MULTITECH®

QuickCarrier™ USB-D EV-DO

MTD-EV3 User Guide

QuickCarrier USB-D MTD-EV3 User Guide

Models: MTD-EV3

Part Number: S000570, Version 1.6

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Knowledge Base

The Knowledge Base provides immediate access to support information and resolutions for all MultiTech products. Visit http://www.multitech.com/kb.go.

Support Portal

To create an account and submit a support case directly to our technical support team, visit: https://support.multitech.com.

Support

Business Hours: M-F, 8am to 5pm CT

Country	By Email	By Phone
Europe, Middle East, Africa:	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

Warranty

To read the warranty statement for your product, visit www.multitech.com/warranty.go. For other warranty options, visit www.multitech.com/es.go.

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Contents

Product Overview

Overview

The QuickCarrier USB-D is a cellular dongle designed and built for M2M applications.

Documentation

The following documentation is available on the MultiTech website at www.multitech.com/setup/product.go.

Document	Description
QuickCarrier USB-D MTD-H5 MTD-EV3 User Guide	This document. Provides an overview, specification, safety and regulatory information, and SIM cards and basic operations.
USB Driver Installation Guide for H5 and G3 DevicesEV3 and C2 Devices	Instructions for installing USB drivers on Linux and Windows Systems (Part number S000553)(Part number S000569)
HSPA+EV-DO and CDMA AT Commands Reference Guide	Configure your device with the HSPA+ EV-DO and CDMA AT Commands Reference Guide (Part number S000574)(Part number S000546)

MTD-EV3 Specifications

Category	MTD-EV3-xx
General	
Features	Dual 800/1900 MHz bands
Speed	
Data Speed	Up to 3.1 Mbps downlink/1.8 Mbps uplink
Interface and Antenna	
USB Interface	USB 2.0 high speed compatible
Antenna	Internal
Environment	
Operating Temperature	-40° C to +50° C
Storage Temperature	-40° C to +85° C
Humidity	15%-93% RH, non-condensing
Power Requirements	
Operating Voltage	5 volts from USB port
Input Power	Via USB Bus

Category	MTD-EV3-xx
SMS	
SMS	Text mode and PDU mode per 3GPP TS27.005 set for SMS.
	Mobile-Terminated SMS
	Mobile-Originated SMS
Certifications and Compliance	
EMC Compliance	FCC Part 15 Class B
Radio Compliance	FCC Part 22
	FCC Part 24
	RSS 132
	RSS 133
Safety Compliance	UL 60950-1
	cUL 60950-1

Dimensions

13.550 [344]

1.575 [40.01]

3.100 [78.73]

.740 [18.80]
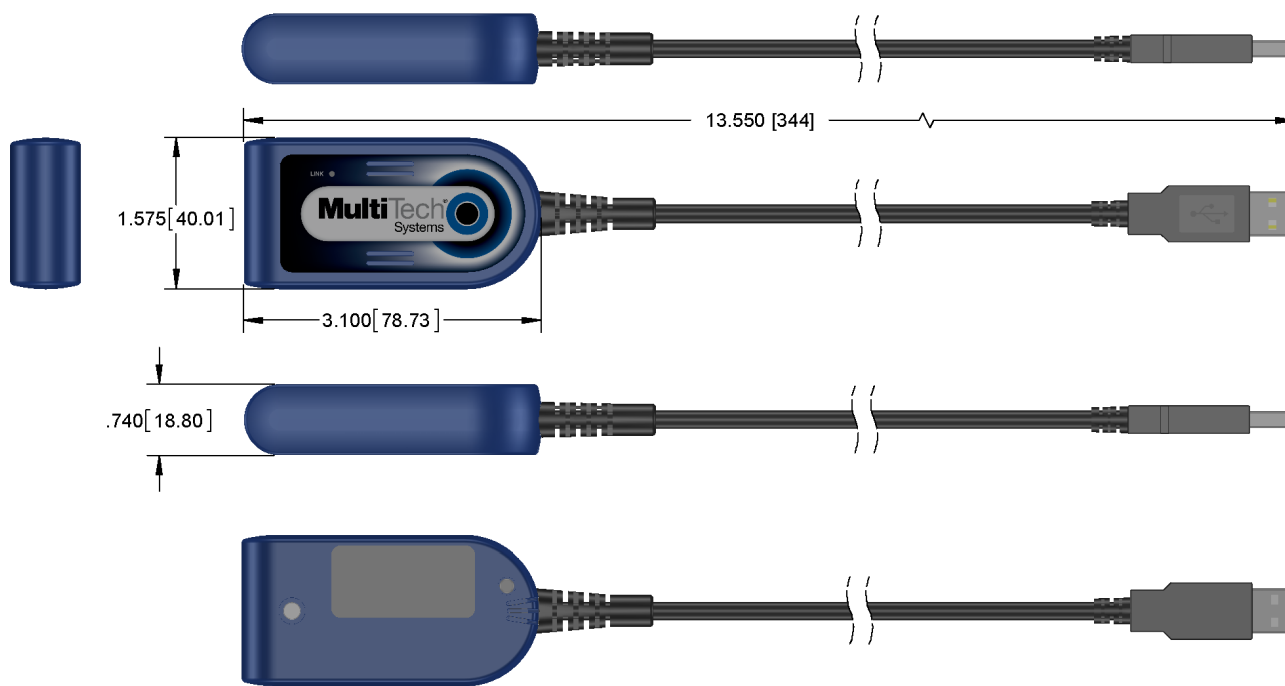
ALL DIMENSIONS IN In [mm]

