

CONNECT

If a UDP session is active, incoming TCP packets are rejected. Likewise, once a TCP session starts, incoming UDP packets are ignored.

Set Command

Command	Response/Action
ATS65=<value>	OK or ERROR

Read Command

Command	Response/Action
ATS65?	<value>

The following table shows the S65 parameters.

Table 45. S65 Parameters

<Parameter>	Description
<value>	0 UDP listen mode disabled 1 UDP listen mode enabled The default value is 0.

Example

ATS65?

0

OK

ATS65=1

OK

5.7.1.2 S66, UDP Idle Timeout

Once a UDP session has been started, it is normally terminated by the terminal (active termination). UDP does not have the same passive termination ability as TCP. When a session is terminated, the g200 notifies the terminal using DSR and a result code:

NO CARRIER

This feature allows the terminal to configure an idle timer (in seconds) for UDP sessions. If the g200 fails to receive a UDP datagram for the prescribed period, it will infer that a problem exist and will automatically terminate the session. Once a data session is terminated, the g200 will be capable of processing AT commands from the terminal, and will also be capable of receiving UDP packets from other IP addresses (if listen mode is enabled).

Set Command

Command	Response/Action
ATS66=<timeout>	OK or ERROR

Read Command

Command	Response/Action
ATS66?	<timeout>

The following table shows the S66 parameters.

Table 46. S66 Parameters

<Parameter>	Description
<timeout>	0 Idle timer disabled 1 Minimum timeout value in seconds 65535 Maximum timeout value in seconds The default value is 30.

Example

ATS66?

30

OK

ATS66=25

OK

5.7.2 PAD Content Commands

These commands allow the user to alter the content that is transmitted to the remote address.

5.7.2.1 S67, PAD Identification

This command allows the user to include identification information in every UDP packet that is sent over the Internet.

Since GSM networks dynamically assign IP addresses, terminals will usually want to include some unique unit ID in messages so that the remote address cannot mistake the identity of the sender. When this feature is enabled, the g200 will automatically preface each UDP packet with a variant of the SIM card's IMSI.

The IMSI is a 15-digit value that uniquely identifies a SIM. The first three digits are the country code (i.e. 310 for the United States, or 302 for Canada). The remaining 12 digits identify the GSM operator and the unit number.

Set Command

Command	Response/Action
ATS67=<value>	OK or ERROR

Read Command

Command	Response/Action
ATS67?	<value>

The following table shows the S67 parameters.

Table 47. S67 Parameters

<Parameter>	Description
<value>	0 Feature disabled 1 ASCII ID (15 digits) 2 BCD ID (15 digits in 8 bytes, extra nibble at end) 3 ASCII ID (last 12 digits) 4 BCD ID (last 12 digits in 6 bytes) The default value is 0.

Example

ATS67?

0

OK

ATI

310123456789012

OK

ATS67=3

OK

ATDP1.2.3.4/56

OK

CONNECT

(Type: Hello<CR>) // g200 sends 123456789012Hello<CR>

(Type: Testing<CR>) // g200 sends 123456789012Testing<CR>

(Terminate PAD)

NO CARRIER

5.8 SMS

5.8.1 SMS Message Transmission

These commands allow users to indicate where SMS messages should be sent and to queue messages for transmission.

Note that SMS messages are only sent and received if *GMODE is set appropriately.

5.8.1.1 *SDA, SMS Destination Address

This command allows the user to specify the destination address for SMS messages.

The destination address is a standard international phone number, without the international access code. It must include the area code, and the country code is not required for North American destinations. So, by way of example:

Calling an Alberta number from within North America:	1 (403) 555-1212
Requires for SMS:	4035551212
Calling a UAE number from within North America:	011 971 (50) 555-1212
Requires for SMS:	971505551212

Set Command

Command	Response/Action
AT*SDA=<address>	OK or ERROR

Read Command

Command	Response/Action
AT*SDA?	<address>

The following table shows the *SDA parameters.

Table 48. *SDA Parameters

<Parameter>	Description
<address>	This is a string that can be up to 19 digits in length. The default value is an empty string.

Example

AT*SDA?