MTD-EV3

Link Status LED

Link Status	Description	
Off	No power to unit.	
On	Continuously lit	Powered on.
	Slow blink (-0.2Hz)	Registered on network.

Power Draw

Radio	Voltage	Expected Current Values		InRush Charge Current in Coulombs/charge time
		Steady State without Data (max)	Steady State with Data (max)	
CDMA 800	5	45ma	576ma	1160mC/19usec
CDMA 1900	5	133ma	592ma	1160mC/19usec

Note:

- **Steady State Maximums:** Radio is registered and is transmitting at the highest values allowed by the carrier. The continuous current with data being sent and without data being sent.

- **InRush Current:** The input current during power up or a device reset (capacitors are charging).

Safety Notices and Warnings

General Safety

The device is designed for and intended to be used in fixed and mobile applications. Fixed means the device is physically secured at one location and cannot be easily moved to another location. Mobile means the device is used in other than fixed locations.

> **CAUTION:** Maintain a separation distance of at least 20 cm (8 inches) between the transmitter's antenna and the body of the user or nearby persons. The modem is not designed for or intended to be used in portable applications within 20 cm (8 inches) of the user's body.
> **Attention:** Maintenir une distance d'au moins 20 cm (8 po) entre l'antenne du récepteur et le corps de l'utilisateur ou à proximité de personnes. Le modem n'est pas conçu pour, ou destinés à être utilisés dans les applications portables, moins de 20 cm du corps de l'utilisateur.

Radio Frequency (RF) Safety

Due to the possibility of radio frequency (RF) interference, it is important that you follow any special regulations regarding the use of radio equipment. Follow the safety advice given below.

- Operating your device close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.

- Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.

- Do not place the antenna outdoors.

- Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.

- Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.

- Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

Sécurité relative aux appareils à radiofréquence (RF)

À cause du risque d'interférences de radiofréquence (RF), il est important de respecter toutes les réglementations spéciales relatives aux équipements radio. Suivez les conseils de sécurité ci-dessous.

- Utiliser l'appareil à proximité d'autres équipements électroniques peut causer des interférences si les équipements ne sont pas bien protégés. Respectez tous les panneaux d'avertissement et les recommandations du fabricant.

- Certains secteurs industriels et certaines entreprises limitent l'utilisation des appareils cellulaires. Respectez ces restrictions relatives aux équipements radio dans les dépôts de carburant, dans les usines de produits chimiques, ou dans les zones où des dynamitages sont en cours. Suivez les restrictions relatives à chaque type d'environnement où vous utiliserez l'appareil.

- Ne placez pas l'antenne en extérieur.

- Éteignez votre appareil sans fil dans les avions. L'utilisation d'appareils électroniques portables en avion est illégale: elle peut fortement perturber le fonctionnement de l'appareil et désactiver le réseau cellulaire. S'il

ne respecte pas cette consigne, le responsable peut voir son accès aux services cellulaires suspendu ou interdit, peut être poursuivi en justice, ou les deux.

- Éteignez votre appareil sans fil à proximité des pompes à essence ou de diesel avant de remplir le réservoir de votre véhicule de carburant.
- Éteignez votre appareil sans fil dans les hôpitaux ou dans toutes les zones où des appareils médicaux sont susceptibles d'être utilisés.

Interference with Pacemakers and Other Medical Devices

Potential interference

Radiofrequency energy (RF) from cellular devices can interact with some electronic devices. This is electromagnetic interference (EMI). The FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cellular devices. This test method is part of the Association for the Advancement of Medical Instrumentation (AAMI) standard. This standard allows manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cellular device EMI.

The FDA continues to monitor cellular devices for interactions with other medical devices. If harmful interference occurs, the FDA will assess the interference and work to resolve the problem.

Precautions for pacemaker wearers

If EMI occurs, it could affect a pacemaker in one of three ways:
- Stop the pacemaker from delivering the stimulating pulses that regulate the heart's rhythm.
- Cause the pacemaker to deliver the pulses irregularly.
- Cause the pacemaker to ignore the heart's own rhythm and deliver pulses at a fixed rate.

Based on current research, cellular devices do not pose a significant health problem for most pacemaker wearers. However, people with pacemakers may want to take simple precautions to be sure that their device doesn't cause a problem.
- Keep the device on the opposite the side of the body from the pacemaker to add extra distance between the pacemaker and the device.
- Avoid placing a turned-on device next to the pacemaker (for example, don't carry the device in a shirt or jacket pocket directly over the pacemaker).