(none)

OK

AT*SDA=4035551234

OK

5.8.1.2 *STXA, Send ASCII SMS

This command can be used to send a 7-bit ASCII message to the current SMS destination address (*SDA).

Messages can only be queued for transmission if:

- There is a room in the queue.
- The message consists of no more than 160 bytes.
- The destination address has been defined.

Set Command

Command	Response/Action
AT*STXA=<message>	OK or ERROR

The following table shows the *STXA parameters.

Table 49. *STXA Parameters

<Parameter>	Description
<message>	This is a string that can be up to 160 digits in length. The terminating <CR> is not included in the message.

Example

AT*SDA=4035551234

OK

AT*STXA=This is a test

OK

5.8.1.3 *STXB, Send Binary SMS

This command can be used to send an 8-bit binary message to the current SMS destination address (*SDA).

Binary messages are formatted using ASCII-encoded hex. Each byte must be represented as a pair of nibbles, MSB first. Messages can only be queued for transmission if:

- There is a room in the queue.
- The message consists of no more than 140 bytes (280 nibbles).
- The message contains an even number of nibbles.
- The destination address has been defined.
- The nibbles are valid hexadecimal values.

Set Command

Command	Response/Action
AT*STXB=<message>	OK or ERROR

The following table shows the *STXB parameters.

Table 50. *STXB Parameters

<Parameter>	Description
<message>	This is a string that can be up to 280 nibbles in length. The terminating <CR> is not included in the message.

Example

AT*SDA=4035551234

OK

AT*STXB=3132330D0A // Message sent: 123<CR><LF>

OK

5.8.2 SMS Message Receipt

Incoming SMS messages are automatically retrieved from the SIM if SMS mode is enabled (*GMODE). If message queuing is disabled, SMS messages are immediately sent to the host:

CONNECT
(SMS message)
NO CARRIER

However, if message queuing is enabled (S80) the message is held in memory. When a message is queued, the g200 can notify the terminal using hardware handshake lines. The terminal can also poll the g200 periodically to see if a message has arrived (S81).

Once the host knows a message has arrived, it can poll for the originating address (S82). The host can then instruct the g200 to discard (*UD) or accept (*UA) the message.

5.8.2.1 S80, Enable Message Queuing

This command allows the user to enable or disable message queuing.

Set Command

Command	Response/Action
ATS80=<value>	OK or ERROR

Read Command

Command	Response/Action
ATS80?	<value>

The following table shows the S80 parameters.

Table 51. S80 Parameters

<Parameter>	Description
<value>	0 Message queueing disabled 1 Message queueing enabled The default value is 0.

Example

ATS80?

0

OK

ATS80=1

OK

5.8.3 Message Inspection Commands

These commands allow the user to acquire information on the number of messages that are pending, and more detailed information on the first message in the queue.

5.8.3.1 S81, Pending Message Count

This command allows the user to acquire the number of messages that are sitting in the queue.

The queue can hold up to three messages. Once the queue is full, the g200 leaves additional incoming SMS messages on the SIM until room is available.

Read Command

Command	Response/Action
ATS81 ATS81?	<value>

The following table shows the S81 parameters.

Table 52. S81 Parameters

<Parameter>	Description
<value>	The number of messages in the queue. The queue can hold up to 3 messages.

Example

ATS81?

0

OK

5.8.3.2 S82, Message Originating Address

This command allows the user to determine the originating address for the first message in the queue.

For SMS message, the originating address is presented as a phone number. This number can be retained by the terminal and used to generate an SMS response if desired (*SDA, *STXA, *STXB).

Read Command

Command	Response/Action
ATS82 ATS82?	<address> or ERROR

If there are no messages in the queue (S81), an ERROR is returned to the terminal.

The following table shows the S82 parameters.

Table 53. S82 Parameters

<Parameter>	Description
<address>	The originating address.

Example

ATS81?

0

OK

ATS82?

ERROR

(Send SMS message to g200)

ATS81?

1

OK

ATS82?

14035551234

OK

5.8.4 Message Handling Commands

These commands allow the user to process received messages appropriately. At present, messages can be accepted (*UA) or discarded (*UD).

5.8.4.1 *UA, Accept SMS Message

This command accepts the first message in the queue. When a message is accepted, it is removed from the queue and sent to the terminal.

Execute Command

Command	Response/Action
AT*UA	CONNECT (SMS message) NO CARRIER or ERROR

If there are no messages in the queue (S81), an ERROR is returned to the terminal.

Example

ATS81?

0

OK

AT*UA

ERROR

(Send SMS message to g200)

ATS81?

1

OK

AT*UA

OK

CONNECT

Testing…

NO CARRIER

ATS81?

0

OK

5.8.4.2 *UD, Discard SMS Message

This command discards the first message in the queue. When a message is discarded, it is removed from the queue and deleted.

Execute Command

Command	Response/Action
AT*UD	OK or ERROR

If there are no messages in the queue (S81), an ERROR is returned to the terminal.

Example

ATS81?

0

OK

AT*UD

ERROR

(Send SMS message to g200)

ATS81?

1

OK

AT*UD

OK

ATS81?

0

OK

5.9 DIRECT ACCESS

5.9.1 Direct Access Session Control

These commands allow the user to initiate and control a Direct Access session. Direct Access modes allow a terminal to communicate directly with the embedded Motorola GSM module. There are six different modes available:

- Software, on demand.
- Hardware, on demand.
- Software, on power up.
- Hardware, on power up.
- Software, on DTR.
- Hardware, on DTR.

For the software modes, Direct Access communications are managed and mediated by the microcontroller in the g200. For the hardware modes, the g200 microcontroller is bypassed completely. The main difference is that the software modes are capable of monitoring the data that is transmitted and received from the GSM module, so it is possible to:

- Watch for a password and terminate Direct Access when the password is detected.
- Have better control over the diagnostic LED's.

When the g200 is configured for Direct Access on demand, an AT command (*PT) must be used to initiate the Direct Access session. DTR must be asserted before starting the Direct Access session. If DTR cannot be controlled, then the g200 must be instructed to ignore it using &D. Clearing DTR normally terminates direct Access on demand. However, if the g200 has been instructed to ignore DTR, an escape sequence can be used (*PEXIT) or the host can cycle the g200 power. Once the Direct Access mode is terminated, the g200 will reset the Motorola GSM module and return to normal operation.

When the g200 is configured for Direct Access on power up, Direct Access mode is started five (5) seconds after power is applied. The state of DTR is ignored, and the session can only be terminated by cycling the g200 power. These modes are recommended when connecting the g200 to a PC, and using standard Internet based PC applications.

When the g200 is configured for Direct Access on DTR, a session is started every time DTR asserts. Clearing DTR terminates the session.

5.9.1.1 *PT, Start Direct Access on Demand

This command allows the user to start Direct Access on demand.

Execute Command

Command	Response/Action
AT*PT	OK CONNECT

AT replies may be received from the GSM module immediately after starting Direct Access. This happens occasionally since the g200 sends AT commands to the GSM module periodically.

Example

AT*PT

OK

CONNECT

(Send AT commands to the GSM module and receive replies)

(Terminate Direct Access)

NO CARRIER

5.9.1.2 *PTM, Select Direct Access Mode

This command allows the user to define the preferred Direct Access mode. It is important to note that if a g200 is configured for Direct Access on power up and you want to change it you must:

- cycle the power to the g200.
- wait until you see HELLO.
- change the mode within five (5) seconds.

Set Command

Command	Response/Action
AT*PTM=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*PTM?	<value>

The following table shows the *PTM parameters.

Table 54. *PTM Parameters

<Parameter>	Description
<value>	0 Software, on demand 1 Hardware, on demand 2 Software, on power up 3 Hardware, on power up 4 Software, on DTR 5 Hardware, on DTR The default value is 0.

Example

AT*PTM?

0

OK

AT*PTM=1

OK

5.10 SECURITY

5.10.1 Firewall Commands

These commands allow enabling and configuring a communications firewall. The firewall can be used to block UDP and TCP packets from unauthorized IP addresses.

5.10.1.1 *FA, Firewall Addresses

This command allows the user to define an acceptable range of IP addresses. The g200 firewall supports up to ten IP address ranges.