Device Maintenance

When maintaining your device:

- Do not attempt to disassemble the device. There are no user serviceable parts inside.
- Do not expose your device to any extreme environment where the temperature or humidity is high.
- Do not expose the device to water, rain, or spilled beverages. It is not waterproof.
- Do not place the device alongside computer discs, credit or travel cards, or other magnetic media. The information contained on discs or cards may be affected by the device.
- Using accessories, such as antennas, that MultiTech has not authorized or that are not compliant with MultiTech's accessory specifications may invalidate the warranty.

If the device is not working properly, contact MultiTech Technical Support.

User Responsibility

Respect all local regulations for operating your wireless device. Use the security features to block unauthorized use and theft.

Getting Started Overview

To use the MTD, do the following:

1. Insert the SIM Card. Refer to *Installing a SIM Card*.
2. Power up the device. Refer to *Turning the Device On or Off.*
3. Install device drivers. Use the *Connection Manager* or follow instructions in the *USB Driver Installation Guide* for your model.
4. Activate the device on your carrier network. Use the *Connection Manager* or refer to *Account Activation for Cellular Devices*.
5. Make a data connection. Use the *Connection Manager* or refer to *Using Linux* and/or *Basic Operations*.

Turning the Device On or Off

This USB-powered device does not have a power button. Connecting the device to a computer's USB port turns it on.

- After plugging in the device, give it time to initialize before using.
- When the PWRMON line gets to high, the device has powered on.
- Wait 10 seconds for the device to reach activation state.

Disconnecting it or shutting off the computer, turns it off. For best practices, follow the steps in *Powering Off or Rebooting a Device*.

Note: When reconnecting the device, use the same USB port that you used when installing drivers. Otherwise, you may need to re-install the driver.

Powering Off or Rebooting a Device

To power off your device:

1. Suspend dial-up network.
2. Suspend ModemQuery.
3. Wait for Steps 1-2 to complete.
4. Verify that the modem has disconnected.
5. Issue **AT#SHDN**.
6. Wait 30 seconds.
7. Power off or disconnect power.

Device Phone Number

Every device has a unique phone number. Your service provider supplies a phone number when you activate your account, or if your device has a SIM card, the phone number may be on it. Wireless service provider implementation may vary. Consult with your service provider to get the phone number for your device.

Using Connection Manager to Install Drivers, Activate a Device, and Connect to the Carrier Network

Connection Manager is software that installs device drivers, activates your device on your carrier's network, and connects your device to your carrier's network.

> **Note:** The Connection Manger can install drivers and connect your device regardless of your CDMA network, however, activation is only supported with Verizon, Aeris, and some CDMA Regional Carriers. If you cannot activate your device with the Connection Manger, refer to *Account Activation for Cellular Devices.*
> **Note:** MTD-H5 models use SIM based activation. If you do not have a SIM card, contact your carrier.

Connection Manager supports the following Windows versions:

- Windows XP, Vista, 7, 8 and 2008, both 32-bit and 64-bit versions
- Windows Server 2012
- Windows 2003 Server 32-bit version

To download and install the Connection Manager:

1. Go to www.multitech.com/connectionmanager.go.
2. Click **Connection Manger**.
3. Open or unzip the **Connection Manager** file and run the installer (.msi file).
4. When prompted, plug the device into a USB port.
5. **Wait for drivers to install**, then click **Next**.
6. Open **Connection Manager**.
7. To set the application to load during Windows startup and automatically connect to the internet:

   a. Click **Settings** and check the boxes for **Run application at Windows startup** and **Connect to the Internet Automatically**.

   b. Click **Apply**.

8. To allow Connection Manager to re-connect when a connection is lost:

   a. Click **Connection** and check **Enable keep-alive**.

   b. Enter an address to ping in the **Host to ping** box (for example, 8.8.8.8 which is www.google.com).

9. Enter **Dial number** and **APN** if different from the default.
10. Click **Apply** to save settings.
11. Click **Main**, then click **Connect** to start your connection.
12. Browse to a website to confirm the device has Internet access.

If the keep-alive fails, Connection Manager automatically reconnects. When you start the computer, Connection Manager launches and establishes a connection.

Troubleshooting

If the connection drops and the Main page shows a **Keep-alive Feature**, clear out the error by removing the numeric file names under this directory.