Set Command

Command	Response/Action
AT*FA<n>= AT*FA<n>=<IP addr> AT*FA<n>=<IP addr>,<IP addr> AT*FA<n>=<IP addr>–<IP addr>	OK or ERROR

A number of different command variants are supported:

- In the first variant, the set command has no arguments. This can be used to quickly reset an address range to a default value.
- In the second variant, a single address is supplied. This can be used to define an address range that only includes a single address.
- In the final two variants, a beginning and end address are used to define a valid address range. The only difference is the delimiter that is used to separate the two addresses.

Read Command

Command	Response/Action
AT*FA?	<1>: <IP addr>[- <IP addr>] <2>: <IP addr>[- <IP addr>] … <10>: <IP addr>[- <IP addr>]
AT*FA<n>?	<n>: <IP addr>[- <IP addr>]

Users have the ability to review all IP address ranges, or just a single range.

The following table shows the *FA parameters.

Table 55. *FA Parameters

<Parameter>	Description
<n>	1 First address range 10 Last address range
<IP addr>	An IP address in dotted decimal notation.

Example

AT*FA1?

1: 0.0.0.0

OK

AT*FA1=10.11.12.13

OK

AT*FA1?

1: 10.11.12.13

OK

AT*FA2=20.123.4.0,20.123.4.255

OK

AT*FA2?

2: 20.123.4.0 – 20.123.4.255

OK

5.10.1.2 *FW, Firewall Enable

This command allows the user to enable or disable a communications firewall.

Set Command

Command	Response/Action
AT*FW=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*FW?	<value>

The following table shows the *FW parameters.

Table 56. *FW Parameters

<Parameter>	Description
<value>	0 Firewall disabled 1 Firewall enabled The default value is 0.

Example

AT*FW?

0

OK

AT*FW=1

OK

5.11 REMOTE ACCESS

5.11.1 MOTAP Enabling Commands

These commands allow the user to enable MOTAP communications and features.

5.11.1.1 *MCE, Enable MOTAP Communications

This command allows the user to enable or disable MOTAP communications.

Set Command

Command	Response/Action
AT*MCE=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*MCE?	<value>

The following table shows the *MCE parameters.

Table 57. *MCE Parameters

<Parameter>	Description
<value>	0 MOTAP communications disabled 1 MOTAP communications enabled The default value is 1.

Once MOTAP communications are enabled, UDP datagrams received by port 17707 are handled as MOTAP messages. Replies are returned to the originating IP address and port number.

Example

AT*MCE?

1

OK

AT*MCE=0

OK

5.11.1.2 *MIE, Enable MOTAP Indications

This command allows the user to enable or disable MOTAP indications. If indications are enabled, the g200 will send a message to a client application according to the period setting (*MIP).

Set Command

Command	Response/Action
AT*MIE=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*MIE?	<value>

The following table shows the *MIE parameters.

Table 58. *MIE Parameters

<Parameter>	Description
<value>	0 MOTAP indications disabled 1 MOTAP indications enabled The default value is 1.

MOTAP indications cannot be sent unless MOTAP communications (*MCE) are enabled, and the client address (*MCA) is defined.

Example

AT*MIE?

1

OK

AT*MIE=0

OK

5.11.2 MOTAP Communication Parameter Commands

These commands allow the user to define communication specifics for MOTAP, such as IP address and port numbers.

5.11.2.1 *MCA, MOTAP Client Address

This command allows the user to define the IP address that MOTAP indications are sent to. It is important to note that indications are only sent if enabled using *MCE and *MIE.

Set Command

Command	Response/Action
AT*MCA=<IP address>	OK or ERROR

Read Command

Command	Response/Action
AT*MCA?	<IP address>

The following table shows the *MCA parameters.

Table 59. *MCA Parameters

<Parameter>	Description
<IP address>	This parameter specifies the default destination IP address. It must be entered in dotted decimal notation. The default value is 0.0.0.0.

Example

AT*MCA?

0.0.0.0

OK

AT*MCA=123.1.15.28

OK

5.11.2.2 *MCP, MOTAP Client Port Number

This command allows the user to define the port number that MOTAP indications are sent to. It is important to note that indications are only sent if enabled using *MCE and *MIE.

Set Command

Command	Response/Action
AT*MCP=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*MCP?	<value>

The following table shows the *MCP parameters.

Table 60. *MCP Parameters

<Parameter>	Description
<value>	0 Minimum value 65535 Maximum value The default value is 17707.

Example

AT*MCP?

0

OK

AT*MCP=20000

OK

5.11.2.3 *MLP, MOTAP Local Port Number

The g200 will always interpret packets received on port 17707 as MOTAP messages, but this command allows the user to specify an alternate port number. It can prove helpful in some environments, particularly those where there are firewall restrictions.

Set Command

Command	Response/Action
AT*MLP=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*MLP?	<value>

The following table shows the *MLP parameters.

Table 61. *MLP Parameters

<Parameter>	Description
<value>	0 Minimum value 65535 Maximum value The default value is 17707.

Example

AT*MLP?

17707

OK

AT*MLP=1234

OK

5.11.2.4 *MUT, MOTAP Unit ID Type

Each MOTAP message can include a unit ID for validation purposes. This command allows the user to specify the type of validation required.

Set Command

Command	Response/Action
AT*MUT=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*MUT?	<value>

The following table shows the *MUT parameters.

Table 62. *MUT Parameters

<Parameter>	Description
<value>	0 No ID required 1 Unit ID is the GSM IMSI 2 Unit ID is the GSM IMEI 3 Unit ID is user specified The default value is 2.

Example

AT*MUT?

2

OK

AT*MUT=1

OK

5.11.2.5 *MUS, MOTAP Unit ID String

This command allows the user to specify a custom unit ID that can be used for MOTAP message validation. It is only used when the unit ID type (*MUT) indicates the unit ID is user specified.

Set Command

Command	Response/Action
AT*MUS=<param>	OK or ERROR

Read Command

Command	Response/Action
AT*MUS?	<param>

The following table shows the *MUS parameters.

Table 63. *MUS Parameters

<Parameter>	Description
<param>	This is a string that can be up to 20 characters in length. The default is an empty string.

Example

AT*MUS?

(none)

OK

AT*MUS=Evaluation unit 15

OK

AT*MUT=3

OK

5.11.2.6 *MIP, MOTAP Indication Period

The g200 can be configured to generate and transmit indications periodically. This command allows the user to specify a period.

Set Command

Command	Response/Action
AT*MIP=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*MIP?	<value>

The following table shows the *MIP parameters.

Table 64. *MIP Parameters

<Parameter>	Description
<value>	0 Only send a single indication each time an IP address is acquired 1 to 3600 Indication period in seconds The default value is 300.

Example

AT*MIP?

300

OK

AT*MIP=600

OK

5.11.2.7 *MIR, MOTAP Indication Retries

The g200 can be configured to send a maximum number of indications without receiving a corresponding confirmation. When the number of retries is exceeded, the g200 will stop sending indications. Indications will resume the next time the g200 acquires a new IP address.

Set Command

Command	Response/Action
AT*MIR=<value>	OK or ERROR

Read Command

Command	Response/Action
AT*MIR?	<value>

The following table shows the *MIR parameters.

Table 65. *MIR Parameters

<Parameter>	Description
<value>	0 to 254 Maximum number of indications to send without confirmation 255 Do not limit the number of indications The default value is 5.

Example

AT*MIR?

5

OK

AT*MIR=15

OK

5.12 DIAGNOSTICS

5.12.1 High Level Diagnostics

These commands allow the user to assess g200 operation and issues at a high level.

5.12.1.1 *PING, Send ICMP Ping Packet

This command allows the user to send a standard ICMP Ping packet to another IP address. The ping can only be sent if the GSM network has assigned an IP address to the module. The g200 will wait up to 10 seconds for a reply. The packet size is fixed.

Also, be aware that many GSM operators will block ICMP packets at a firewall.

Execute Command

Command	Response/Action
AT*PING<IP address> AT*PING=<IP address>	OK or ERROR

An error results if the module has not been assigned an IP address yet (*GSTAT), the address is malformed, or the g200 times out while waiting for a reply.

The following table shows the *PING parameters.

Table 66. *PING Parameters

<Parameter>	Description
<IP address>	This parameter specifies the destination IP address and is optional. It must be entered in dotted decimal notation.