C:\Users\tdg\AppData\Roaming\Multi-Tech Connection Manager
> **Note:** Replace "**tdg**" with your Windows username.
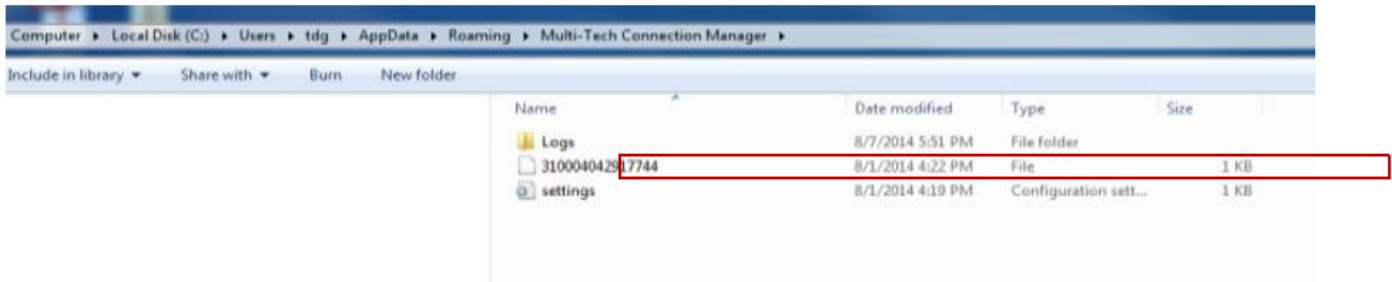
Account Activation for Cellular Devices

Some Multi-Tech devices are pre-configured to operate on a specific cellular network. To use the device, you must set up a cellular data account with your service provider. Each service provider has its own process for adding devices to their network. To find activation steps for your device:

1. Go to **http://www.multitech.com/support**.
2. Select your device.
3. Scroll to **Activation** and click **Download**.

Creating a Windows Dial-Up Connection

Each version of the Windows operating system has different steps for creating dial-up Internet connections. Consult Windows Help for the specific steps for your version.

You may need the phone number, username, and password for your carrier.

Carrier Specific Information

Notice for Devices that Use Aeris Radios

One component of your device is a radio. A radio algorithm prevents your device from repeatedly attempting to connect to the network when the radio:

■ Cannot establish a packet data connection or

■ Fails to access the application server.

When writing applications for your devices, ensure that your applications do not interfere with the radio's connection retry algorithm. If you fail to do so, Aeris might block network access for your devices.

After your devices reach the end of their commercial lifespan, you must remove them from the Aeris network. To do so, remove power from the devices and remove their antennas. If your devices continue to attempt to register with the network after you cancel device subscriptions, Aeris can bill you for any traffic generated by those devices.

Multi-Tech Sprint Approved Device Requirements

Any changes to a Sprint approved Multi-Tech device circuit board or antenna system requires you to contact Sprint certifications. Sprint will determine if additional testing is required due to modification of the approved device circuit board or antenna system.

All applications interacting with Sprint approved Multi-Tech devices must be written in a manner where they do not interfere/ interrupt the Sprint HFA process or OMA-DM processes outlined in section labeled Telit OMA DM Notifications.

If the Multi-Tech device will be co-located with any other transmitters you will be required to submit your device to an FCC approved lab for additional FCC testing.

If the Sprint approved Multi-Tech device/circuit board is embedded into another device/circuit board be aware you will be required to perform EMC and safety testing on your end device.

Telit OMA DM Notifications

Applications should look for the following unsolicited OMA indications at all times:

#904	HFA Started
#905	PRL - Session started
#906	DC - Session started
#907	FUMO -Session started

If application sees one of these indications it should not attempt to issue commands, attempt data connection, or reset device until the OMA process is complete as indicated by additional #9XX OMA success or failure indications below.

If the device is in a data connection when a Network Initiated PRL, DC, or FUMO update alert message is received from Sprint the radio will wait for a point where data is not being transmitted, then "gracefully" close the data connection, and then start OMA-DM process with #9xx indication. When this occurs the application should not

attempt to issue AT commands, attempt to start data connection again, or reset device in an attempt to regain control. Application should wait for a #9xx indication the process has completed before proceeding.

Be aware after the HFA process is successfully completed the radio will be reset. The radio may also reset after other OMA functions.

#9XX OMA Unsolicited Indications

#900   DM Client Ready

Hands Free Activation HFA Notifications

#901   HFA Attempt #

#902   HFA Countdown Timer (seconds)

#904   HFA Started

#911   HFA Error - credential error

#912   HFA Error - unreachable server

#913   HFA Error - network error

#914   HFA Done - HFA success

#922   HFA Done - No profile received

#923   HFA Error – ETC

#924   HFA Cancelled

#DREL   Data session release

Network Initiated Device Configuration (NIDC) or Client Initiated Device Configuration (CIDC)

#906   DC - Session started

#911   DC - Error - credential error

#912   DC - Error - unreachable server

#913   DC - Error - network error

#915   DC - Error - update fails for other reasons

#918   DC - Done - success

#924   DC - Cancelled - no profile received

#DREL   Data session release

Network Initiated or Client Initiated Preferred Roaming List (NIPRL or CIPRL) Download

#905   PRL - Session started

#909   PRL - Done - PRL success

#910   PRL - Done - No PRL update

#911   PRL - Error - credential error

#912   PRL - Error - unreachable server

#913	PRL - Error - network error
#915	PRL - Error - update failed for other reasons
#DREL	Data session release

Network Initiated (NI) or Client Initiated (CI) Firmware Update Management Object (FUMO) Notifications