Example

AT*GSTAT

ABCXXX

OK

AT*PING123.122.121.120

ERROR // g200 does not have an IP address yet

AT*GSTAT

ABCDEF

OK

AT*PING123.122.121

ERROR // Incomplete destination IP address

AT*PING172.23.0.45

OK

5.12.1.2 S200, Last Registration Error

This command allows the user to acquire some information about the registration status. This is useful if the g200 is having difficulty getting an IP address from the GSM network.

Read Command

Command	Response/Action
ATS200 ATS200?	<status>

The following table shows the S200 parameters.

Table 67. S200 Parameters

<Parameter>	Description
<status>	0 g200 is registered and has an IP address 8 g200 can't communicate with the GSM module 9 g200 can't configure the GSM module 10 GSM module having problems reading the SIM 11 SIM is locked and requires PIN 12 SIM is blocked and requires PUK 13 SIM is locked and requires PIN2 14 SIM is blocked and requires PUK2 15 SIM is waiting for phone to SIM PIN 16 SIM is waiting for personalization password 17 No APN has been defined (*GAPN) 18 g200 can't get the IMSI from the SIM 19 g200 can't get the IMEI from the GSM module 20 g200 can't get the firmware version from the GSM module 255 Initial value on power up

Example

(Power up)

ATS200?

255

OK

AT*GSTAT

ABCDEF

OK

ATS200?

0

OK

5.12.1.3 S201, Last TCP Connection Error

This command allows the user to retrieve a status code for the last TCP connection attempt. It is useful when the g200 is having difficulty establishing a TCP connection to a remote address (D).

Read Command

Command	Response/Action
ATS201 ATS201?	<status>

The following table shows the S201 parameters.

Table 68. S201 Parameters

<Parameter>	Description
<status>	0 Last attempt succeeded 1 Connection reset by peer 2 Connection refused 4 Connection attempt timed out 10 No free TCP control block The default value on power up is 0.

Example

(Power up)

ATS201?

0

OK

AT*GSTAT

ABCDEF

OK

ATDT1.2.3.4/56 // Unused address and port

OK

(Wait for S61 to expire)

NO ANSWER

ATS201?

4

OK

5.12.2 Low Level Diagnostics

These commands allow the user to assess g200 operation and issues at a low level. They are not recommended for casual use.

5.12.2.1 *DBICMP, Debug ICMP

This command allows the user to observe incoming and outgoing ICMP packets. Packets are sent to the terminal in a hex dump format.

Please note that ICMP packets cannot be sent or received unless an IP address has been assigned to the GSM module (*GSTAT).

Set Command

Command	Response/Action
AT*DBICMP=<value>	OK or ERROR

The following table shows the *DBICMP parameters.

Table 69. *DBICMP Parameters

<Parameter>	Description
<value>	0 Debug mode disabled 1 Debug mode enabled The default value is 0. This value is not retained in the g200's configuration.

Example

AT*DBICMP=1

OK

5.12.2.2 *DBIP, Debug IP

This command allows the user to observe incoming and outgoing IP packets. Packets are sent to the terminal in a hex dump format.

Please note that IP packets cannot be sent or received unless an IP address has been assigned to the GSM module (*GSTAT).

Set Command

Command	Response/Action
AT*DBIP=<value>	OK or ERROR

The following table shows the *DBIP parameters.

Table 70. *DBIP Parameters

<Parameter>	Description
<value>	0 Debug mode disabled 1 Debug mode enabled The default value is 0. This value is not retained in the g200's configuration.

Example

AT*DBIP=1

OK

5.12.2.3 *DBMT, Debug MOTAP

This command allows the user to observe incoming and outgoing MOTAP packets. Packets are sent to the terminal in a hex dump format.

Please note that MOTAP packets cannot be sent or received unless an IP address has been assigned to the GSM module (*GSTAT), and MOTAP communications have been enabled (*MCE).

Set Command

Command	Response/Action
AT*DBMT=<value>	OK or ERROR

The following table shows the *DBMT parameters.

Table 71. *DBMT Parameters

<Parameter>	Description
<value>	0 Debug mode disabled 1 Debug mode enabled The default value is 0. This value is not retained in the g200's configuration.