#907	FUMO - Firmware DM session started or started again until no more updates are available
#911	FUMO - credential error
#912	FUMO - unreachable server
#913	FUMO - network error
#915	FUMO – update fails with other reasons
#916	FUMO - Firmware done, no firmware update
#919	FUMO - Firmware downloaded successfully
#920	FUMO - Firmware download progress (percent)
#921	FUMO - Firmware download start
#921	FUMO - Firmware size get from the OMA-DM server (byte)
#929: 200	FUMO - Firmware Update Success
#929: 402	FUMO - Firmware corrupted , CRC error
#929: 403	FUMO - Firmware package mismatch
#929: 404	FUMO - Firmware signature failed
#929: 406	FUMO - Firmware update authentication failed
#929: 410	FUMO - Firmware update General Error #930 FUMO - Firmware Reporting Firmware Update result to server
#DREL	Data session release

Additional Network Initiated Alert Indications (NIA Retry)

#926	NIA - NIA retry start
#927	NIA - Notification done with no NIFA information
#928	NIA - NIA digest mismatch error

OMA-DM Commands

These commands are available after the unsolicited indication #900 appears, which means DM client is ready.

AT#OMADMSVADDR=<URL>	Set OMA-DM server address (default https://oma.ssprov.sprint.com/oma)
AT#OMADMSVADDR?	Read OMA-DM server address
AT#OMADMSVPORT=<port#>	Set OMA-DM server (default 443)
AT#OMADMSVPORT?	Read OMA-DM server

AT#OMADMPROXY=<port#>,<URL>	Set OMA-DM proxy server port/URL (default http://oma.ssprov.sprint.com:80)
AT#OMADLPROXY=<port#>,<URL>	Set OMA-DL Proxy DL Server Port URL (default http://oma.ssprov.sprint.com:80)
AT+OMADMCEN=<onoff>	Set OMA-DM Client feature Disable=0, Enable=1
AT#OMADMCEN?	Query the current OMA-DM client status
AT+OMADMCEN=?	Query OMA-DM available values
AT+OMADM=(onoff)	Set OMA-DM Client Initiated Device Configuration
	Disable=0, Enable=1, Initiate=2
	(Many OMA commands will result in error if OMADMCEN=0 is set)
AT+OMADM=?	Query OMA-DM Client Initiated Device setting
AT+PRL=<onoff>	Set OMA-DM CIPRL Session
	Disable=0, Enable=1, Initiate=2
AT+PRL=?	Query OMA-DM CIPRL Session setting
AT+FUMO=	Set OMA-DM FUMO enable parameter
	Disable=0, Enable=1, Initiate=2
AT+FUMO=?	Query OMA-DM FUMO parameter
AT#HFA	Initiate Sprint Hands Free Activation (HFA)
AT#HFACANCEL	Cancel Sprint Hands Free Activation (HFA) DM Session
AT#SPRTN=xxxxxx	HFA Reset (after device reboot HFA will occur) xxxxxx= SPC or MSL (currently last 6 digits MEID)
AT#DCCANCEL	Cancel Device Configuration (DC) Session
AT#PRLCANCEL	Cancel Preferred Roaming List (PRL) Session
AT$PRL?	Query Preferred Roaming List (PRL) ID #
AT#FUMOCANCEL	Cancel Firmware Update Management Object (FUMO) session.

Using Linux

Shell Commands

Testing Serial Ports

To test the serial ports created by the driver, type in a shell:

```
# cat /dev/ttyACM0 &
# echo –en "ATE0\r" > /dev/ttyACM03
# echo –en "AT\r" > /dev/ttyACM0

cat /dev/ttyUSBx &
# echo –en "ATE0\r" > /dev/ttyUSBx
# echo –en "AT\r" > /dev/ttyUSBx
```

> **Note:** Sending ATE0 is required, to avoid issues in the terminal output. It prevents the sending/receiving spurious characters to/from the modem when used with the Linux commands "echo" and "cat"

You can perform the same test using the other interface (ttyACM1 ttyACM3).

Create a PPP Connection

Most recent Linux distributions have GUI tools for creating PPP connections; the following instructions are for creating a PPP connection through command line interface.

PPP support must be compiled into the kernel; pppd and chat programs are also required.

pppd needs two scripts: the first script performs the environment setting and calls the second script, which is used by the chat program. For creating a PPP connection type:

```
# pppd file /etc/pppd_script &
```