Example

AT*DBMT=1

OK

5.12.2.4 *DBPPP, Debug PPP

This command allows the user to observe incoming and outgoing PPP packets. Packets are sent to the terminal in a hex dump format. Additional diagnostic messages provide details on protocol events and state transitions.

Set Command

Command	Response/Action
AT*DBPPP=<value>	OK or ERROR

The following table shows the *DBPPP parameters.

Table 72. *DBPPP Parameters

<Parameter>	Description
<value>	0 Debug mode disabled 1 Debug mode enabled The default value is 0. This value is not retained in the g200's configuration.

Example

AT*DBPPP=1

OK

5.12.2.5 *DBTCP, Debug TCP

This command allows the user to observe incoming and outgoing TCP packets. Packets are sent to the terminal in a hex dump format.

Please note that TCP packets cannot be sent or received unless an IP address has been assigned to the GSM module (*GSTAT).

Set Command

Command	Response/Action
AT*DBTCP=<value>	OK or ERROR

The following table shows the *DBTCP parameters.

Table 73. *DBTCP Parameters

<Parameter>	Description
<value>	0 Debug mode disabled 1 Debug mode enabled The default value is 0. This value is not retained in the g200's configuration.

Example

AT*DBTCP=1

OK

5.12.2.6 *DBUDP, Debug UDP

This command allows the user to observe incoming and outgoing UDP packets. Packets are sent to the terminal in a hex dump format.

Please note that UDP packets cannot be sent or received unless an IP address has been assigned to the GSM module (*GSTAT).

Set Command

Command	Response/Action
AT*DBUDP=<value>	OK or ERROR

The following table shows the *DBUDP parameters.

Table 74. *DBUDP Parameters

<Parameter>	Description
<value>	0 Debug mode disabled 1 Debug mode enabled The default value is 0. This value is not retained in the g200's configuration.

Example

AT*DBUDP=1

OK

6.1 GETTING A DATA CONNECTION

Connect a PC to the g200 and use a terminal emulator, like Microsoft ® HyperTerminal. By default, the g200 communicates at baud rate of 19200 with 8 bit data, no parity, 1 stop bit and no flow control.

Before the g200 can be used on a network it must have a SIM card installed in the SIM socket. The g200 must also be configured with the proper network access parameters (APN, username and password) before it can gain access to the Internet.

The g200 provides AT commands for setting the Access Point Name (APN) as well as the username and password. By default, the g200 is not configured for any specific network.

AT*GAPN=<*Network APN*>	// Set APN
AT*GUSER=<*Username*>	// Set network user name
AT*GPASS=<*Password*>	// Set network password
AT&W	// Save settings and reboot

6.1.1 Monitoring the Service LED

A diagnostic LED on the g200 shows the connection status (SVC). This LED will blink slowly on power up, quickly once the g200 has registered on the voice side of the GSM network, and will remain on once the g200 has been assigned an IP address.

6.1.2 Monitoring With AT Commands

The current registration and connection status can be monitored using the *GSTAT command.

(Power up)

AT*GSTAT?

AXXXXX

OK

AT*GSTAT?

ABCXXX

OK

AT*GSTAT?

ABCDEF

OK

Alternatively, automatic reporting (indications) can be enabled using the *GRPT command.

(Power up)

AT*GRPT=1

OK

AXXXXX

ABXXXX

ABCXXX

ABCDXX

ABCDEX

ABCDEF

6.1.3 Diagnosing Connection Issues

Once configured properly, the g200 should be able to acquire service shortly after power-up. If the g200 has not acquired service within a couple of minutes, there are some diagnostic services that can help the user or Motorola personnel assess the situation.

- Ensure that the power supply meets the g200 electrical specifications.
- Ensure that the GSM antenna is properly connected.
- Ensure that the g200 has been populated with a valid SIM.
- Ensure that the g200 has been configured with the proper network access parameters (APN, username and password).
- The last registration error can be acquired using S200.
- PPP debugging can be enabled, using *DBPPP, for those users that are familiar with the PPP negotiation process.

6.2 UDP PAD

Once the g200 has an IP address, a UDP PAD can be established with a device on the Internet.

For simple tests, you can have one g200 call another or you can even call yourself.