Example

```
# Debug info from pppd
debug
#kdebug 4
# Most phones don't reply to LCP echos
lcp-echo-failure 3
lcp-echo-interval 3
# Keep pppd attached to the terminal
# Comment this to get daemon mode pppd
nodetach
# The chat script (be sure to edit that file, too!)
connect "/usr/sbin/chat -v -
f /etc/chatscripts/hsdpa_connect/etc/chatscripts/gprs_connect/etc/chatscripts/evdo_connect"
# Serial Device to which the modem is connected
/dev/ttyACMttyUSBttyACM
# Serial port line speed
115200
dump
```

```
# The phone is not required to authenticate
#noauth
user <insert here the correct username for authentication>
name <insert here the name of the connection>
password <insert here the correct password for authentication>
# If you want to use the HSDPAGPRSEV-DO link as your gateway
defaultroute
# pppd must not propose any IP address to the peer
#noipdefault
ipcp-accept-local
ipcp-accept-remote
# Keep modem up even if connection fails
#persist
# Hardware flow control
crtscts
# Ask the peer for up to 2 DNS server addresses
usepeerdns
# No ppp compression
novj
nobsdcomp
novjccomp
nopcomp
noaccomp
# For sanity, keep a lock on the serial line
lock
# Show password in debug messages
show-password
```

This script calls the option *connect* using the script *hsdpa_connectevdo_connectgprs_connect*, for example:

```
#!/bin/sh
# Connection to the network
'' AT+CGDCONT=1,"IP","<insert here the correct APN provided by
your network operator>"# Connection to the network
'' AT+CGDCONT=1,"IP","<insert here the correct APN provided by
your network operator>"
# Dial the number.
OK ATD*99***1#ATD*99***1#ATD#777
# The modem is waiting for the following answer
CONNECT ''
```

After launching a PPP connection is possible to use ftp protocol or other utilities that allow the access to the Internet.

Basic Operations

Interacting with Your Device Overview

This section describes how to use AT commands to interact with your device. Using terminal software such as Kermit, you can issue AT commands to communicate with and configure your modem. The AT commands let you establish, read and modify device parameters and help you control how the device operates. This section documents basic interactions with your device, such as verifying signal strength and network registrations, sending and reading SMS text messages, and sending and receiving data.

Generally, USB modems are used as unintelligent bit pipes. In Windows, this means you create a dial-up network connection that uses the Windows IP stack to use the modem to create a PPP connection to the cellular network. The modem is assigned an IP address from the cellular carrier. This connection provides Internet access and is the basis for TCP/IP communication for sending and receiving email, creating TCP/UDP Sockets, or putting and getting files from an FTP server.

In Linux, PPPD is used to dial the modem and create the connection to the cellular TCP/IP network. This provides Internet access for sending and receiving email, creating TCP/UDP Sockets, or putting and getting files from an FTP server.

Related Documentation

Related documentation for using HSPA+ H5 devices:

- HSPA-H5 AT Commands Reference Guide (S000528) provides for additional information on AT commands available for your device. The Introduction chapter describes command formatting, syntax, and other basic information.
- Configuring Devices: Using AT RUN, Setting up Digital Voice Interface, and Configuring Ports Reference Guide (S000552).

Related documentation for using EV-DO EV3 devices:

- EV-DO EV3 AT Commands Reference Guide (S000546) provides for additional information on AT commands available for your device. The Introduction chapter describes command formatting, syntax, and other basic information.

Before You Begin

Before you begin:

- If you have not done so, install any drivers. Refer to the separate driver installation guide for your device.
- Power up your device and ensure it is connected to the computer that you use to issue AT commands.
- Install terminal software that can communicate with the device, such as HyperTerminal, TerraTerm, Kermit, or Putty.

Preparing the Modem for a Data Connection

Set the APN by issuing the following command where <APN Name> is the APN assigned by the carrier.

- **AT+CGDCONT=1,"IP","<APN Name>**

Check for registration by issuing **AT+CREG?<cr>** and wait for the response. If the second value of the response (for example, +CREG:x,y) is 1, then the modem is registered on the home network. If y=5, then the modem is registered but roaming. See the AT Command reference guide for other possible responses. If the second value is not 1 or 5, then do not attempt to dial. Wait ~5 seconds for the modem to finish registration and check +CREG again.

Using the Radio IP Stack to Make a Data Connection

Connect by issuing the command: **AT#SGACT=1,1** (using PDP context #1).

Using the Host System IP Stack to Make a Data Connection

This device only supports packet data connections, such as dial-up networking. To make a data connection, you must use a PPP dialer. If your carrier requires a username and password for the Internet connection, be sure to enter that information into the PPP dialer. Dial up using **ATD*99***1#** (using PDP context #1).

Disconnect a Data Connection Using an Internal IP Stack

Issue the following command to disconnect: **AT#SGACT=1,0**

How to Disconnect a Data Connection Using Host IP Stack

Issue the following command to disconnect: **AT#SGACT-1,0**.

Using Command Mode and Online Data Mode

Modems have two operation modes, command and online data. When you power up the modem it is in command mode and ready to accept AT commands.

Use AT commands to communicate with and configure your modem. They allow you to establish, read, and modify device parameters and control how the modem works. The device can also generate responses to AT commands that help determine the modem's current state.

If the modem is in online data mode, it only accepts the Escape command (+++).

To send the modem AT Commands from terminal emulation software, set the software to match the modem's default data format, which is:

- Speed: 115,200 bps
- Data bits: 8
- Parity: none
- Stop bit: 1
- Flow control: hardware

To confirm you are communicating with the device:

- Type **AT** and press **Enter**.

If the device responds with OK, you are communicating with the device.

Verifying Signal Strength

To verify the device signal strength, enter:

AT+CSQ

The command indicates signal quality, in the form:

+CSQ: <rssi>,<ber>

Where:

<rssi>	Received signal strength indication.
0	(-113) dBm or less
1	(-111) dBm
2-30	(-109) dBm - (-53) dBm / 2 dBm per step
31	(-51) dBm or greater
99	Not known or not detectable
<ber>	Bit error rate, in percent
0	Less than 0.2%
1	0.2% to 0.4%
2	0.4% to 0.8%
3	0.8% to 1.6%
4	1.6% to 3.2%
5	3.2% to 6.4%
6	6.4% to 12.8%
7	More than 12.8%
99	Not known or not detectable

Note: Signal strength of 10 or higher is needed for successful packet data sessions.

Example

A example response to AT+CSQ:

+CSQ: 15,1

Checking Network Registration

Before establishing a packet data connection, verify the is device registered on the network. To do this enter the network registration report read command:

AT+CREG?

If the device returns:

+CREG: 0,1

The device is registered.

If the device returns:

+CREG: 0,2

The device is in a network searching state.

Verify that Device Detects a Valid SIM Card

If your device uses a SIM card, use the query SIM status command to verify if the device detects the SIM card. To do this, enter:

AT#QSS?

If the device detects that SIM card, it responds with one of the following:

Response	Description
#QSS: 2, 1	SIM inserted
#QSS: 2, 2	SIM inserted and PIN unlocked.
#QSS: 2, 3	SIM inserted and ready.

If your device does not reply with one of those responses, verify that the SIM card is properly inserted.

When your device fails to connect

Work through the steps below until your device connects.

1. Wait 30 seconds and try again.
2. Wait 1 minute and try again.
3. Wait 2 minutes and try again.
4. Wait 8 minutes and try again.
5. Make one attempt every 15 minutes for an hour.
6. Make one attempt every 90 minutes.

When a call drops

If a connected call drops for any reason:

■ Wait 30 seconds and restart the sequence again.

Reading, Writing, and Deleting Messages

Reading Text Messages

To read a text message in text mode:

1. **Put the device in text mode.**
   Enter: AT+CMGF=1
2. **Read message.**
   Enter: AT+CMGR=1

Example response:

+CMGR: "REC UNREAD","+16155554562z`z","","13/09/05,13:39:40-20"
How are you?
OK

Sending Text Messages

To send a text message in text mode:

1. **Put the device in text mode.**
   Enter:
   AT+CMGF=1
   The device responds.
   OK
2. **Enter the recipient's number and your message.**
   Enter:
   AT+CMGS="##########"
    >Your message here
   where ########## is the recipient's number.
3. **Send the message.**
   Enter CTRL+Z.
   The device responds:
   +CMGS: 255
   OK

For example:

AT+CMGF=1
OK
AT+CMGS="6155554563"
> How are you?   <CTRL+Z to send>
+CMGS: 255
OK

Deleting Messages

To delete one text message, enter:

AT+CMGD=I,#

where I is the index in the select storage and # is the delflag option. Enter:

0	Deletes message in the specified index.
1	Deletes all read messages. Leaves unread messages and stored device-originated messages.
2	Deletes all read and sent device-originated messages. Leaves unread messages and unsent device-originated messages.
3	Deletes all read messages and sent and unsent device-orginated messages. Leaves unread messages.
4	Deletes all messages.

For example:

```
AT+CMGD=1 (delete message at index 1)
AT+CMGD=2 (delete message at index 2 )
AT+CMGD=1,0
AT+CMGD=1,1
AT+CMGD=1,2
AT+CMGD=1,3
AT+CMGD=1,4
```

Carrier Information

For Verizon customers:

1. Send **ATD*22899;<cr>**
2. Wait of response **OK**
3. Wait for response **#OTASP:0**
4. Wait for response **#OTASP:1**
5. Wait for response **#OTASP:2**
6. Modem will reset when done with the activation.
7. Close terminal program.
8. Unplug and replug the USB cable.
9. Check registry with **AT_REG?**

Check the Multi-Tech website for the latest activation information.

Regulatory Statements

47 CFR Part 15 Regulation Class B Devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada Class B Notice

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Reglement Canadien sur le matériel brouilleur.

This device complies with Industry Canada RSS Appliance radio exempt from licensing. The operation is permitted for the following two conditions:

1. the device may not cause harmful interference, and
2. the user of the device must accept any interference suffered, even if the interference is likely to jeopardize the operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

EMC, Safety, and R&TTE Directive Compliance

The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility;
and
Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits;
and
Council Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment;
and
Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national regulatory requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

Other Countries

The above country-specific information does not cover all countries with specific regulations; they are included to show you how each country may differ. If you have trouble determining your own country's requirements, check with MultiTech's Technical Support for assistance.