6.2.1 Establishing a UDP PAD With Yourself

Establishing a UDP PAD with yourself sounds unusual, but it is a quick and convenient way to experiment using this feature. UDP messages are sent from the g200 to the GSM network. The GSM network discovers that they are intended for you and delivers them.

```
ATS50=0                          // Turn off the data forwarding idle timer
OK

ATS51=13                         // Send a packet every time ENTER is pressed
OK

ATS66=30                         // Terminate PADs that are idle for 30 seconds
OK

ATS54?                           // Get current listen port number
1
OK

AT*GIP                           // Get current IP address
172.28.1.24
OK

ATDP172.28.1.24/1                // Call yourself
OK
CONNECT
(Type 123<CR>)                   // UDP packet sent to the Internet containing 123<CR>
123<CR>                          // UDP packet delivered to the g200
(Do nothing for 30 seconds)
NO CARRIER                       // Idle PAD is terminated
```

6.2.2 Establishing a UDP PAD with Another Device

If you have two g200s, it is easy to establish a connection between them. One of the g200 devices will initiate the session and the other will have to be configured to use listen mode.

You need one PC with two communication ports, or two PCs to run this test. Each g200 must be connected to a terminal emulator. Once the connection is established, everything typed into one of the terminals is sent to the other. There is no local echo when a PAD is active.

6.2.2.1 Sender's Configuration

```
ATS50=0                          // Turn off the data forwarding idle timer
OK

ATS51=13                         // Send a packet every time ENTER is pressed
OK

ATS66=30                         // Terminate PADs that are idle for 30 seconds
OK
```

6.2.2.2 Receiver's Configuration

```
ATS50=0                          // Turn off the data forwarding idle timer
OK

ATS51=13                         // Send a packet every time ENTER is pressed
OK

ATS66=30                         // Terminate PADs that are idle for 30 seconds
OK

ATS65=1                          // Enable listen mode
OK

ATS54=200                        // Define the listen port number
OK

AT*GIP                           // Get current IP address
123.10.11.12
OK
```

6.2.3 PAD Operation

ATDP123.10.11.12/200	// Sender dials
OK	
CONNECT	
(Type Hello…<CR>)	// Packet sent to receiver
RING	// Receiver detects an incoming packet
CONNECT	// Receiver starts a PAD session
Hello…<CR>	// Data received from sender
(Type Hi<CR>)	// Data sent to the sender
Hi<CR>	// Packet received from the sender

Data can be sent back and forth as long as the PAD is open. Each g200 will automatically terminate its PAD if it has been idle for a prolonged period.

6.2.4 UDP PAD Diagnostics

If the UDP PAD is not working properly, or if you are curious, UDP debugging can be enabled using *DBUDP. If UDP debugging is enabled, the g200 will output a hex dump for every UDP packet that is sent or received. This level of detail is typically only useful for those individuals that are familiar with the UDP protocol.

Likewise, debugging can also be enabled at the IP (*DBIP) or PPP (*DBPPP) levels.

6.3 SMS AND MESSAGE QUEUEING

SMS messages can be sent between a g200 and another g200, or phone, or any other SMS device. This example presumes that:

- The g200 has a SIM with a phone number (403) 555-1212
- A cellular phone has a SIM with a phone number (403) 555-3434

6.3.1 Sending a Message to Yourself

The g200 can send a message to itself. Although not very exciting, this test confirms that the SIM is capable of sending and receiving SMS messages. For this test, message queuing is disabled.

```
AT*GMODE=0                          // Use SMS rather than GPRS
OK

ATS80=0                             // Disable message queueing
OK

AT*SDA=4035551212                   // Send SMS messages to yourself
OK

AT*STXA=Just a quick test           // SMS message sent
OK

CONNECT                             // SMS message received
Just a quick test
NO CARRIER
```

6.3.2 Receiving a Message From a Phone

For this test, message queuing is enabled so that users can see how message queuing behaves.

```
AT*GMODE=0                          // Use SMS rather than GPRS
OK

ATS80=1                             // Enable message queueing
OK
```

```
ATS81?
0                                   // No messages in the queue
OK

(Send a message from the phone)

ATS81?
1                                   // There is a message in the queue
OK

ATS82?
14035553434                         // The message has come from the phone
OK

AT*UA
OK
CONNECT
(Message contents)
NO CARRIER
```