Environmental Notices

Waste Electrical and Electronic Equipment Statement

Note: This statement may be used in documentation for your final product applications.

WEEE Directive

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all MultiTech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.

July, 2005

Restriction of the Use of Hazardous Substances (RoHS)

Multi-Tech Systems, Inc.

Certificate of Compliance

2011/65/EU

Multi-Tech Systems, Inc. confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2011/65/EU of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS).

These MultiTech products do not contain the following banned chemicals[1]:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 1000 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Cadmium, [Cd] < 100 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ether, [PBDE] < 1000 PPM

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1
- Maximum Soldering temperature = 260C (in SMT reflow oven)

[1]Lead usage in some components is exempted by the following RoHS annex, therefore higher lead concentration would be found in some modules (>1000 PPM);

- Resistors containing lead in a glass or ceramic matrix compound.

REACH Statement

Registration of Substances

After careful review of the legislation and specifically the definition of an "article" as defined in EC Regulation 1907/2006, Title II, Chapter 1, Article 7.1(a)(b), it is our current view Multi-Tech Systems, Inc. products would be considered as "articles". In light of the definition in § 7.1(b) which requires registration of an article only if it contains a regulated substance that "is intended to be released under normal or reasonably foreseeable conditions of use," Our analysis is that Multi-Tech Systems, Inc. products constitute nonregisterable articles for their intended and anticipated use.

Substances of Very High Concern (SVHC)

Per the candidate list of Substances of Very High Concern (SVHC) published October 28, 2008 we have reviewed these substances and certify the Multi-Tech Systems, Inc. products are compliant per the EU "REACH" requirements of less than 0.1% (w/w) for each substance. If new SVHC candidates are published by the European Chemicals Agency, and relevant substances have been confirmed, that exceeds greater than 0.1% (w/w), Multi-Tech Systems, Inc. will provide updated compliance status.

Multi-Tech Systems, Inc. also declares it has been duly diligent in ensuring that the products supplied are compliant through a formalized process which includes collection and validation of materials declarations and selective materials analysis where appropriate. This data is controlled as part of a formal quality system and will be made available upon request.

Information on HS/TS Substances According to Chinese Standards

In accordance with China's Administrative Measures on the Control of Pollution Caused by Electronic Information Products (EIP) # 39, also known as China RoHS, the following information is provided regarding the names and concentration levels of Toxic Substances (TS) or Hazardous Substances (HS) which may be contained in Multi-Tech Systems Inc. products relative to the EIP standards set by China's Ministry of Information Industry (MII).

Hazardous/Toxic Substance/Elements

Name of the Component	Lead (PB)	Mercury (Hg)	Cadmium (CD)	Hexavalent Chromium (CR6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Printed Circuit Boards	O	O	O	O	O	O
Resistors	X	O	O	O	O	O
Capacitors	X	O	O	O	O	O
Ferrite Beads	O	O	O	O	O	O
Relays/Opticals	O	O	O	O	O	O
ICs	O	O	O	O	O	O
Diodes/ Transistors	O	O	O	O	O	O
Oscillators and Crystals	X	O	O	O	O	O
Regulator	O	O	O	O	O	O
Voltage Sensor	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Speaker	O	O	O	O	O	O
Connectors	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
Screws, Nuts, and other Hardware	X	O	O	O	O	O
AC-DC Power Supplies	O	O	O	O	O	O
Software /Documentation CDs	O	O	O	O	O	O
Booklets and Paperwork	O	O	O	O	O	O
Chassis	O	O	O	O	O	O

X Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.
O Represents that no such substances are used or that the concentration is within the aforementioned limits.

Information on HS/TS Substances According to Chinese Standards (in Chinese)

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP) 标准－中华人民共和国《电子信息产品污染控制管理办法》（第 39 号），也称作中国 RoHS, 下表列出了 Multi-Tech Systems, Inc. 产品中可能含有的有毒物质 (TS) 或有害物质 (HS) 的名称及含量水平方面的信息。

有害/有毒物质/元素

成分名称	铅 (PB)	汞 (Hg)	镉 (CD)	六价铬 (CR6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板	O	O	O	O	O	O
电阻器	X	O	O	O	O	O
电容器	X	O	O	O	O	O
铁氧体磁环	O	O	O	O	O	O
继电器/光学部件	O	O	O	O	O	O
ICs	O	O	O	O	O	O
二极管/晶体管	O	O	O	O	O	O
振荡器和晶振	X	O	O	O	O	O
调节器	O	O	O	O	O	O
电压传感器	O	O	O	O	O	O
变压器	O	O	O	O	O	O
扬声器	O	O	O	O	O	O
连接器	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
螺丝、螺母以及其它五金件	X	O	O	O	O	O
交流–直流电源	O	O	O	O	O	O
软件/文档 CD	O	O	O	O	O	O
手册和纸页	O	O	O	O	O	O
底盘	O	O	O	O	O	O

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求。
O 表示不含该物质或者该物质的含量水平在上述限量要求之内。

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